Household Finances, Well-Being and Subjective Financial Situation: An Empirical Analysis of Household Survey Data

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Abstract

This thesis aims to contribute to the existing literature relating to household finances and well-being by considering three related, yet distinct, topics. Recently, household finances and well-being have received increasing academic attention for numerous reasons, including the recent economic downturn. This thesis aims to explore household finances, well-being and the relationship between them.

Chapter 2, the first empirical chapter, investigates the determinants of household financial portfolio allocation in the U.S. by exploring the proportion of total financial assets allocated to four distinct asset categories. The chapter employs a variety of econometric techniques to ascertain whether accounting for the proportional nature of the dependent variables influences the estimated coefficients. The analysis shows that it is important to separate decisions over holding different asset types and the proportions held.

Chapter 3 explores the relationship between the household's financial position and well-being in Britain, Australia and Germany. Building on the existing literature by employing panel data techniques, the analysis suggests that subjective financial position is an important determinant of well-being, while monetary levels of the household's financial situation have a limited direct impact on well-being.

Chapter 4 aims to ascertain the determinants of the subjective financial position and further explores the relationship between the head of household's subjective financial position and overall life satisfaction in Australia and Germany. It is found that assets and net wealth are positively related to the subjective financial position, whereas debt levels are inversely related. In addition, risk attitudes are found to be an important determinant of subjective financial position.

For Australia, once a joint modelling approach is implemented, there is no statistical relationship found between the head of household's subjective financial position and overall life satisfaction. In Germany, the subjective financial position appears to mediate the relationship between monetary financial measures and overall life satisfaction.

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Notes

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The data (and tabulations) used in this thesis were made available through the ESRC Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex (now incorporated within the Institute for Social and Economic Research). Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.

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1 Introduction

1.1 Aims and Motivation

Household finances can potentially have a dramatic impact on a variety of macroeconomic and microeconomic outcomes. At the macro level, household liquidity constraints and debt levels can have a significant impact on the level of aggregate demand in the economy. The state of household finances can also influence the effectiveness of monetary policy through household liquidity constraints and the household's ability to respond to changes in interest rates. At the micro level, the household's financial position can affect the individual's consumption levels, and in turn, influence their levels of well-being and utility. In addition, due to an aging population, the household's financial position will affect their ability to support themselves in later life.

The composition of the household's financial portfolio, including the levels of assets and debt held, in addition to the allocation of financial assets to different financial products, has received considerable attention from the media and politicians over the past three decades. This interest has arguably increased due to the current economic downturn. The UK, following significant financial reforms and deregulation since the late nineteen seventies, which aimed to reduce barriers to entry and increase competition across the banking sector, experienced a substantial consumer credit boom. This credit explosion was accompanied by a prolonged period of economic growth under the then Labour Government. The increased availability of secured and unsecured credit is, perhaps, indicated by the variety of institutions offering both secured and unsecured loans. What once was the preserve of traditional banks; loans are now available from a variety of institutions including building societies, national and international financial institutions, supermarkets and high street shops. In addition, since the "credit crunch", there has been a substantial increase in the availability of payday loans.

In the developed world, changing population demographics have placed increased pressure on Governments to support aging populations. Consequently, a series of reforms to the UK pension system have been proposed and implemented. These reforms include increasing the retirement age[1] and imposing higher pension

[1] Previously 65 years of age in the UK, individuals are now able to work beyond this age if desired. In addition, the state pension age is being increased from 65 to 67 in 2026.

contributions. In recent times, in the developed world, the support ratio, defined as the ratio of the number of people working compared to people beyond retirement age, has dramatically decreased and this trend is set to continue into the future. For example, in the U.S., the support ratio has fallen from 5.3 in 1970 to 4.6 in 2010, and is predicted to fall further still to 2.6 in 2050 (OECD, 2010). In addition, in 2008, the UK support ratio was reported to be 3.7, and this is expected to decrease to 2.4 by 2050 (OECD, 2010). As a result, a large burden is placed on Governments to provide adequate pensions and, consequently, there has been an increased emphasis placed on individuals to support themselves in their retirement.

Across the developed world, there have been significant increases in the range of financial products available to individuals and households; these products include mutual funds, stocks, shares and a variety of retirement accounts. These products have the potential to earn relatively large returns compared to alternative financial investments. As a result, this could make it possible for households to increase their wealth over long investment horizons, thus making it easier to accrue sufficient funds for retirement. However, due to the nature of these assets, the financial risk that households are exposed to is perceived to be relatively large. Conversely, as a result of the recent recession, households may be attracted to safer financial assets, such as savings accounts, to reduce the risk exposure of their personal finances. Consequently, ascertaining the determinants that influence the composition of a household's financial portfolio is of importance to both policy makers and financial advisors, in order to advise individuals, based on their personal circumstances and characteristics, to maximise their asset returns. This need is highlighted by the "the Markets in Financial Instruments Directive" (MiFiD), introduced by the European Commission on 1st November 2007, which requires financial advisors to specifically tailor their advice according to the household's risk preferences.

In general, the concepts of well-being and happiness have received considerable attention from a variety of academic disciplines, including both psychology and economics. In addition, politicians and the wider public are growing increasingly interested in the concept of well-being. Politicians are drawn to measures of well-being, to be used in conjunction with traditional measures, such as GDP, as a measure of economic progress. This culminated, in the UK, with Prime Minister David Cameron in 2010 commissioning the Office of National Statistics (ONS) to start collecting information on national well-being with a view to inform and evaluate public policy.

This view is being replicated across the world, for example, the Stiglitz Commission in France, the Australian National Development Index (ANDI) and the OECD 'Beyond GDP' initiative.

In the existing economics literature, two strands have developed, one concerned with the aggregate level of well-being in the economy and the other concerned with the determinants of well-being at the individual level. Arguably, the first person to use subjective measures of well-being in the economics literature was Easterlin (1974) who observed his famous paradox; despite increasing levels of GDP across time, the aggregate level of well-being in an economy does not appear to increase, however, within a given country, individuals with higher income report higher levels of well-being. Since this study, there has been a significant increase in the number or articles which exploit subjective measures of well-being. Dolan *et al.* (2008) provide a substantial review of the existing economics literature. The household's financial position could potentially have a significant influence on the well-being of individuals within the household, which may be either positive or negative, depending upon the financial position of the household.

The empirical analysis presented in this thesis aims to contribute to the existing literature in several ways. The first empirical chapter aims to explore the determinants of the household's financial portfolio allocation using a variety of econometric techniques. The second empirical chapter explores the relationship between well-being and the household's financial situation in a longitudinal framework making it possible to control for individual heterogeneity. The analysis accounts for a variety of monetary financial measures and, also, includes the head of household's subjective financial position. This is conducted across a variety of countries to see if different economies yield different results. The final empirical chapter further explores the relationship between subjective financial position and overall life satisfaction in Australia and Germany. Initially the chapter explores the determinants of the head of household's subjective financial position. The chapter then jointly models the subjective financial position and overall life satisfaction in order to account for the potential endogeneity of the subjective financial position in the overall life satisfaction model.

1.2 Structure and Content of the Thesis

Chapters 2, 3 and 4 present the empirical analysis of this thesis. These chapters explore three distinct topics relating to household finances and well-being. Each empirical

chapter is a standalone self-contained study. Finally, Chapter 5 provides a conclusion to the whole thesis. A brief summary of each of the empirical chapters is given below.

1.2.1 Chapter 2

The empirical analysis presented in Chapter 2 explores the determinants of household portfolio allocation in the U.S. Analysing the 1989 to 2007 waves of the Survey of Consumer Finances (SCF), the chapter aims to develop the existing literature by applying three econometric methodologies which have previously not been employed in this context. The analysis serves to ascertain whether the results obtained in the existing literature are robust to different econometric specifications. In accordance with Rosen and Wu (2004), the household's financial assets are separated into four specific categories; safe, risky, retirement and bonds. The proportion of total household financial assets held within each of these categories form the dependent variables analysed within the chapter. Consequently, the dependent variables are defined on the [0, 1] interval and so techniques which accurately capture the properties of the dependent variables are required. In the existing literature, the most common econometric technique employed is a double censored tobit model, censored at zero and one, however, this approach is arguably inappropriate as the dependent variable is not censored, but rather defined on the unit interval. This chapter uses a variety of econometric methodologies to assess whether the model employed affects the estimated parameter coefficients. Initially, a tobit model is used and serves as a benchmark for the other models to be compared against, and to verify the results obtained in the existing literature. A fractional logit model is then employed in order to account for the proportional nature of the dependent variables. The analysis goes on to use a zero-inflated beta model in order to account for the proportional nature of the dependent variable, in addition, to separating the decision to hold and the decision about the proportion of total financial wealth held in each asset category. Finally, a multivariate tobit model is employed in order to account for the potential interrelationships between holding different asset categories.

The results indicate that significant differences arise between the single equation models, the tobit model and the fractional logit model, and the two-part model, the zero-inflated beta model. The results from the fractional logit model accord with those obtained from the tobit model and those presented in the existing literature. This suggests that the functional form of the model employed does not have a dramatic impact on the factors which influence the share of total financial wealth held within

each asset category. In contrast, the zero-inflated beta model yields different results compared to the alternative models and the existing literature. Many factors, including race, gender and education, are found to influence the likelihood of holding particular assets, however, conditional on holding the asset, do not influence the level of the asset held. These differences are attributed the separation of the decision to hold each type of asset and the level of each asset type held. Consequently, it is argued that it is important to account for the decision to hold certain asset categories, in addition to the proportion of each asset held.

The multivariate tobit model accounts for the potential interdependence between holding different asset categories. This is investigated by jointly modelling the level of risky assets, retirement funds and bonds. The analysis reveals that there exist unobservable characteristics which influence the proportion of each asset category held, suggesting an interdependence between asset categories. It is found that holding a larger proportion of risky assets is associated with holding a higher proportion of retirement funds and a lower proportion of bonds. Also, holding a higher proportion of retirement funds is associated with holding a lower level of bonds in the household's financial portfolio. This potentially suggests that individuals view some asset classifications as being complements to each other whilst, or types of assets are substitutes.

1.2.2 Chapter 3

The second empirical chapter explores the relationship between the household's financial position and the head of household's well-being. The analysis presented considers both overall life satisfaction and psychological well-being, whilst the household's financial measures capture the level of assets, debt and net wealth. In addition, the head of household's subjective financial position is also included in the analysis. The chapter explores these relationships in Britain, Australia and Germany, in order to provide cross-country comparisons.

Following Ferrer-i-Carbonell and Frijters (2004), who assert the importance of accounting for individual heterogeneity when analysing subjective well-being measures, fixed effects ordered logit models are employed to analyse the discrete ordinal dependent variables, whilst fixed effects linear models are used where appropriate. The analysis presented in this chapter contributes to the existing literature in several ways. Initially, the chapter provides longitudinal analysis of the relationship between well-

being and the household's financial position in Australia. This relationship has only previously been explored using cross-sectional techniques; see, for example, Headey and Wooden (2004) and Headey *et al.* (2008). In addition, in line with Brown *et al.* (2005), the household's net wealth is separated into total assets and total debt, and total debt further into secured and unsecured debt. Finally, the analysis presented includes the head of household's subjective financial position, which has not previously been included in conjunction with the household's monetary financial position.

The results reveal that, for Britain and Australia, the monetary levels of the household's assets, debt and net wealth have a limited direct impact on the head of household's well-being once individual heterogeneity is accounted for. What is found, however, is that the subjective financial position is a statistically significant determinant of both overall life satisfaction and psychological well-being. The analysis for Germany indicates that the monetary variables have a statistically significant impact on overall life satisfaction and psychological well-being. That is, the level of assets and net wealth are positively related to both well-being measures, whilst total debt is inversely related. Also, the results support the analysis presented in Brown *et al.* (2005), where it is found that unsecured debt, opposed to secured debt, has a detrimental impact on psychological well-being. In accordance with the Australian and British analyses, the results for Germany indicate that the subjective financial position maintains a statistically significant relationship with both well-being measures. The subjective financial position is argued to capture information beyond that contained in the household's monetary financial position. The subjective financial position potentially captures the relative financial position of the household or alternatively it could capture the control the individual feels they possess over their current financial situation. Therefore, it is arguably possible to increase an individual's level of well-being by increasing their subjective financial position, not necessarily, increasing the level of assets, or reducing the level of debt held by the household. This could potentially be done by improving levels of financial knowledge, which could be obtained by improving education on financial matters.

1.2.3 Chapter 4

The final empirical chapter further explores the relationship between overall life satisfaction and the head of household's subjective financial position in both Australia and Germany. The analysis presented develops that presented in the previous chapter and in the existing literature in several ways. Initially, the determinants of the head of

household's subjective financial position are explored; where the household's monetary financial position is considered, as well as exploring the role of the head of household's risk attitudes. In the existing literature, a small number of studies explore the determinants of financial satisfaction within a longitudinal framework, for example, Plagnol (2011) and Headey *et al.* (2008), whilst also controlling for the household's asset and debt levels. Following Joo and Grable (2004), the head of household's risk attitudes are also included in the analysis to determine whether they result in different levels of subjective financial position. It is argued that an individual's risk attitudes capture their level of financial knowledge, which could potentially influence their subjective financial position. The chapter goes on to jointly model the head of household's subjective financial position and overall life satisfaction in order to account for the potential endogeneity of subjective financial position in the overall life satisfaction model. This is conducted using a bivariate ordered probit model with Mundlak fixed effects. The joint modelling approach also makes it possible to explore whether the subjective financial position mediates the relationship between the household's monetary financial position and the head of household's overall life satisfaction.

Focusing on the univariate models, for Australia, the level of household assets and net wealth are positively related to the head of household's subjective financial position. In line with prior expectations, total debt is inversely related to the subjective financial position. In addition, the household's levels of secured and unsecured debt are inversely related to the head of household's subjective financial position. The analysis for Germany indicates that the level of concern relating to their economic situation is increasing with the level of household debt, whilst the level of household assets does not exert a statistically significant impact on the subjective financial position. The head of household's risk attitudes are found to be an important determinant of subjective financial position in both Australia and Germany, with risk tolerant household heads, on average, reporting higher levels of subjective financial position and lower levels of financial concerns, respectively.

The results indicate that a bivariate approach is preferred to a series of univariate models for both Australia and Germany, as a statistical relationship is found between the unobservable characteristics of the subjective financial position equation and the overall life satisfaction equation. This suggests that the results presented in Chapter 3 are potentially biased due to endogeneity.

For Australia, it is found that, once the joint modelling approach is implemented, the relationship between subjective financial position and overall life satisfaction disappears. This suggests that the relationship observed in the previous chapter was driven by the endogeneity of subjective financial position. The joint modelling analysis for Germany, however, reveals that the subjective financial position maintains a statistically significant relationship with overall life satisfaction in accordance with the analysis presented in Chapter 3. Furthermore, the analysis indicates that the household's monetary financial position does not directly influence the head of household's overall life satisfaction; it is however mediated through the head of household's subjective financial position. This relationship is also observed for unemployment and household income, where they fail to have a direct impact on overall life satisfaction, but are found to be statistically significant determinants of subjective financial position.

2 The Determinants of Financial Asset Holding: Analysis of U.S. Household Level Data

2.1 Introduction

The composition of financial portfolios at the household level has been of interest to economists over the past four decades. Early contributions include Hamburger (1968) and Uhler and Cragg (1971), who explore household demand for financial assets and analyse diversification of the household financial portfolio, respectively. Since these seminal papers, there has been a large amount of attention focused upon household portfolios. There is a large literature exploring financial portfolio allocation at the household level and the majority of these studies aim to ascertain how certain household characteristics influence the composition of a household's financial portfolio. For example, Bertaut and Starr-McCluer (2002) investigate the composition of household assets and liabilities in the U.S. and King and Leape (1998) investigate the relationship between wealth and the household's portfolio. Numerous studies explore the determinants of holding stocks and shares within the household's portfolio, for example, Shum and Faig (2006) and Bertaut (1998), and a large number are concerned with analysing the level of diversification of the household's financial portfolio see, for example, Barasinska *et al.* (2008) and Kelly (1995). There are a growing number of studies that examine the impact that health status exerts on the portfolio composition, for example, Rosen and Wu (2004), Edwards (2008), Fan and Zhao (2009) and Bogan and Fertig (2013). There has also been a long interest in the literature in the influence of taxation levels on the household's financial portfolio, with examples including, Poterba and Samwick (2002), Scholz (1994) and Hubbard (1985). In these studies age, gender, education and ethnicity all play a statistically significant role in the composition of the household financial portfolio. In addition, the health status, the level of risk aversion and the planning horizons of the household all have a statistically significant impact upon financial portfolio composition.

The econometric analysis applied in many of these studies is arguably limited due to the nature of the dependent variables. For this reason, it is important to explore the robustness of the findings of the existing studies by employing econometric methodologies that have not been previously used in this area. The vast majority of studies exploit a discrete choice model to ascertain the determinants of holding certain types of assets and a tobit or linear regression model to analyse the factors that

determine the proportion of each asset held. The use of a tobit model for analysing a proportional dependent variable has been heavily criticised (Maddala, 1991). This is because the dependent variable is defined on the interval of zero and one rather than observationally censored at these points. The tobit model also assumes a linear relationship between the dependent and independent variables; however, due to the proportional nature of the dependent variable, a non-linear relationship is implied. Another potential problem with the existing literature is that the potential correlation between holding different asset categories is not accounted for, as only univariate models are employed. For this reason a multivariate analysis may be more appropriate.

The empirical analysis implemented in this chapter adds to the existing literature on the composition of household financial portfolios by exploiting three econometric methodologies which have not been previously applied in this context. These are namely the zero-inflated beta regression model, the fractional logit model and the multivariate tobit model. These models provide several advantages to the methodologies that have been previously employed in the literature. Both the fractional logit model and the zero-inflated beta model are suited to modelling proportional dependent variables as they do not assume the data is observationally limited between zero and one and they do not assume normality of the error terms as in the tobit model. The multivariate tobit model is then employed to account for the potential correlation between the dependent variables and will potentially provide more efficient estimations. The findings of these models are compared to the results of a double censored tobit model and will serve as a robustness check to the results in the existing literature.

This chapter analyses the U.S. Survey of Consumer Finances (SCF) between the years of 1989 and 2007 which contains a wide variety of information on both the participants' demographic and socio-economic characteristics as well as detailed information on both the types and quantities of financial assets held. The assets held by the household are separated into four distinct asset categories based on their risk exposure, and then the proportion of each asset category held within the household portfolio held is calculated. These classifications are namely risky assets, bonds, retirement funds and safe assets. This is the same asset classification strategy employed initially by Rosen and Wu (2004) and, subsequently, by Berkowitz and Qiu (2006), Fan and Zhao (2009) and Bogan and Fertig (2013).

In the univariate models several contradictions arise with respect to the empirical findings. In both the tobit model and the fractional logit model, being female and being black or Hispanic are inversely related to the proportion of risky assets held within the household's financial portfolio. When the level of education of the head of household is higher, the tobit model and the fractional logit model suggest that a higher proportion of risky assets will be held, whilst being in better health is associated with holding higher proportions of risky assets and lower proportions of safe assets. In contrast, the results from the zero-inflated beta model indicate that the gender, race, education and self-assessed health are statistically insignificant determinants of the proportion of risky assets held. The results however indicate that gender, race, education level and self-assessed health status influence the decision to hold certain asset categories. Across all three univariate models, households that display a willingness to take substantial financial risks for substantial returns are associated with holding a higher proportion of risky assets and a lower proportion of safe assets. Similarly, household income and household net wealth are positively related to the proportion of risky assets held and inversely related to the proportion of safe assets held across all three models considered. These contrasting results highlight the importance of separating the decision to hold a particular asset category and the proportion of wealth held in that asset category.

In the multivariate tobit specification, the proportion of risky assets, the proportion of bonds and the proportion of retirement funds held within the household portfolio are modelled jointly. It is potentially important to allow for joint decision making across the different asset types because factors that influence the share of one asset type are likely to influence the alternative asset categories. The joint modelling of the dependent variables will provide more efficient coefficient estimates and will also allow the analysis of the variance-covariance matrix of the error terms. The results of the multivariate tobit model are consistent with the results of the univariate tobit model. When the variance-covariance matrix is considered, a positive correlation exists between the errors of risky assets held and retirement accounts. A negative correlation exists between the proportion of risky assets and bonds and between the proportion of bonds and retirement accounts held. This suggests that it is advantageous to jointly model the proportion of assets held, ahead of the univariate tobit specification.

The chapter is structured as follows: Section 2.2 reviews the previous literature and Section 2.3 discusses the data and econometric techniques employed in the chapter. Section 2.4 discusses the results and, finally, Section 2.5 concludes.

2.2 Literature Review

In this section a review of the previous studies is presented. Initially, the theoretical literature relating to household portfolio allocation will be considered. The section will then explore the empirical literature. This review will provide an insight into the data and econometric methods used in addition to the key empirical findings of the previous literature. It will also highlight any shortcomings of the previous studies and it will show how the empirical analysis presented in this chapter contributes to the existing literature.

The composition of the household's financial portfolio is determined by a variety of household characteristics. A theoretical literature establishes how portfolio decisions are characterised by factors such as risk aversion and investment opportunities. In general, the increased risk of owning risky assets is compensated by higher expected returns; however, risk averse households must determine their trade-off between an asset's risk and its expected return. In a static frame work, Tobin (1958b) and Mossin (1968) show investors select portfolios based on maximising expected utility given their level of total wealth and the risk-return patterns of available assets. The convexity of the utility function is determined by the individual's degree of risk aversion. In these models an increase in the level of absolute risk aversion causes a reduction in the demand for risky assets. Similarly, an increase in wealth is anticipated to result in an increase in the demand for risky assets under the assumption of decreasing absolute risk aversion.

More recently the literature has moved to a dynamic framework in which an investor's portfolio is selected in order to maximise expected lifetime utility. King and Leape (1998) show the importance of incomplete portfolios in portfolio selection; whilst Heaton and Lucas (1997) show that human capital uncertainty is inversely related to risky asset holding. Bodie *et al.* (1992) and Foldes (2000) also show that the substitutability of labour and asset income and uncertain time horizons are also important determinants of portfolio allocation, respectively.

The empirical literature on household portfolio choice aims to ascertain observable characteristics that explain variation in household portfolio allocation. Generally these variables include measures of the financial resources available to the household, including wealth and income, in addition to demographic characteristics. The remainder of this section explores the empirical literature relating to household finances.

The U.S. SCF is widely used in the previous literature on household finances. Due to the wealth of information contained in the U.S. SCF, it has been utilised to investigate a wide variety of topics relating to household finances. For example, Bertaut (1998) aims to ascertain the determinants that influence the stock holding behaviour of U.S. households using the 1983 and 1989 waves of the SCF. The study initially outlines the stockholding puzzle, that is, the low incidence of stock holding amongst households, and the influence information costs have on stock holding in a consumption capital asset pricing model (CCAPM). Simulations are then used to assess the impact several variables have on the probability of stock holding. The study finds that variables that capture the level of investment opportunities and market information, lower levels of risk aversion, higher expected future income, lower levels of income risk and the presence of bequest motives are positively associated with the probability of stock market participation.

Bertaut (1998) then analyses the determinants of stock holding behaviour using a bivariate probit model jointly applied to the 1983 and 1989 waves of the U.S. SCF. This approach controls for individual heterogeneity as it allows the disturbance terms from the 1983 and 1989 equations to be correlated. The authors define stockholding in 1983 to include shares of publically traded stocks and shares held within mutual funds and in 1989 to include shares of publically traded stocks and the shares of stock or combination mutual funds. The analysis indicates that higher levels of education are associated with an increased probability of holding stocks in both years. Both financial and non-financial net worth exert a statistically significant positive effect on the probability of holding stocks. Households that are willing to take above average financial risks are more likely to hold stocks and households that are not willing to take any financial risks are less likely to hold stocks. Age is found to exert a statistically significant positive effect on the probability of holding stocks. The credit constraints of the household and the labour income of the household are not found to have a statistically significant impact upon the stock holding behaviour of the household.

Bertaut (1998) goes on to consider the predicted probabilities of stock holding and finds that households with the median characteristics have a predicted probability of stock holding of 14.4% and 17.5% in 1983 and 1989, respectively. This is then compared to households at the 75^{th} percentile of the characteristics and it is found that these households are considerably more likely to hold stocks. The authors then consider the conditional probability of a household entering or leaving the stock market between

1983 and 1989. The aim is to discover how likely a non-stockholder in 1983 is to be a stockholder in 1989. Households with higher levels of education, reporting lower levels of risk aversion and with greater financial and non-financial resources are more likely to join the stock market. It is also found that there is a large likelihood that if the household is a stockholder in 1983 they will remain a stock holder in 1989 indicating that there is a large amount of persistence and inertia within the composition of household financial portfolios. The study is arguably limited, however, as it fails to take into account the proportion of the household's wealth that is invested in the stock market. It also fails to acknowledge the possible influence different assets could have on the decision to participate in the stock market. These issues are addressed by Bertaut and Starr-McCluer (2002) who again analyse the U.S. SCF.

Bertaut and Starr-McCluer (2002) investigate the composition of household portfolios in the U.S. The study uses data from both the Federal Reserve Board's Flow of Funds Accounts (FFA) between 1983 and 1998 and the 1983, 1989, 1992, 1995 and 1998 waves of U.S. SCF. The study initially investigates changes in the composition of household portfolios at the aggregate level using the FFA and then investigates changes in the composition of the household's portfolio at the household level using the U.S. SCF. At the aggregate level, residential housing is found to be the most important asset held, accounting for a 28% share of the household portfolio in 1983 and 22% in 1998. Across this period, the share of financial assets increased from 45% of total assets in 1983 to 65% in 1989. It is also reported that a greater emphasis is placed upon pension funds, corporate equity and mutual funds in the household's financial portfolio in 1998 compared to 1989. A decline in the relative importance of time and saving deposits across this period was also observed. The authors outline several important factors for the changing composition of the household portfolio. Across the period considered, there was substantial and sustained growth in stock market prices and tax-deferred retirement accounts were introduced. Both of these factors have resulted in an increase in the share of equity held within the household's financial portfolio. The household level data generally supports the trends observed at the aggregate level. It is found that the share of households owning public stock, either directly or indirectly, increased by 17.4% between the years of 1989 and 1998. The SCF also supports the findings of the FFA in terms of the role of residential housing in the household portfolio. In 1989 the primary residence accounted for 28% of the household's net worth, however, this fell to 21% in 1998.

Bertaut and Starr-McCluer (2002) go on to investigate the structure of household portfolios using econometric techniques applied to the U.S. SCF. The authors analyse the proportion of risky assets held using a tobit model and a Heckman selection model. These models are applied to a pooled data set combining the 1983, 1989, 1992, 1995 and 1998 waves of the SCF. The authors exclude all households with zero financial assets as these households arguably do not face a decision about household portfolio composition. In the tobit results, the risky asset share is found to increase with both wealth and being married, whilst, an inverse relationship between the risky asset share and household income is observed. Being self-employed is associated with a lower share of risky assets within the household's portfolio and education exerts a positive influence on the proportion of risky assets held. Having a female headed household does not exert a statistically significant impact on the proportion of risky assets held.

The Heckman selection model is used to allow for the correlation between the unobserved determinants of the decision to hold risky assets and the proportion of risky assets held. The Heckman selection model identifies the determinants that influence the household's decision to participate in holding risky assets and, then amongst these participating households, the model ascertains the determinants of the share of risky assets held. The results indicate that the probability of ownership and proportion of risky assets held increase with the level of financial assets. Income, on the other hand, increases the probability of ownership of risky assets but does not induce holding a higher share of risky assets, whilst wealth increases both the probability of holding risky assets and the proportion of risky assets held within the household's portfolio. The probability of holding risky assets increases with the level of education and is higher for female headed households compared to male headed households. Non-white headed households are less likely to own risky assets compared to white headed households but do not have a statistically significant impact on the proportion of risky assets held. Being above the age of 65 reduces both the probability of holding risky assets and the proportion of risky assets. Households who are not willing to undertake financial risk hold a lower proportion of risky assets and are less likely to hold risky assets. The year controls indicate that there has been an increasing trend in both the proportion of risky assets held and the ownership of risky assets in line with the analysis at the aggregate level.

The main contribution of Bertaut and Starr-McCluer (2002) is the application of a multivariate probit model[2]. This approach allows investigation of joint decisions of the household to hold different assets and liabilities within their portfolio. The multivariate probit model allows for correlation across the error terms which may occur due to unobserved household specific effects. The study divides assets and liabilities into stock based financial assets, safe investment assets, primary residence, business interests and consumer debt. The results indicate that age has a statistically insignificant impact upon the probability of holding stock based and safe investment assets. Net worth increases the probability of holding all four asset categories and reduces the probability of having consumer debt. Income is positively associated with the probability of holding stock based assets and the probability of home ownership whereas income exerts a statistically insignificant impact on the probability of holding safe assets and business interests. Possessing a college education increases the probability of holding stock based assets as does being in a household with a married head. It is found that there is correlation between the error terms. A positive and statistically significant correlation is found between stock based and safe investment assets and between home ownership and consumer debt. There is also a positive and statistically significant correlation at the 10% level between safe investment assets and home ownership. The paper only considers the decision of jointly holding various asset types; it does not consider the joint decision relating to the share of each asset held within the household's portfolio which is explored in Section 2.4.5 below.

In accordance with Bertaut (1998) and Bertaut and Starr-McCluer (2002), Shum and Faig (2006) investigate the determinants of the stock holding behaviour of U.S. households using the SCF. The paper initially explores the distribution of stock holding in the U.S. between 1992 and 2001 and the authors find that there has been an increasing trend in stock holding over the years considered. The sample analysed is limited to households that have sufficient funds to construct reasonable portfolios. As a result, the following sample selection criteria are imposed: households with financial net worth above $1000; positive total net worth; and positive labour income are included in the analysis. Shum and Faig (2006) use a probit model to explore the determinants of the probability that the household holds stocks. Using pooled data across the years of 1992, 1995, 1998 and 2001, a 'humped' shaped age effect on the probability of holding stocks is found. The probability of holding stocks is increasing in

[2] Bertaut and Starr-McCluer (2002) restricts the multivariate probit analysis to the 1995 SCF due to computational limitations.

financial net worth whereas the level of risk aversion is negatively associated with stock market participation. In addition, the probability of holding stocks is negatively correlated with holdings of other risky assets, such as investments in private businesses.

Shum and Faig (2006) then consider the equity shares within the household's asset portfolio. A conditional linear regression and a tobit specification are used to estimate the determinants of the equity share in the household's financial portfolio using pooled data for households that hold stocks. The tobit analysis serves as an alternative specification and reinforces the results of the conditional linear regression. Age is a significant determinant of stock holding with a concave pattern. The findings related to risk aversion are consistent with prior expectations, in that higher levels of risk aversion lead to less risky assets held. The model also includes time variables, which indicate that the level of equity holding increases over the period studied. Shum and Faig (2006) suggest that a lack of information available to the household and the transaction costs they are subjected to limit participation in the stock market. Shum and Faig (2006) employ a tobit model to analyse the proportion of stocks held within the financial portfolio. As discussed above, the approach fails to account for the joint decision making of asset holding. The econometric methodologies employed in this chapter, as discussed in Section 2.3, aim to address both of these issues.

The U.S. SCF has also been used to investigate the role housing and home ownership play in investment in stocks and risky assets with both Yamashita (2003) and Fratantoni (1998) investigating this relationship. Fratantoni (1998) examines the impact home ownership has on the household's decision to hold risky financial assets. The study uses measures of committed expenditure relating to home ownership to ascertain if home ownership induces households to hold safer financial assets. The study utilises data from the 1989 U.S. SCF and divides financial assets into two categories, risky and riskless. Risky assets include stocks, equity mutual funds, corporate and municipal bonds, saving bonds and bond funds. The risky asset share is defined to be wealth held in risky assets divided by the total financial wealth held by the household. The study also generates a stock share dependent variable that is defined as the proportion of total financial wealth held in stocks and equity funds. The study uses the logarithm of labour income and the logarithm of wealth as explanatory variables and, as a consequence, excludes any observation if either variable takes a value of zero. A measure of committed expenditure risk is also included. For households that rent, this is defined to be the ratio of annual rent to labour income and, for homeowners; this is defined as the

ratio of annual mortgage repayments to labour income. The study also controls for a wide variety of other demographic variables.

A two-stage least squares approach is taken to account for the potentially endogenous nature of the wealth variable. Age squared and the household's financial planning horizon are used as instruments, as it is argued that the discount rate is highly correlated with the wealth of the household, however, it is argued to be uncorrelated with the error term since it is an individual characteristic. The paper implements two independent variable specifications. The first specification uses the usual set of demographic and socio-economic variables. The second includes the predicted probability of home ownership based on a probit model.

When the risky asset ratio is specified as the dependent variable, wealth is positively related to the level of risky assets held. Heads of households that are male or more educated hold a higher proportion of risky assets and labour income uncertainty reduces the level of risky assets held. Similarly, home ownership is negatively related to the demand for risky assets and households with married heads hold a lower proportion of risky assets. The ratio of mortgage payments to income has a statistically significant negative impact on the level of risky asset holding. Within the renter subsample, the rent to income ratio is negatively related to the risky asset share; however, income, wealth, uncertainty and the health measures do not exert a statistically significant impact on the risky asset share. The paper then uses the stock ratio as the dependent variable and repeats the analysis. In this specification, the uncertainty variables and the liquidity constraint measures are not statistically significant determinants of the stock share. Within the home owner subsample, the mortgage to income ratio exerts a negative statistically significant influence on the ratio of stocks held and in the renter subsample; the rent to income ratio no longer exerts a statistically significant impact on the proportion of stocks held by the household.

The study by Fratantoni (1998) is arguably limited as the paper fails to take account of the proportional nature of the dependent variables used. As the dependent variables used are the risky asset share and the stock share, techniques to account for the proportional nature of the dependent variables should be employed.

In line with Fratantoni (1998), Yamashita (2003) explores the impact home ownership has on the household's financial portfolio using the 1989 U.S. SCF. The study analyses the role that the house value to net worth ratio has on the household's stock holding.

The study empirically tests the implications of the model presented in Flavin and Yamashita (2002). The main implication of the model is that the pattern of asset holding by households is induced by the ratio of the house value to net worth. This ratio is largely determined by consumption demand for housing rather than purely investment demand for housing. The inclusion of this ratio may explain how overinvestment in housing affects investment in other financial assets. The study imposes several selection criteria. For example, farm households and households whose heads are in full-time education are omitted. Also, households with a reported negative labour income, negative housing equity or negative net worth are also excluded, as are households with zero financial assets. The value of housing is the reported value of the primary residence of the household and the value of stocks includes both directly and indirectly held stocks.

The relationship between the ratio of house value to net worth and the ratio of stocks held within financial assets are analysed. The author acknowledges that there are potentially two issues that may cause biases in the regression estimates, sample selection issues and potential endogeneity of the independent variables. The sample selection issue arises due to not all households holding stocks. A two-step Heckman procedure is used, where the selection and the shares of stock equations are simultaneously estimated, in order to overcome this problem. The potential endogeneity is overcome by using a two-stage estimation process whereby the ratio of house value to net worth is estimated using OLS and then the predicted value of house value to net worth is used in the stock share model.

Several different specifications of the independent variables are implemented. Initially, the housing variables are omitted and similar results are obtained to previous studies. For example, younger households hold a smaller proportion of financial assets in stocks. Higher household income is associated with a larger proportion of stock holding, as are male headed households and college educated heads of household. Non-white headed households and those with below high school education hold a lower share of stocks, whilst households that normally pay off debt are found to hold a larger share of stocks. In contrast to Fratantoni (1998), it is found that the mortgage to income ratio is positive and statistically significant related to stock holding. These differences are attributed to the different selection criteria imposed and the different methodologies employed.

Once the housing variables are included, the effects of family size and being married become smaller and less significant statistically. Non-white headed households and households with lower than high school education are found to hold lower levels of stocks in their financial assets. The house value to net worth ratio has a statistically significant negative effect on the share of stocks held by households with mortgages, and is positive for households that do not have mortgages.

The SCF has also been used to investigate the role tax rates have on the composition of the household's financial portfolio. Poterba and Samwick (2002) consider the relationship between marginal income tax rates, sets of financial assets held and the weightings of these assets in the household portfolio using the U.S. SCF from the years of 1983, 1989, 1992, 1995 and 1998. The authors develop a new algorithm to input the marginal tax rates into the SCF. The paper divides financial assets into eight categories relating to the tax treatment of each asset[3]. The authors utilise a probit model to ascertain the probability of asset ownership and a tobit model to model the portfolio shares as a function of the marginal tax rates. They acknowledge that, due to the non-linear nature of the functional form of the models employed, the likelihood function can be improved by jointly maximising over the coefficients and the parameters of the correlation matrix. However, due to the computational problems of estimating eight way probit and tobit models, they only implement bivariate specifications across all of the eight asset classifications. They find that there are a small number of differences between these estimations and the univariate case.

The results indicate that the marginal tax rates have a significant impact on both the assets that the household holds and the share of each asset within the household portfolio. Households that are subject to a higher rate of marginal income tax tend to hold more tax advantaged and tax deferred assets. As previously noted, the use of a tobit model is arguably inappropriate to model a proportional dependent variable. Similarly, the study could be developed by using a multivariate tobit model to analyse the proportions held within each asset category.

Stock and risky asset holding at the household level has been analysed across many countries. For example, Hochguertel *et al.* (1997) analyse stock holding of households in the Netherlands, Cardak and Wilkins (2009) analyse the proportion of risky assets

[3] These asset categories are namely taxable equity held directly, taxable equity held in mutual funds, assets in tax deferred accounts, tax exempt bonds, taxable bonds, interest bearing accounts and other financial assets.

held by households in Australia and Guiso *et al.* (1996) analyse risky asset holding of households in Italy. Hochguertel *et al.* (1997) analyse the structure of household portfolios in the Netherlands exploiting the Dutch Collective Bank Study. The authors consider determinants of the total level of financial wealth and the choice between risky assets and safe assets. In the study, risky assets are defined as either stocks or bonds and the risk free assets are defined as saving accounts. The paper improves on the econometric methodology of the previous literature by allowing for zero financial wealth and assets to be held by individuals by using a threshold equation. In order to analyse the portfolio share of risky assets held, the paper specifies a budget share equation for households with positive financial wealth. From this, a target proportion is to be invested within risky assets. It is then possible to calculate the proportion invested in savings accounts. A tobit model is employed to ascertain the determinants of the proportion of risky assets held. It is found that there is a statistically significant positive association between income and financial wealth. In addition, the marginal tax rate on the income of the household increases the level of financial wealth held. Both age and education exert a positive influence on the level of financial wealth of the household.

The results of the tobit model indicate that income significantly increases the proportion of risky assets held. A higher marginal tax rate is associated with a higher proportion of risky assets held relative to safe assets as is a higher level of education. A statistically significant 'U-shaped' age pattern is found which is attributed to younger individuals being expected to face higher financial constraints and, as a result, refrain from holding risky assets. The study then goes on to perform a series of robustness checks on the model by comparing the actual and simulated averages and only small differences between the two values are found. Hochguertel *et al.* (1997) also considers the impact of changes in the marginal tax rates on the regime choice, financial wealth and the budget share of stocks and bonds. This is assessed by simulating the elasticities and these give the short run effects of changes in the tax rates. The tax rate elasticity of average financial wealth is found to be roughly 1.3 at the median marginal tax rate. The change in the amount of stocks and bonds held is found to be 3% as a result of a change in the marginal tax rates.

Cardak and Wilkins (2009) aim to ascertain the determinants of risky asset holding of households in Australia. The authors exploit data from Wave 2 (2002) of the Household, Income and Labour Dynamics in Australia (HILDA) Survey in which a wealth module was included. This wealth module contains detailed information on both

the household's financial and non-financial assets in addition to the household's liabilities. From this information, the dependent variable measuring the proportion of risky assets held within the household portfolio is constructed. The proportion of risky assets held within the household portfolio is analysed via a double censored tobit model limited between zero and one. The authors analyse the role that different factors such as background risk, liquidity and credit constraints and possible substitutes have on the proportion of risky assets held. The analysis is based on a full sample of households and two further sub-samples of employed heads households and households who's heads are retired and above the age of 55. In the full sample, age has a positive effect on the proportion of risky assets held, however it does not display a non-linear relationship. The proportion of risky assets held is found to increase with the level of education and net worth follows a concave path.

The paper includes three measures of credit and liquidity constraints: if the household cannot raise $2000; if they do not have a credit card; and if the household does not pay off all credit card debt at the end of the month. All three measures of credit constraints are associated with holding a lower proportion of risky assets within the household portfolio. Within the measures of background risk, health does not have a significant impact upon the proportion of risky assets held contradicting several other studies, see for example, Rosen and Wu (2004) and Cardak and Wilkins (2009), which find that poor health significantly reduces the proportion of risky assets held. Labour income risk has a statistically significant negative impact upon the proportion of risky assets held within the household portfolio and the ratio of mortgage repayments to income has a positive and significant impact upon risky asset holdings. Home ownership is found to increase the proportion of risky assets held which contrasts with the findings of Heaton and Lucas (2000) and Yamishita (2003). Individuals with longer planning horizons hold a higher proportion of risky assets and individuals that display a higher level of risk aversion hold a lower proportion of risky assets.

Cardak and Wilkins (2009) find that, for the employed subsample, their findings for the demographic variables are consistent with that for the full sample and that income risk has a negative effect on the proportion of risky assets held. Within the retired subsample, there is no age gradient and the health effect is statistically insignificant. Consistent with the full sample, a strong negative relationship exists between the proportion of risky assets and risk aversion, however, the planning horizon is an insignificant factor in determining the proportion of risky assets held. In accordance

with Shum and Faig (2006), Poterba and Samwick (2002) and Bertaut and Star-McCluer (2002), the use of a tobit model is arguably flawed when applied to a proportional dependent variable. In addition, in accordance with Bertaut (1998), Shum and Faig (2006) and Yamashita (2003), the study fails to take into account the alternative types of assets held.

Guiso *et al*. (1996) investigate the impact income risk and borrowing constraints have on the composition of the household's financial portfolio in Italy. The study analyses the 1989 Bank of Italy Survey of Household Income and Wealth (SHIW). The SHIW contains information on the earnings, income, wealth and demographic characteristics of 8,274 households. The study imposes a series of selection criteria; households are omitted if: they have missing values for one or more financial assets; the sum of labour and pension income is zero; the head of the household is above the age of 90; and households with missing information on the proxy for income uncertainty. Once the criteria are imposed, 4,079 households remain in the sample. The paper constructs the ratios of risky assets and safe assets to total financial wealth and these are used as the dependent variables in the analysis which are analysed via a tobit model. The study exploits the variance of expected inflation and expected income growth as a proxy for the subjective variance of real income. They also use information from the 1987 wave of the SHIW to obtain a measure of credit constraints. Households are defined as credit constrained in 1987 if they were denied or discouraged from borrowing in 1987. From this, the predicted probabilities that households are credit constrained in 1989 are derived.

The results indicate that there is a positive relationship between the proportion of risky assets held and the age of the head of household. Income and wealth exert a positive influence on the share of risky assets. Households with higher levels of education hold a higher share of risky assets within the household's financial portfolio. Households who have had more days off work due to illness and are defined to be credit constrained are found to hold a lower share of risky assets.

Guiso *et al.* (1996) then perform some sensitivity analysis. They test for the presence of heteroscedasticity in the tobit results by comparing the results to those of the Least Absolute Deviation (LAD) estimator. They find that the estimates of the LAD model are qualitatively the same as those from the tobit model; however, the estimated effects are larger than in the tobit model.

Many studies investigate the impact the health status of the household has on the household's portfolio composition. Due to the limited health status information contained in the U.S. SCF, often alternative data sources are utilised to analyse this relationship. For example, Rosen and Wu (2004) exploit data from the U.S. Health and Retirement Survey (HRS) between 1994 and 1998 to study the impact health status has on the portfolio decisions of heads of households above the age of 55. They divide the financial assets held by the households into four distinct categories; safe, risky, bonds and retirement assets. Rosen and Wu (2004) define an individual in the household to be 'healthy' if they report being in excellent, very good or good health. Alternatively, an individual is classified as "sick" if the individual reports having "fair" or "poor" health. The paper initially analyses the probability of holding these assets via a probit model. Being in 'sick' health exerts a negative and statistically significant effect on the probability of holding each financial asset. Couples, where both individuals are in poor health, are 7% less likely to hold risky assets compared to those in good health.

The paper then goes on to analyse the channels through which these health effects operate. The authors consider the influence health has on the risk attitudes of the individuals, their planning horizons, bequest motives and life insurance, all of which will potentially influence the types of assets held by households. They find, however, that none of these channels explain the strength of the observed link between health and portfolio status. They attribute this to two possible reasons. Firstly, the measures may be insufficient and may not accurately capture the true underlying characteristics. Secondly, there may be alternative channels that health status operates through, for example, the individual's permanent income. The paper then, as is standard in this literature, analyses the portfolio shares held by households via four individual univariate tobit models. The authors implement a basic specification of the model and find that being in poor health is associated with an increase in the holding of safe assets and a decrease in holding of the other three assets. Being in poor health is generally linked to holding less risky assets. Education increases the proportion of risky assets, bonds and retirement assets held and decreases the proportion of safe assets held within the financial portfolio.

Several regressions are implemented in an attempt to ascertain via which channels health affects the portfolio decisions of the household. Longer planning horizons are negatively related to the proportion of safe assets held within the household's financial portfolio. The inclusion of risk preferences, planning horizon, bequest motives and

health insurance in the basic model does not result in significant changes in the estimated coefficients on health status. The authors acknowledge that health must be operating through alternative channels to those considered. The findings suggest, therefore, that there is evidently a clear relationship between health status and household portfolio decisions; however it is not clear through which channels health affects these decisions.

In accordance with the previous studies discussed above, the empirical analysis presented in Rosen and Wu (2004) uses a tobit model to model the proportions of assets held. As mentioned above, applying the tobit model to proportional data, however, violates the assumptions of the model and is arguably inappropriate. This approach also fails to jointly model the holding of different types of assets. Another limiting factor of the study is the data used. The study utilises the HRS, which only contains information on households that are above the age of 55. A possible extension of this study would be to apply the methodology across the entire age range of the population. This would enable a comparison across different age groups within the population in order to examine whether the determinants affect individuals in different age ranges in different ways.

Berkowitz and Qiu (2006) assess the impact a change in health status has on the portfolio composition of households within the U.S. In line with Rosen and Wu (2004), Berkowitz and Qiu (2006) exploit the U.S. HRS between 1992 and 2002. They focus on whether adverse health shocks have a symmetric impact upon the amount of financial, and non-financial, assets held by the household. It would be expected that there is an asymmetric effect, dependent on the liquidity of the asset types considered. Generally, financial assets tend to be relatively liquid compared to non-financial assets. As a consequence, an adverse health shock would tend to reduce the quantity of financial assets held more than the level of non-financial assets. The paper initially uses a probit specification to analyse the probability of holding different types of assets, and then uses a random effects tobit model to model the proportion of each asset held. As predicted, changes in health status have a larger impact upon the level of financial assets compared to non-financial assets. The largest effect on the level of financial assets due to an adverse health shock is experienced by married couples. The results suggest that health status influences the household portfolio mainly through a wealth effect. The risk preferences of the household are also appear to operate in this way. As previously explained, one potential limitation of this study is the use of the HRS that only contains

information on older individuals, which may be non-representative of the population as a whole as health could affect the household portfolio in different ways depending on the stage of the individual's life cycle.

In line with Rosen and Wu (2004) and Berkowitz and Qiu (2006), Bogan and Fertig (2013) assess the relationship between portfolio choices and mental health issues using the U.S. HRS. The paper uses the same classification of assets as Rosen and Wu (2004), that is, a four way asset classification based upon the risk exposure of each asset. The analysis focuses on the proportions of safe and risky assets held. The paper exploits the HRS between the years of 2000 and 2008 and uses the Panel Survey of Income Dynamics (PSID) to perform several robustness checks. Four mental health measures are analysed, namely, whether the individual is diagnosed with emotional, nervous or psychiatric problems, a measure of depression, a measure of cognitive abilities and a measure of memory status. Initially, the authors use a logit model to examine the ownership probabilities relating to each asset category. The paper then goes on to analyse a random effects tobit model to analyse the proportion of total wealth held in safe assets. An increase in mental health issues decreases the probability of holding risky assets as well as the share of risky assets held within the household's portfolio. However, the relationship between mental health and portfolio allocation disappears once a fixed effects logit model is employed. The authors use a lagged measure of mental health in order to help reduce reverse causality and report evidence in accordance with a causal relationship between mental health issues and household portfolio choices. As previously stated, the fact the HRS is employed means that the analysis fails to account for individuals below the age of 55. Also, when the paper considers the proportion of each asset held, the use of a tobit model, as mentioned above, is arguably inappropriate due to the proportional nature of the dependent variable. Finally, the authors do not account for the possible interaction and correlation between holdings of different types of assets.

Fan and Zhao (2009) also consider the relationship between health status and the household's financial portfolio. The study aims to explore the impact of unobserved individual characteristics on the relationship between the household's health status, the total number of assets held and the proportion of risky assets held. The paper exploits data from waves 1 and 2 of the U.S. New Beneficiary Survey (NBS); which were conducted in 1982 and 1991, respectively. The authors focus on individuals who are 60 years old and older so the results are comparable to studies that use the widely exploited

HRS data set. The NBS data is potentially preferred above alternative surveys as the questions regarding the health status and asset allocations are consistent across time. The fact that the data has a nine year delay allows for changes in an individual's health status and asset allocations. Four measures of an individual's health status are constructed, compared to the usual singular measure that alternative studies employ. These measures cover physical limitations, chronic conditions, if the respondents have a history of a heart attack or stroke and conditions that limit the individual's ability to work. The paper initially considers a basic Ordinary Least Squares (OLS) specification with the quantity of assets held and the proportion of risky assets held within the household's portfolio as dependent variables. The paper then considers both random and fixed effects models in an attempt to capture the causality between health status and financial portfolio composition.

In the OLS specification, a positive relationship exists between health status and the quantity of financial assets held within a cross sectional analysis. The authors find, however, that this relationship is driven by heterogeneous effects as this relationship disappears within a fixed effects specification. The results indicate that an adverse health shock decreases the level of risky assets held prompting individuals to hold safer portfolios; however, the total level of investment remains unchanged in light of an adverse health shock. The authors acknowledge that the direction of causality is not identified and that heterogeneous effects are observed as the relationship disappears in the fixed effects model. A potential limitation of the study is that it focuses on individuals above the age of 60 and, hence, does not shed any light on the relationship between the health status and the portfolio composition of younger individuals.

The only study to my knowledge which attempts to address the misspecification problems of using a tobit model is Stavrunova and Yerokhin (2012). Analysing the HILDA survey, the study explores the demand for risky assets at the household level using an alternative methodology to the standard tobit model. Specifically, the study contributes to the existing literature by employing a two-part fractional logit model, arguing that the use of a tobit specification is inappropriate if covariates are thought to have differential impacts on participation and the proportion held. The study compares the results from a tobit specification and the zero-inflated fractional logit model. The study finds that the two-part model is preferable to the tobit model. The study reports that many of the covariates influence the decision to participate, in contrast to the tobit model which indicates that they influence the proportion held. For example, age, net

worth, education and planning horizons do not influence the proportion of risky assets held, only the decision to hold risky assets. The study extends the analysis presented in Stavrunova and Yerokhin (2012) by applying a variety of econometric techniques to the demands of safe assets, retirement accounts and bonds, in addition to risky assets.

Summary

To summarise, many of the papers discussed above are arguably limited in several ways. Statistically, the use of a tobit specification can be seen as a limiting factor. As described by Cook *et al.* (2008), the use of a tobit model to analyse a proportional dependent variable can be severely limiting, violating several of the assumption of linearity between the dependent and independent variables. Also, as Maddala (1991) observes, a proportional dependent variable is defined on the interval zero and one rather than observationally censored where a tobit model would be appropriate. A proposed way to improve this methodology is to exploit a fractional logit model or a zero-inflated beta model both of which are more suited to modelling proportional dependent variables, the advantages of which are discussed in detail in Section 2.3.3 below.

The empirical analysis presented in this chapter also builds upon the work of Bertaut and Starr-McCluer (2002), who utilise a multivariate probit model to investigate the joint decisions of the household to hold different assets within their portfolio. This approach is developed to take into account the shares of total wealth held within each asset classification, via a multivariate tobit specification, which accounts for the correlation between the proportions held of each asset classification.

The empirical analysis presented in this chapter thus contributes to the existing literature by developing the econometric methodology employed in the analysis of household finances, namely exploiting the zero-inflated beta regression model and the fractional logit model. It appears that both of these models have not been applied to this area previously and they both overcome many of the theoretical problems associated with applying a tobit specification to a proportional dependent variable. In addition, a multivariate tobit specification is used to account for the possible correlations between each asset category held. The next section describes the data and methodology employed in this study in detail.

2.3 Data and Methodology

2.3.1 Data

In this chapter, the U.S. SCF is analysed[4]. The SCF is a triennial survey and contains comprehensive information on the wealth of households in the U.S. The survey oversamples the wealthiest households within the population to account for the skewed nature of the assets held within the population. This study pools the 1989, 1992, 1995, 1998, 2001, 2004 and 2007 waves of the survey yielding 145,070 observations. It is important to note that the SCF is not a panel survey as the households participating in the study are not consistent over time; this unfortunately limits the study as panel data methodologies cannot be employed. The SCF does however provide detailed information on the type and quantity of individual assets held by households. From this information, it is possible to construct the relevant dependent variables. The survey also contains detailed information on the socio-economic and demographic characteristics of the household, which enables a comprehensive examination of the determinants of the types of assets held. This chapter analyses a pooled sample of 133,787 observations, once sample selection criteria and missing values are accounted for.

2.3.2 Dependent Variables

Classical portfolio choice theory, as developed by Samuelson (1969) and Merton (1969), suggests that, under the assumption that stock returns are not mean reverting, the fraction of wealth optimally held in stocks is consistent irrespective of an investors age or wealth. This result contrasts the general investment advice traditionally given which proposes risky portfolio share should be 100 minus the investor's age, see Malkiel (1999). As a result of this theoretical work, the existing empirical literature that examines portfolio choice generally explores the proportion of an investors wealth devoted to certain asset categories, see for example, Bertaut and Starr-McCluer (2002), Fratanoni (1998), Cardak and Wilkins (2009) and Rosen and Wu (2004) amongst many others. In addition, as the individual is constrained by the amount of financial wealth they possess, the decision of the portfolio allocation is captured by the proportion held in each asset category. One potential problem with this approach is that it forces a trivial correlation between asset categories. However, if the level of each asset category were analysed, as generally the amount held in each asset category are increasing in

[4] Data are obtained from http://www.federalreserve.gov/pubs/oss/oss2/scfindex.html.

wealth, a positive correlation will be observed between each asset category[5]. As a result, the proportion of total financial wealth allocated to each specific asset category is analysed as it arguably captures the decision of the household takes.

In the existing literature, various strategies have been used for dividing and collecting assets into categories with similar characteristics for the purposes of empirical analysis. For example, Hurd (2002) collects assets into three distinct categories based upon the assets' risk exposure; safe, fairly risky and risky assets. Similarly, Carroll (1998) defines three asset categories to be clearly safe, fairly safe and risky assets. Several studies divide the assets based upon the tax treatment given to each asset classification, see for example, Poterba and Samwick (2002). In this chapter, the asset classification proposed by Rosen and Wu (2004) is employed, which is subsequently used by Berkowitz and Qiu (2006), Fan and Zhao (2009) and Bogan and Fertig (2013). This asset classification is used for the purposes of comparison with the recent existing literature. In this specification, a four way classification is utilised, which consists of safe assets (*SA)*, risky assets (*RA*), bonds (*B*) and retirement funds (*RF)*. The assets included in the safe category are checking and saving accounts, money market funds, certificates of deposits, government saving bonds and Treasury bills. Risky assets include stocks and mutual funds. The bond asset category includes corporate, municipal and foreign bonds and bond funds whilst retirement funds include individual retirement accounts (IRA's) and Keogh accounts[6]. The bond and retirement accounts are separated due to the different tax treatment given to the assets held. In addition, they are separated as retirement accounts could be relatively illiquid for many households compared to bonds. This separation of retirement accounts and bonds is also implemented by Poterba and Samwick (2002) and King and Leape (1998).

The dependent variables are generated by calculating the proportion of financial wealth held within each asset category. Equations 2.1 to 2.4 define the proportions held in each asset category;

$$SA_i = \frac{\text{Total value of safe assets}}{\text{Total value of all financial assets}} \tag{2.1}$$

[5] Indeed a positive and statistically significant correlation between the level of each asset category held is observed in the data.

[6] Keogh accounts are tax deferred trust saving accounts that allow self-employed individuals or owners of their own incorporated business to save for their retirement accounts. An IRA is a tax deferred retirement investment account. IRA's are available to employed and self-employed workers who earn a wage or salary.

$$B_i = \frac{\text{Total value of bonds}}{\text{Total value of all financial assets}} \quad (2.2)$$

$$RF_i = \frac{\text{Total value of retirement accounts}}{\text{Total value of all financial assets}} \quad (2.3)$$

$$RA_i = \frac{\text{Total value of risky assets}}{\text{Total value of all financial assets}} \quad (2.4)$$

where the total value of all financial assets held is the sum of the total values of risky assets, safe assets, bonds and retirement funds held and subscript i denotes the household index. There are 11,159 observations, 7.7% of the total sample, that have a reported total financial wealth of zero and, hence, have a value of zero in the denominator of equations 2.1 to 2.4. As a consequence these observations are excluded from the subsequent regressions. Bertaut and Starr-McCluer (2002) and Yamashita (2003) both use this sample selection criterion as it is argued that households with zero financial assets do not face a decision about their portfolio allocation[7].

This omission of households that hold no wealth, could potentially lead to sample selection bias in the data. This could be overcome by employing a Heckman selection model. However, due to the non-linear nature of the models being employed, a Heckman selection model is not appropriate as it imposes a linear relationship in the second stage of the model. Also, as the omission constitutes less the 8% of the total sample, it is felt that the omission will not seriously inhibit the results obtained.

Table A2.1 presents the descriptive statistics of the dependent variables used in this study. The first column shows the percentage of households that hold the types of assets considered. The second column shows the average proportion of each asset held within the household's financial portfolios. From the table, it is clear that the majority of households hold at least one safe asset with 99.7% of households possessing some form of safe asset. On average, safe assets constitute over half of the total assets held within the household portfolio. On the other hand, 42.3% of households hold some form of risky assets and, on average, risky assets comprise 22.0% of the household portfolio. Retirement funds are widely held with 39.7% of households possessing them; however, on average, they only amount to 14.7% of the household portfolio. Similarly, bonds are not widely held, with only 16.2% of households holding them and, on average, they constitute around 4.7% of the household's assets. Figures A2.1, A2.3,

[7] Consistent results are found when households with zero financial wealth are included in the analysis and are defined to hold zero risky assets, safe assets, retirement funds and bonds.

A2.5 and A2.7 show the distributions of the proportion of risky assets, the proportion of safe assets, the proportion of bonds and the proportion of retirement funds held within the household portfolio, respectively. Figures A2.2, A2.4, A2.6 and A2.8 show the distributions of the proportions of risk, safe, bonds and retirement assets held conditional on holding that asset category.

From Table A2.1, it is clear that the percentage of households that hold risky assets has increased over the time period considered. In 1989, 37.6% of households held some kind of risky asset compared to 42.0% in 2007; this peaked at 46.5% in 2001. Although, over the time period, there was only a 5% increase in the number of households that held a risky asset from 1989 to 2007, there was a large increase in the proportion of risky assets held within the household portfolio; in 1989, on average, risky assets only accounted for 15.9% of the household financial portfolio and, in 2007, they accounted for 22.0% of the household's total financial wealth. One reason for this increase could be attributed to the increase in both the information relating to and the range of financial products available to households across this period.

The percentage of households that hold a safe asset has stayed relatively constant over the sample period. However, the proportion of safe assets held within the household's portfolio has decreased from 63.8% to 58.5% across the sample period. This could indicate a change in the attitudes of households as well as technological progress across this period. With the advent of the internet in the later years of the survey, households have more information available to them when considering financial products. This could explain the changing characteristics of the household portfolio.

The percentage of households holding bonds decreased across this period from 18.1% of households holding bonds to 13.8% of households. There has also been a decrease in the proportion of bonds held within the household's portfolio: in 1989, bonds, on average, made up 6.0% of the total wealth in the household's financial portfolio. However, this fell to 3.8% in 2007.

With respect to retirement accounts, relatively small changes were found in both the proportion of households that hold at least one of the assets and the proportion of the total financial wealth retirement funds account for. The proportion of households that held at least one retirement account increased from 40.0% in 1989 to 41.3% in 2007. The proportion of retirement funds within the household's portfolio increased from 14.3% to 15.7% in 1989 and 2007, respectively.

One explanation for the possible changes in the composition of the household financial portfolio relates to the sustained growth in stock prices over the period considered. Figure A2.9 shows the Standard and Poor's (S & P's) 500 stock index, which shows a growth in the index from 300 in 1989 to 1400 in 2007[8]. There has also been a fall in the average corporate bond yield and a fall in the interest rate of the 6 month certificate of deposit across this period. The average return of a Treasury bill has also fallen across the period analysed. Examples of these trends are shown in Figures A2.10 and A2.11. This increase in stock prices and fall in rates of return for other safe assets could be one explanation for the change in portfolio composition. These changes in the household's financial portfolio are also discussed in Bertaut and Starr-McCluer (2002).

It is clear from the distributions that the dependent variables are all limited between zero and one and that there are a large number of households that hold zero assets within each asset category. This suggests that a zero-inflated model may be an appropriate methodology relative to the techniques widely used in the existing literature. The next section describes the various econometric techniques employed in this chapter. Initially, the tobit model is outlined, which is the standard econometric technique used in this literature (see Section 2.2) and will provide a reference case for the alternative models employed. The zero-inflated beta regression model and the fractional logit model are then considered. Finally, the multivariate tobit model is described.

2.3.3 Methodology

As previously stated, the dependent variables analysed in this chapter are proportional in nature and, therefore, are defined upon the interval [0, 1]. As a consequence, statistical techniques are required in order to take into account the censored nature of the variable. The majority of previous studies utilise the tobit model, developed by Tobin (1958). This chapter builds on previous literature by utilising alternative econometric specifications. Initially, a tobit model is employed as a reference case so comparisons between these results and the alternative models can be made. Subsequently, a zero-inflated beta model and a fractional logit model will be employed to ascertain the determinants of the proportions of each asset category held within the household's financial portfolio. This is then developed to take into account the potential interaction between holding each type of asset classification by estimating a multivariate tobit

[8] The S&P 500 base period is 1941-1943 and the index is set as 10.

model. In this specification, it is possible to assess the interdependence between each asset classification by analysing the covariance matrix of the error terms.

2.3.3.1 Tobit Model

In the existing literature, a tobit model is the most common approach used to deal with the proportional nature of the dependent variable. The model was originally developed by Tobin (1958) and is an extension of the probit model. A full formulation of the Tobit model is presented in Greene (2012).

Let the latent variable be defined as:

$$y_i^* = \boldsymbol{\beta}'\mathbf{x}_i + \varepsilon_i \tag{2.5}$$

where $\mathbf{x}_i$ is the vector of independent variables, $\boldsymbol{\beta}$ is the corresponding vector of parameters to be estimated, ε_i is the error term and the subscript i denotes the household index. It is assumed that the errors are normally distributed with a mean of zero and variance σ, that is, $\varepsilon_i \sim N(0, \sigma^2)$. The latent variable y_i^* is not observed and it is defined to be left censored at α and right censored at μ, representing the lower and upper limits respectively. What is observed is y_i, which is defined as follows:

$$y_i = \begin{cases} \mu \text{ if } y_i^* \geq \mu \\ y_i^* \text{ if } \alpha < y_i < \mu \\ \alpha \text{ if } y_i^* \leq \alpha \end{cases} \tag{2.6}$$

in our specification, the upper limit is $\mu = 1$ and the lower limit is $\alpha = 0$. The respective log likelihood function is given by:

$$\ln L(\boldsymbol{\beta}, \sigma \mid y_i, \mathbf{x}_i, \alpha, \mu) = \sum_{y_i} \Phi\left(\frac{\alpha - \boldsymbol{\beta}'\mathbf{x}_i}{\sigma}\right) + \sum_{y_i = y_i^*} \frac{1}{\sigma}\varphi\left(\frac{y_i - \boldsymbol{\beta}'\mathbf{x}_i}{\sigma}\right) + \sum_{y_i}\left(1 - \Phi\left(\frac{\mu - \boldsymbol{\beta}'\mathbf{x}_i}{\sigma}\right)\right) \tag{2.7}$$

where Φ and φ are the cumulative distribution and probability density functions of the standard normal distribution respectively and σ is the standard deviation of the error term, ε_i. In order to obtain meaningful results the marginal effects must be considered. This will allow changes in the independent variables whilst holding all other variables constant, *(ceteris paribus).*

Marginal Effects

The coefficients estimated in the tobit model cannot be directly interpreted as a change in the independent variable on the expected value of the dependent variable. The marginal effects of the tobit estimators can be decomposed into two distinct parts. These parts include the intensity of adoption and the probability of adoption of the dependent variable given a change in the independent variable. In the two limit scenario considered here, the differential of the log likelihood function is as follows:

$$\frac{\partial E(y_i \mid \mathbf{x})}{\partial x_k} = \text{prob}(\alpha < y_i^* < \mu)\beta_k$$

$$= \left(\Phi\left(\mu - \frac{\boldsymbol{\beta}'\mathbf{x}}{\sigma} \right) - \Phi\left(\alpha - \frac{\boldsymbol{\beta}'\mathbf{x}}{\sigma} \right) \right) \beta_k \approx \frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} \beta_k \qquad (2.8)$$

where the parameters are as previously defined, see Greene (2012) for full proof. Therefore, the tobit coefficients have to be multiplied by:

$$\frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} \qquad (2.9)$$

in order to obtain the marginal effects of the tobit estimator. This is known as the scaling factor. Multiplying this by the corresponding coefficients approximates the marginal effects of the independent variables, thus allowing the analysis of changes in these variables whilst holding all other factors constant.

2.3.3.2 Zero-Inflated Beta Model

The zero-inflated beta model was developed by Cook *et al.* (2008) in order to overcome the misspecified statistical models previously used in the finance literature. Cook *et al.* (2008) indicate that a tobit specification is conceptually flawed for modelling dependent variables that are proportional in nature. Maddala (1991) argues that proportional dependent variables are not observationally censored on the interval of zero and one but are rather defined only over the interval. Similarly, due to the proportional nature of the dependent variable, a nonlinear relationship between the conditional mean and the independent variables is implied; however, the tobit model assumes a linear relationship. Also, when considering the distributions of the dependent variables presented in Figures A2.1, A2.3, A2.5 and A2.7, it appears that there are a large proportion of households that hold zero of each asset classification. For this reason, it may be advantageous to separate the decision of whether the household holds the asset

and the decision about the proportion of that asset the household holds within their financial portfolio. The tobit model does not distinguish between the determinants that influence whether a household holds a certain type of asset and the determinants of the proportion of that asset held. It assumes that each determinant exerts the same influence on whether the household holds risky assets and the proportion of risky assets held, and this may not be the case. Another strong assumption of the tobit model is that it is assumed that the underlying disturbances of the model are normally distributed.

In order to overcome these problems, a beta distribution is employed in the continuous part of the distribution and a logit model implemented for the decision to hold the asset categories. As the beta distribution is defined on the interval of (0, 1), it seems appropriate to exploit this distribution to model a proportional dependent variable. Ferrari and Cribari-Neto (2004) discuss the use of a beta regression to model a proportional dependent variable. A logit model is employed to capture the probability of not holding a particular type of asset. The zero-inflated beta probability distribution is defined as;

$$g(y_i, \theta) = \begin{cases} 0 \text{ if } y_i < 0 \\ \delta \text{ if } y_i = 0 \\ (1-\delta)\, f(\mathbf{x}_i; \theta) \text{ if } 0 < y_i < 1 \end{cases} \tag{2.10}$$

where $f(y_i, p, q)$ is assumed to follow a two parameter beta distribution, that is:

$$f(y_i \mid p, q) = \left(\frac{\Gamma(p+q)}{\Gamma(p)\Gamma(q)} y_i^{\,p-1} (1-y)_i^{\,q-1} \right) \text{ for } 0 < y < 1 \tag{2.11}$$

where Γ is the gamma distribution. The zero-inflated beta regression model is formulated as;

$$f(y_i = 0 \mid \mathbf{x}_i) = C(\boldsymbol{\alpha}' \mathbf{x}_i) \text{ for } y_i = 0 \tag{2.12}$$

and

$$f(y_i \mid \mathbf{x}_i) = (1 - C(\boldsymbol{\alpha}' \mathbf{x}_i)) \left(\frac{\Gamma(p + q(\mathbf{x}_i))}{\Gamma(p)\Gamma q(\mathbf{x}_i)} y_i^{\,p-1} (1-y_i)^{q(\mathbf{x}_i)-1} \right) \text{for } 0 < y_i < 1 \tag{2.13}$$

where $q(\mathbf{x}_i) = pe^{-\boldsymbol{\beta}' \mathbf{x}_i}$ and p is the parameter of the beta distribution. In this specification, $C(\boldsymbol{\alpha}' \mathbf{x}_i)$ denotes the probability of the household choosing to hold zero of a specific type of asset. This is assumed to follow a logistic function. In this model, $\mathbf{x}_i$

is the set of independent variables, **α** and **β** represent the vectors of parameter estimates of the logit and beta regression models, respectively. p and q are the beta model parameters and y_i is the observational data. In this specification, it is possible to specify different independent variables for the probability of holding an asset and the proportion of assets held. However, in this chapter, the same independent variables are used for the decision to hold a certain asset classification and the proportion held. Further details of these variables are discussed in Section 2.3.8 below. The second part of the equation uses the beta distribution to model the proportion of each asset held. This will provide an interesting comparison against the benchmark case of the tobit model, which imposes normality and does not consider the probability of holding each asset category.

Marginal Effects

As in the tobit model, in order to obtain meaningful results, the marginal effects have to be considered. This is obtained by differentiating the log likelihood function with respect to the independent variable of interest. This will allow the analysis of changes in the independent variables, *ceteris paribus*. In this case, there are two cases to consider: the marginal effects of the beta distribution given that the asset is held; and the marginal effects of the logistic distribution that determines the probability of holding zero assets. In the second case, the marginal effects are given by the standard marginal effects of the logistic distribution. In the case of the proportional part of the equation, the marginal effects of the beta distribution are required. The expected value of an independent variable conditional on the vector of independent variables in the beta distribution is given by;

$$E(y_i \mid \mathbf{x}_i) = \frac{p}{p + q(\mathbf{x}_i)} \tag{2.14}$$

As previously defined, the parameter $q(\mathbf{x}_i)$ follows a logistic link function, that is:

$$q(\mathbf{x}_i) = pe^{-\boldsymbol{\beta}'\mathbf{x}_i} \tag{2.15}$$

Substituting this into the expected value yields

$$E(y_i \mid \mathbf{x}_i) = \frac{p}{p + pe^{-\boldsymbol{\beta}'\mathbf{x}_i}} = \frac{1}{1 + e^{-\boldsymbol{\beta}'\mathbf{x}_i}} \tag{2.16}$$

The marginal effects for the k^{th} independent variable are given by the partial differentiation of the expected value of the dependent variable with respect to the k^{th} dependent variable via the chain rule;

$$\frac{\partial E(y_i \mid \mathbf{x}_i)}{\partial x_k} = \beta_k \frac{e^{-\mathbf{x}_i'\beta}}{(1+e^{-\mathbf{x}_i'\beta})^2} \tag{2.17}$$

This gives the marginal effects for the proportional section of the zero-inflated beta model. This allows the changes in the independent variables to be considered, *ceteris paribus*, in terms of their impact on changes in the dependent variable. This will allow comparison between the estimates of the tobit model and the zero-inflated beta model.

2.3.3.3 Fractional Logit Model

An alternative to the tobit model and the zero-inflated beta model is the fractional logit model. Papke and Wooldridge (1996) initially developed the fractional logit model in order to analyse the participation rates in pension plans. As previously discussed, the dependent variables analysed in this chapter are proportions, bounded between zero and one. Let y_i be the observed data, where q is defined as the type of asset held and i is the household index, then it is given that $0 \leq y_i \leq 1$. Given this limit, the population model is estimated as $E(y_i \mid \mathbf{x}_i) = G(\beta'\mathbf{x}_i)$. In order to model the data between the limits of zero and one, imposing a logistic functional form upon G ensures that these bounds are adhered to. Hence, the model is estimated as;

$$E(y_i \mid \mathbf{x}_i) = G(\mathbf{x}_i\beta) = \frac{e^{\mathbf{x}_i\beta}}{1+e^{\mathbf{x}_i\beta}}. \tag{2.18}$$

This gives the fractional logit model, which is presented in Papke and Wooldridge (1996). The Bernoulli log-likelihood function is defined as follows:

$$LL = y_i \ln\left(\frac{e^{\mathbf{x}_i\beta}}{1+e^{\mathbf{x}_i\beta}}\right) + (1-y_i)\ln\left(1-\frac{e^{\mathbf{x}_i\beta}}{1+e^{\mathbf{x}_i\beta}}\right) \tag{2.19}$$

This is estimated in STATA 11 using the GLM command.

Marginal Effects

As explained previously, the marginal effects are considered. This will allow the consideration of changes in the independent variables whilst holding all other variables constant. This is calculated by partially differentiating the expected value of the

proportion of each asset conditional on the means of the independent variables. This is given by:

$$\frac{\partial(y_i \mid \mathbf{x}_i)}{\partial x_k} = \frac{\partial G(\beta' \mathbf{x}_i)}{\partial x_k} \tag{2.20}$$

Recalling that $G(\beta' \mathbf{x}_i)$ is assumed to follow a logistic function, the marginal effects of the k^{th} independent variable are given by:

$$\frac{\partial(y_i \mid \mathbf{x}_i)}{\partial x_k} = \beta_k \frac{e^{\boldsymbol{\beta}' \mathbf{x}_i}}{(1+e^{\boldsymbol{\beta}' \mathbf{x}_i})^2} \tag{2.21}$$

This gives the marginal effects of the fractional logit model, which will allow the consideration of changes in the independent variables, *ceteris paribus*, enabling comparisons to the tobit and the zero-inflated beta models.

2.3.3.4 Multivariate Tobit Model

In the previous literature, univariate tobit regressions for each group of assets have generally been conducted[9]. This, however, fails to take into account the potential interconnection and correlations between different asset types. The multivariate tobit model is used to account for such correlations between the different types of asset held within the household portfolio. From the results of the multivariate tobit model, it is possible to test the null hypothesis of independence between the asset types via the variance-covariance matrix of the error terms. If this hypothesis is rejected, then it is assumed that there is interdependence between the assets held within the household portfolio, which endorses a joint modelling approach.

Table 2.1 presents the bivariate correlations between each asset classification and the associated statistical significance levels. It is clear from the table that there is a negative relationship between the proportion of risky assets held and the proportions of safe assets and retirement funds held within the household portfolio. A negative relationship is displayed between the proportions of retirement funds and both safe assets and bonds held. In contrast, a positive relationship is present between the proportion of risky assets held and the proportion of bonds held. All of these correlations are statistically significant at the 1% level.

[9] Poterba and Samwick (2002) acknowledge that their estimators would be improved by jointly modelling their dependent variables. However, due to computational limitations, they only calculate the bivariate cases. Similarly, Bertaut and Starr-McCluer (2002) study the multivariate probit model for analysis of the choice of asset holding, but the proportions held are not jointly considered.

Table 2.1: Correlations between Asset Classifications

	RA	SA	B	RF
RA	1.0000			
SA	-0.7073 (0.000)	1.0000		
B	0.0626 (0.000)	-0.3492 (0.000)	1.0000	
RF	-0.1361 (0.000)	-0.5112 (0.000)	-0.0817 (0.000)	1.0000

P-values are presented in parentheses. Where SA, B, RF and RA are defined as in equations 1, 2, 3, and 4, respectively

In order to ascertain the determinants of the proportions of the different assets held, a multivariate tobit model is estimated. The tobit model was initially extended to the multivariate case by Amemiya (1974) and subsequently by Lee (1993). A multivariate tobit model can account for the joint decisions between holding different proportions of each asset. It is clear from Table 2.1 that there exists a level of correlation between the different asset categories. Let the vector **x** be the vector defining the set of independent variables that exert an influence on the proportion of assets held, where they are defined as in the previous section. It is possible to construct a series of three double censored equations that are jointly estimated. The multivariate tobit model is given by;

$$\mathbf{y} = \begin{cases} 1 \text{ if } \mathbf{y}^* \geq 1 \\ \mathbf{y}^* \text{ if } 0 < y < 1 \\ 0 \text{ if } \mathbf{y}^* \leq 0 \end{cases} \tag{2.22}$$

where $\mathbf{y} = (y_{RA}, y_B, y_{RF})$ and let the latent variable be defined as;

$$\mathbf{y}^* = \boldsymbol{\beta}'\mathbf{x} + \boldsymbol{\varepsilon} \tag{2.23}$$

where $\mathbf{y^*} = (y^*_{RA}, y^*_B, y^*_{RF})$ and $\boldsymbol{\varepsilon} = (\varepsilon_{RA}, \varepsilon_{RF}, \varepsilon_B)$ is assumed to follow a multivariate normal distribution, $\boldsymbol{\varepsilon} \sim N(0, \sum)$. The subscripts RA, RF and B are risky assets, retirement funds and bonds as previously defined, respectively. In this specification, $\mathbf{y}^*$, $\boldsymbol{\varepsilon}$ and **y** are 3 by 1 vectors, **x** is a k by 1 vector of the independent variables and $\boldsymbol{\beta}$ is a 3 by k matrix of coefficients, each column relating to the set of estimated coefficients for each dependent variable and $\sum$ is the variance-covariance matrix of the error terms. If the covariance elements between the error terms are non-zero, that is, the off diagonal elements of the matrix are non-zero, then there may be efficiency advantages to modelling the system of equations simultaneously via a multivariate tobit model[10].

[10] The category of safe assets is omitted from the system analysis due to the construction of the dependent variables in this chapter.

The parameter estimates are estimated via the method proposed by Huang (1999). Assuming that $\boldsymbol{\varepsilon_{(k+1),i}}$ follows a multivariate normal distribution with a mean of 0 and a variance of Ω, Huang (1999) states that the likelihood function, which accounts for all the possible combinations of censoring over all of the observations, is given by:

$$L(y; \beta, \Omega)=\prod_{j=1}^{n} L_j^{S_k}(y_j; \beta, \Omega) \quad (2.24)$$

where $y = (y_1', y_2', \ldots, y_k')$ and $L_j^{S_k}$ provides the likelihood of the case that the j^{th} observation falls into regime k. This is estimated in STATA using the "mvtobit" command developed by Barslund (2007). This model allows for the possible interaction between the different types of assets held by allowing possible correlations between the error terms via the covariance matrix of error terms. From the covariance matrix of error terms, it is possible to test the hypothesis of independence between the asset classifications. It is important to note that this correlation is not the correlation between the dependent variables but the correlation between the error terms of the equations.

Marginal Effects

As in the standard tobit model, it is possible to approximate the marginal effects using the scaling factor that is estimated by using the number of censored variables divided by the total number of observations. Multiplying the coefficient by the scaling factor gives the marginal effect of the changes in the independent variables, *ceteris paribus.*

2.3.4 Independent Variables

The U.S. SCF contains a large amount of information on the demographic and socio-economic characteristics of the participating households. This information will provide the basis for the independent variables utilised in the chapter. Tables A2.2 and A2.3 in the appendix present the descriptions and summary statistics of the independent variables used in the chapter, respectively. Initially, a baseline specification is outlined, which includes a series of standard demographic and socio-economic variables. The chapter then includes a series of attitudinal variables in the regressions.

2.3.4.1 Baseline Variables

Initially, a baseline specification is considered for all of the models implemented. This specification includes a series of demographic and socio-economic variables which are specified from the existing literature including age, gender, whether there are children

present in the household, year controls, relationship status, education, labour force status, ethnicity, household income and household net worth.

In line with the existing literature, age and age squared are controlled for in the analysis. Many studies report a concave relationship between equity holdings and age. Yamashita (2003) finds that there is a positive relationship between age and the proportions of stocks held in the household's financial portfolio. Similarly, Bertaut (1998) finds that older individuals are more likely to participate in stock holding, while, Bertaut and Starr-McCluer (2002) report, however, that age exerts a statistically insignificant effect on the probability of holding stock based assets. In the sample analysed, the average age of the head of household is 51 years old.

Variables that indicate the years of 1992, 1995, 1998, 2001, 2004 and 2007 are included to control for changes in the household portfolio composition over time, with 1989 as the omitted category. As previously mentioned such changes could be attributed to the increased information and financial products available to households in the later time periods studied. Shum and Faig (2006) report that there has been an increase in the level of stocks held at the household level between 1992 and 2001. Bertaut and Starr-McCluer (2002) find that financial asset holding has substantially increased between 1983 and 1998: the proportion of financial assets held within the household portfolio increased from 45% in 1983 to 61% in 1998. They also document an increase in the holding of pension funds, corporate equity and mutual funds across this period.

Variables are included for being married or cohabiting, whether the head of household is female and whether there are children present in the household as these are likely to impact upon the financial decisions of the household. Bertaut and Starr-McCluer (2002) find that married couples are more likely to own both stock based assets and safe investment assets. They also find that female headed households are more likely to hold more stock based assets than single male headed households. Yamashita (2003) finds that married households hold a lower proportion of stocks and male headed households are found to hold more stocks than female headed households. They also find a negative relationship between the proportion of stocks held and family size. Hochguertel *et al.* (1998) report that the number of children present, female headed households and being married exert negative effects on the level of financial wealth of the household.

A series of educational variables are included based upon the head of household's response to the question *"What is the highest level of education reached?"* A series of variables indicating whether a high school level of education, college education, or a post graduate education are included, with the omitted category being having less than high school level of education. It is widely accepted across the literature that the level of education has a significant impact upon the portfolio composition of the household. For example, Bertaut and Starr-McCluer (2002) find that college educated households are more likely to hold stock based assets compared to high school only educated households. Similarly, Shum and Faig (2006) observe a positive relationship between education and total stock holding and Rosen and Wu (2004) find a positive association between the level of education and the proportion of risky assets held. In addition Fratantoni (1998), Guiso *et al.* (1996) and Yamashita (2003) all find a positive relationship between the risky asset ratio and education.

A set of dummy variables to capture the effects of the head of household's current employment status is included; employed and self-employed, unemployed and retired. The omitted category is being out of the labour force which includes students, housewives and individuals who are unable to work due to a disability. Yamashita (2003) reports that being retired does not exert a statistically significant influence on the proportion of stocks held. Conversely, Bertaut and Starr-McCluer (2002) report that being retired is negatively associated with the risky asset share.

The ethnicity of the head of household is included as it has been previously found that being of a non-white ethnicity reduces the level of diversification within the household portfolio and a reduction in the proportion of risky assets held. Yamashita (2003) and Rosen and Wu (2004) find that non-white headed households hold a lower proportion of risky assets in their financial portfolio.

Total income is based on the household's response to the question: *"What was the total income from all sources in the previous year?"* The reported income values are then inflated to 2007 price levels. Where total income is reported to be positive, the natural logarithm is simply taken. When an undefined value of the natural logarithm of total income is returned, due to total income being zero, these values are defined to be zero.

The net worth of a household is defined as $(a_h - d_h)$ where a_h is the total value of the assets held by the household and d_h is the total value of liabilities held by the

household. In the case where $(a_h - d_h) > 0$, the natural logarithm of net worth is simply defined to be $\ln(a_h - d_h)$. When $(a_h - d_h) < 0$ the logarithm of net worth is defined as $(-1)\ln(|a_h - d_h|)$ and is set to zero otherwise[11]. Bertaut and Starr-McCluer (2002) find that both higher net worth and income are associated with a higher probability of holding stocks. This is supported by Rosen and Wu (2004) who find that a positive relationship exists between the proportion of risky assets held and the net worth of the household and the household's income. Shum and Faig (2006) also find that financial net worth is positively related to risky asset holding.

2.3.4.2 Attitudinal Variables

Risk Attitudes

The U.S. SCF contains a self-reported risk attitudes variable that is consistent across all the years analysed in this chapter. The measure of risk attitudes is based upon the following question: *"Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?* There are four possible responses to the question, and from this three dummy variables are constructed; willingness to take an average level of risk in return for average returns; willingness to take an above average level of risk in return for above average returns; and willingness to take a substantial amount of risk for substantial returns. The omitted category is the case where the head of household indicates that they are not willing to take any risk. From Table A2.3, it is apparent that 43.0% of heads of households report a willingness to take an average level of risk in return for average returns and 30.5% of heads of households are unwilling to take any financial risk. 21.0% and 5.5% of household heads report a willingness to take above average and substantial risks, respectively. It is expected that households which report a willingness to take higher amounts of risk in return for higher returns will hold a higher proportion of risky assets within their portfolios and a lower level of safe assets. Cardak and Wilkins (2009) report that risk averse households hold a lower proportion of risky assets within the household's portfolio. Shum and Faig (2006) also find that more risk averse households hold a lower proportion of stocks and Yamashita (2003) find that households that display a willingness to take risks hold a higher proportion of stocks in the household's portfolio.

[11] There are no reported values of net worth between zero and one, and so, is not a concern in this chapter.

Health Status

In line with Rosen and Wu (2004), Berkowitz and Qiu (2006), Fan and Zhao (2009) and Bogan and Fertig (2013), the analysis in this chapter will control for the head of households health status. It is argued that health status can potentially increase the level of background risk experienced by individuals, which cannot be avoided or diversified away from. Consequently, health status can influence the portfolio allocation of a household. The U.S. SCF contains information relating to self-reported health status. The measure of self-assessed health status is common in the area of health economics and is widely used with empirical research, for example, Love and Smith (2010), Smith (1999), Kennedy *et al.* (1998) and Deaton and Paxson (1998) all make use of a self-assessed health measure. The measure is constructed from the responses to the question, *"Would you say your health is excellent, good, fair, or poor?"* From the responses to this question, a series of dichotomous variables are constructed with being in poor health as the omitted variable. Of the sample analysed, 44.4% of individuals report that they are in good health and 37.9% claim to be in excellent health. In the sample, 13.8% of respondents report being in average health and only 3.9% of respondents report being in poor health. In the previous literature, there is much debate surrounding the causality between health and portfolio composition, however association between the two measures is consistently found. For example, Cardak and Wilkins (2009), Fratantoni (1998) and Guiso *et al.* (1996) all find that poor health is associated with holding a lower proportion of risky assets in the household's portfolio. In addition, Rosen and Wu (2004) find that sick heads of households are less likely to hold risky assets, bonds and retirement accounts. In contrast, Berkowitz and Qiu (2006) report that severe health conditions are not a statistically significant determinant of stock holding.

In the literature review it is acknowledged that the health status of the head of households could be endogenous to the proportion of each asset category held. This problem could potentially be overcome by employing an instrumental variable technique. However, due to the nonlinear nature of the models outlined in Section 2.3.3, it would not be possible to adopt this strategy. Also, as the chapter focuses on the modelling of the proportion of each asset held and not on the causal relationship between the covariates and the dependent variable, IV analysis is not implemented.

Investment Horizon

The household's time preference (i.e. discount factor) is proxied by the response to a question on the financial planning horizon of the household. The question permits five responses in relation to the household's most important period in the future: the next few months; next year; next few years; five to ten years; or longer than ten years in the future. A longer time horizon is associated with a lower time preference (i.e. lower discount factor); arguably such an individual would be willing to bear a higher rate of risk in the short term in return for a higher payoff in the future. In this study, dummy variables are constructed for each time horizon, with the shortest time period being the omitted category. It is found that: 11.2% of respondents indicated that their most important period was next year; 24.7% responded that the next few years were most important to them; and 29.4% and 19.7% of households indicated a most important period of five to ten years and ten or more years, respectively. Cardak and Wilkins (2009) find a positive and statistically significant relationship between the household's time horizon and the proportion of risky assets held. Rosen and Wu (2004) also find that longer time horizons are associated with higher proportions of risky assets.

Shopping Tendencies

In the SCF, respondents are asked to indicate how much 'shopping around' they do when borrowing money or obtaining credit and how much 'shopping around' they do when making investment decisions. The respondents indicate their level of shopping tendencies upon a five point scale, ranging from *"no shopping"* to *"a large amount of shopping"*. A series of variables are generated, where *"no shopping"* forms the omitted variable, for both obtaining credit and when making investment decisions. From this measure of shopping tendencies, a proxy of the level of information households have available to them when compiling their portfolio is constructed. It may be expected that a more informed household would hold more risky assets than a household which indicates that they participate in a small amount of shopping.

Of the sample analysed, 16.5% of households report a large amount of shopping relating to investment decisions compared to 24.7% who report doing a great deal of shopping relating to borrowing. The descriptive statistics indicate that households do more shopping around relating to borrowing rather than investment decisions. 40.5% of households report no shopping tendencies relating to investment decisions compared to 19.2% who report no shopping tendencies relating to borrowing.

Economic Expectations

The economic expectations of the household are generated by the responses to the question: *"Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years?"* It is found that 42.6% of individuals believed that the economy would perform the same as the previous five years, 32.3% believed it would be better and 25.1% of individuals believed the economy would perform worse than in previous years. This variable is included as economic expectations could proxy the level of background risk perceived in the economy. It is expected that households with a more positive economic outlook will hold a greater proportion of risky assets. Brown *et al.* (2005b) demonstrate that individuals with more optimistic financial expectations are likely to hold levels of debt.

2.4 Results

Initially, the baseline model will be discussed and then the attitudinal variables will be included in the set of independent variables. Firstly, the results from the univariate tobit models are discussed. The zero-inflated beta model and the fractional logit model are then considered and comparisons are made between the model estimates. Finally, the results from the multivariate tobit model are presented.

2.4.1 Univariate Tobit Model

Table A2.4 presents the results for the baseline and full specifications, for each asset classification utilised in the study. The discussion will focus on the marginal effects and, as previously explained, these are obtained by multiplying the estimated coefficients by the calculated scaling factor. The scaling factors for risky assets, safe assets, bonds and retirement funds are given as 0.5784[12], 0.4389[13], 0.8380[14] and 0.6043[15], respectively. Initially, the results from the baseline model are presented, and then, the attitudinal variables are introduced.

[12] $\frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} = \frac{77,382}{133,787} = 0.5784$

[13] $\frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} = \frac{58,721}{133,787} = 0.4389$

[14] $\frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} = \frac{112,111}{133,787} = 0.8380$

[15] $\frac{\text{Number of Censored Observations}}{\text{Total Number of Observations}} = \frac{80,853}{133,787} = 0.6043$

2.4.1.1 Baseline Model

In the baseline tobit model for all asset classifications, the null hypothesis that all of the coefficients are simultaneously equal to zero is rejected. The respective test statistics of the risky, safe, bond and retirement assets are as follows: 44,648.65, 64,424.64, 39,802.47 and 26,970.97, respectively.

In contrast to Bertaut and Starr-McCluer (2002) and Cardak and Wilkins (2009), age has a statistically insignificant impact upon the level of risky assets held within the household portfolio. Age, however, reduces the proportion of safe assets and bonds held in the household's financial portfolio. A one year increase in age reduces the proportion of safe assets and bonds by 1.08% and 0.32% respectively, *ceteris paribus*. The age of the head of household has a positive relationship with the proportion of retirement funds held. Rosen and Wu (2004) find that older individuals are more likely to hold a greater proportion of bonds and a lower proportion of safe assets. They find, however, that age does not have a statistically significant impact upon the proportions of risky or retirement funds held. Berkowitz and Qiu (2006) find that age is positively associated with the share of retirement assets and bonds and negatively associated with the risky asset share and safe assets. In contrast to this study, they find that age is a significant determinant only in the retirement equation.

The natural logarithm of total income is positively related to the proportion of risky assets held: a 1% increase in total income corresponds to an increase in the proportion of risky assets by 4.60%, *ceteris paribus*. Similarly, a positive relationship between net worth and the proportion of risky assets is observed: a 1% increase in the net worth of the household increases the proportion of risky assets held by 1.83%, *ceteris paribus*. Shum and Faig (2006) find that greater financial net worth is associated with a greater proportion of equity shares within the financial portfolio of households. However, they find that income has a statistically insignificant effect at the 5% level. The result of Shum and Faig (2006) is supported by Cardak and Wilkins (2009) who find that net worth is positively associated with the risky asset share and income does not have a statistically significant effect. The natural logarithm of net worth is found to have a negative relationship with the proportion of safe assets and a positive relationship with the proportion of bonds held.

Table A2.4 indicates that being female reduces the proportion of risky assets held by 4.89%, *ceteris paribus*. Being female is associated with holding a higher proportion of

safe assets and the proportion of bonds held, whereas being female reduces the proportion of retirement accounts held. Similarly, having children present in the household reduces the proportion of risky assets held by 2.24%, *ceteris paribus.* This result accords with those presented in Rosen and Wu (2004). Married or cohabiting households hold higher proportions of risky assets, compared to non-married households. In accordance with Poterba and Samwick (2002), being married is found to reduce the proportion of directly held equity and interest bearing bonds.

In line with Rosen and Wu (2004), Cardak and Wilkins (2009), Hochguertel *et al.* (1997) and Shum and Faig (2006), education is positively associated with the proportion of risky assets within the household portfolio. Compared to having below high school education, possessing a post graduate degree increases the proportion of risky assets held by 33.00%, *ceteris paribus*. It has been found in the existing literature that higher levels of education are associated with a greater degree of diversification, a larger proportion of risky assets held and a greater proportion of stocks held compared to lesser educated individuals. It is apparent that an increased level of education is associated with a lower proportion of safe assets held. In addition, education is positively related to the proportion of bonds and retirement accounts held. These results are consistent with the existing literature.

In accordance with Bertaut and Star-McCluer (2002), compared to being out of the labour force, employed and retired heads of households hold a higher proportion of risky assets. Being unemployed, however, does not have a statistically significant impact on the proportion of risky assets held within the household's portfolio. Employed heads of household hold a lower proportion of safe assets and bonds, but a higher proportion of retirement accounts compared to households who are not participating in the labour force.

Having a black or Hispanic head of the household reduces the proportion of risky assets held by 13.48% and 17.57% compared to white headed households, respectively. Households with non-white heads hold a higher proportion of safe assets and a lower proportion of bonds and retirement funds in the household's financial portfolio, *ceteris paribus*, supporting the findings of Rosen and Wu (2004).

Finally, there has been an increase in the proportion of risky assets held each year compared to the base year of 1989, where 1998 and 2001 have the greatest increases in the proportion of risky assets held, compared to 1989, with increases in the proportion

held by 9.30% and 9.25% ceteris paribus, respectively. As previously outlined, one possible explanation for these years demonstrating the greatest increase in risky asset holding is due to the price index of the stock market. Figure A2.9 shows that the S&P 500 Stock Index reaches a maximum across the period between 1998 and 2001 and this may have driven more households to hold a higher proportion of risky assets. Shum and Faig (2006) find that households within the 1995, 1998 and 2001 waves of the SCF hold a greater proportion of equity shares within their household portfolios. This is statistically significant at the 5% level. Poterba and Samwick (2002) find that there were significant changes within the portfolio composition of households between 1993 and 1998, with substantial increases in tax deferred accounts and the holding of mutual funds.

2.4.1.2 Attitudinal Variables

Table A2.4 presents the full specification model which includes the attitudinal variables along with the baseline specification. As with the baseline tobit models, across all asset categories, the null hypothesis that all of the coefficients are simultaneously equal to zero is rejected. The χ^2 results of the proportions of risky, safe, bond and retirement assets as the dependent variables are 52,664.48, 74,921.19, 40,960.41 and 53,573.88, respectively.

Upon comparing the results from the tobit models for the baseline specification and once the attitudinal variables are included, as expected, indicates a reduction in the size of the coefficients in the baseline variables. This is potentially due to the attitudinal variables more accurately capturing the influence on the proportion of each asset held.

Once the attitudinal variables are included, changes relative to the findings from the baseline model are that age now has a negative relationship with the proportion of risky assets held and this is statistically significant at the 1% level. Also, being female becomes a statistically insignificant determinant of the proportion of retirement funds held.

Focusing on the attitudinal variables, in line with Rosen and Wu (2004), Gusio *et al.* (1996) and Fratantoni (1998), health status is positively related to the proportion of risky assets held. Being in fair, good and excellent health increases the proportion of risky assets held by 4.29%, 7.73% and 8.98%, respectively, compared to households whose heads are in poor health. Better health is inversely related to the proportion of safe assets held; however, health is not a statistically significant determinant of the

proportion of bonds held. Health status is positively associated with the proportion of retirement accounts held. Being in excellent health increases the proportion of retirement funds by 8.53% compared to being in poor health. These results accord with Rosen and Wu (2004) who find that poor health has a negative effect on the proportion of risky assets held and a positive effect on the proportion of safe assets held in the household portfolio. Similarly, Berkowitz and Qiu (2006) find that the health status of households plays a significant role in determining the composition of household portfolios, with health changes having a larger impact upon the financial element of the household's portfolio compared to the nonfinancial component. Similarly, Fan and Zhao (2009) find that negative health effects promote a 'safer' household portfolio and Bogan and Fertig (2013) find that increased mental health problems are associated with a lower proportion of risky assets held. In contrast, Cardak and Wilkins (2009) report that health status is not statistically significant in determining the proportion of risky assets held. Although, the results presented here indicate that the health status of the head of household is correlated with the household's portfolio composition, it should be explicitly acknowledged that the analysis does not shed any light on the on-going debate surrounding the causal link between health status and the household's portfolio.

In line with the previous literature and economic theory, the risk attitude measures have the expected result, that is, a positive relationship exists between the level of risk the household is willing to take and the proportion of risky assets held. Similarly, a negative relationship is found between level of risk the household is willing to take and the proportion of safe assets within the household portfolio. Households that report that they are willing to take a substantial amount of risk for substantial rewards hold a share of risky assets of 22.51% more than a household that is not willing to undertake any financial risk, *ceteris paribus*. A positive relationship between willingness to take risk and the proportion of retirement accounts held is also found. Households that report willingness to take an above average amount of risk for an above average return hold 12.62% more retirement funds compared to households that are not willing to undertake any financial risks, *ceteris paribus*. In previous studies, the findings have been mixed, for example, Rosen and Wu (2004) find that the risk attitudes of the household have a statistically insignificant impact on the composition of the household portfolio. Shum and Faig (2006) find, however, that there is a negative relationship between the level of risk aversion and the proportion of equity held within the household portfolio.

Similarly, Cardak and Wilkins (2009) find that risk averse households hold a lower proportion of risky assets within their household portfolio.

There is a positive relationship between the length of the investment horizon and the proportion of risky assets held. Households that report more than ten years in the future as their most important period hold a 6.96% higher proportion of risky assets compared to individuals who value the immediate future most. The opposite relationship is found with the proportion of safe assets held within the household's financial portfolio; with households that value more than ten years in the future most holding 6.91% less safe assets than households that value the next few months as the most important period, *ceteris paribus*. Cardak and Wilkins (2009) find that there is a positive relationship between the household's saving horizon and the proportion of risky assets held. Similarly, Rosen and Wu (2004) find that the saving horizon impacts upon the composition of the household portfolio. However, only having a planning horizon of five to ten years is found to impact upon the proportion of risky assets held.

Households that indicate that they conduct a great deal of 'shopping around' when considering investment decisions hold a higher proportion of risky assets, *ceteris paribus*, compared to households that display no 'shopping around' when considering investment decisions. In contrast, households that display a great deal of 'shopping around' when borrowing money hold a lower proportion of risky assets compared to households who display no 'shopping around' when considering borrowing decisions. A negative relationship between the household's shopping tendencies for both borrowing and investments and the proportion of safe assets held is found. Households that display a moderate amount of shopping tendencies hold a lower proportion of safe assets compared to households with no such shopping tendencies.

An optimistic economic outlook is positively associated with the proportion of risky assets held by the household, compared to households that have a pessimistic outlook on the economy. Having a more optimistic economic outlook reduces the proportion of bonds and safe assets held, and it is associated with holding a higher the proportion of retirement funds.

The results from the tobit analysis presented in this chapter are generally in line with the previous literature. Education, net worth, total income and being married are all associated with holding a higher proportion of risky assets within the household's financial portfolio. There has also been an increasing trend in holding risky assets

across the time period considered supporting the previously reported descriptive statistics. Having a female, black or Hispanic head of household are inversely related to the proportion of risky assets held and have a positive association with the proportion of safe assets held. In addition, having children present in the household reduces the proportion of risky assets held within the financial portfolio. Amongst the attitudinal variables, households unwilling to take financial risks hold a lower proportion of risky assets and a higher proportion of safe assets. Better health is positively associated with the proportion of risky assets within the household's financial portfolio. Both these results are consistent with the existing literature outlined above. The discount rate is found to have the same relationship with risky asset share as found in the existing literature, see for example, Cardak and Wilkins (2009) and Rosen and Wu (2004). Finally, heads of households who believe that the economy will perform better in the next five years hold a higher proportion of risky assets within the financial portfolio.

2.4.2 Zero-Inflated Beta Model

The results of the zero-inflated beta models suggest that the separation of the decision to hold and the decision about the proportion held has a dramatic impact on the estimated results. The results indicate that a variety of factors influence the decision to hold certain asset categories, however, these factors fail to display a statistically significant relationship with the proportion held.

2.4.2.1 Baseline Model

Table A2.5 presents the results of the zero-inflated beta model for the four dependent variables; the proportion of risky assets, the proportion of safe assets, the proportion of bonds and the proportion of retirement accounts. The model for the proportion of risky assets is characterised by a χ^2 statistic of 1,912.76, which implies rejection of the null hypothesis that all the coefficients are simultaneously equal to zero. Similarly, the null hypothesis is rejected for the other dependent variables. The impact of each independent variable upon the probability of holding each asset classification and the impact upon the proportion of the asset categories held are discussed in what follows.

The logit component of the zero-inflated model captures the probability that the dependent variable takes a value of zero. Hence, a positive (negative) coefficient represents a higher (lower) probability of holding none of the asset type considered. In the continuous part of the model, these coefficients are interpreted in the usual manner; a positive coefficient is associated with a greater proportion of the asset held.

Age does not have a statistically significant impact on holding risky assets; however, age is inversely related with the proportion of risky assets held. That is, older heads of household tend to hold a lower proportion of risky assets within their household financial portfolio. This contradicts the findings of the univariate tobit analysis that predicts that the age of the head of household does not have a statistically significant impact upon the proportion of risky assets held. Age reduces both the proportion of safe assets held and the proportion of bonds held and is positively related to the proportion of retirement assets held within the financial portfolio. These findings are consistent with the univariate tobit results.

In line with Bertaut and Starr-McCluer (2002), being female is positively associated with the probability of holding no risky assets, however, being female does not have a statistically significant impact upon the proportion of risky assets held, contradicting the results of the tobit model. Females are more likely to hold safe assets and hold higher proportions of safe assets within their financial portfolio, which is consistent with the results of the tobit model. Similarly, female headed households are more likely to hold no retirement accounts; however, being female does not exert a statistically significant influence on the proportion of retirement accounts held within the portfolio.

Having children present in the household increases the probability of holding no risky assets and reduces the proportion of risky assets within the household portfolio, if some risky assets are held, in accordance with the findings of the tobit model. The findings of the zero-inflated beta model support the results of the tobit model, in that households with children present hold a greater proportion of safe assets within the household's financial portfolio. The findings differ from the tobit results however in that having children present does not have a statistically significant impact upon the proportion of retirement funds held. Having children present does, however, increase the likelihood of holding zero retirement funds within the financial portfolio, *ceteris paribus*.

Being married or cohabiting increases the probability of holding risky assets, yet has a negative impact upon the proportion of risky assets held. This contradicts the finding from the tobit specification where being married or cohabiting increases the proportion of risky assets held. Similarly, being married or cohabiting increases the proportion of safe assets by 1.97%, *ceteris paribus*. This finding differs from that of the tobit model where married or cohabiting couples hold 1.15% less safe assets, *ceteris paribus*.

Findings from both the tobit model and the zero-inflated beta model indicate that being married or cohabiting has a statistically insignificant impact on the proportion of bonds held with the financial portfolio.

Higher levels of education reduce the probability of holding no risky assets, however, in contrast to the results from the tobit specification and the majority of the previous literature, education has a statistically insignificant impact upon the proportion of risky assets held. This may be attributed to the fact that the majority of the studies in the existing literature have not disentangled the impact of the covariates upon participation and the levels held. The result, however, is consistent with Bertaut and Starr-McCluer (2002) and Stavrunova and Yerokhin (2012) who employ a Heckman selection model and a two-part fractional response model, respectively, and find that education is positively associated with the probability of holding risky assets, but not a statistically significant determinant of risky asset share. A consistent finding with the tobit results and the previous literature is, however, that higher levels of education reduce the proportion of safe assets held within the financial portfolio and higher levels of education reduce the probability of holding safe assets. Higher levels of education are also positively associated with holding retirement accounts and bonds within the household's financial portfolio.

Heads of households of black or Hispanic origin are less likely to hold risky assets compared to households with white heads. This result is statistically significant at the 1% level, however, if some risky assets are held, ethnicity does not have a statistically significant impact upon the proportion of risky assets held, contradicting the findings of the tobit model. This is consistent with the results presented in Bertaut and Starr-McCluer (2002) who employed a Heckman selection model and find non-white or Hispanic headed households are statistically significantly less likely to hold risky assets, however, it does not exert a statistically significant impact on the share of risky assets held. Being Black or Hispanic increases the proportion of safe assets held by 3.37% and 4.17% respectively, *ceteris paribus*. This result is in accordance with the findings of the tobit specification and the previous literature.

Both the natural logarithms of net worth and total income are positively associated with the probability of holding risky assets and with the proportion of risky assets held. Higher net worth is associated with a lower proportion of safe assets held. A 1% increase in net worth increases the proportion of safe assets held by 1.11%, *ceteris*

paribus. Net worth and income are found to have a negative relationship with the proportion of retirement funds held. The year controls reveal that compared to 1989, there is a greater proportion of risky assets held in all other years.

2.4.2.2 Attitudinal Variables

Table A2.6 presents the results of the full specification from the zero-inflated beta models. As in the baseline zero-inflated beta models, the null hypothesis that all of the variables are simultaneously equal to zero is rejected. As expected, the likelihood ratio test indicates that the full specification model is preferred over the baseline model.

In line with Stavrunova and Yerokhin (2012), health status does not exert a statistically significant impact on the proportion of risky assets held. However, health has a positive impact on the probability of holding risky assets within the household portfolio. The health of the head of household does not have a statistically significant impact upon the proportion of safe assets held or the probability of holding safe assets. Being in excellent health is the only exception, which reduces the proportion of safe assets held by 2.41%, *ceteris paribus*, compared to heads of household who are in poor health. This contrasts with the findings of the tobit model and previous studies, where being in good health increases the proportion of risky assets held and reduces the proportion of safe assets held within the household's financial portfolio.

In line with Stavrunova and Yerokhin (2012) and Bertaut and Starr-McCluer (2002), the risk attitudes of the head of household exert a statistically significant impact upon the probability of holding risky assets and the proportion of risky assets held. Households that are willing to accept a substantial amount of risk in return for a substantial return are 29.50% more likely to hold risky assets and hold 12.47% more risky assets than households that are not willing to undertake any financial risk, *ceteris paribus*. This result is consistent with the findings of the tobit model. Similarly, heads of households that display a willingness to undertake higher financial risks for higher returns hold a lower proportion of safe assets, compared to heads of households who are not willing to take any financial risks, again supporting the results of the tobit model.

In contrast to the tobit model and Cardak and Wilkins (2009), households that value the future more than the present are less likely to hold no risky assets. The findings suggest, however, that the household's discount factor does not exert a statistically significant impact upon the proportion of risky assets held within the household's

financial portfolio. Similarly, households that value the future more than the present are less likely to hold zero retirement accounts and bonds.

'Shopping around' tendencies reduce the probability of holding no risky assets and higher 'shopping around' tendencies in both investment and borrowing decisions reduce the proportion of risky assets held. Higher levels of investment 'shopping around' tendencies increase the proportion of safe assets held. Compared to displaying no 'shopping around' tendencies, indicating an above average level of 'shopping around' tendencies increases the proportion of safe assets held by 1.66%, *ceteris paribus*. This result contrasts with the findings of the tobit model, where households that 'shop around' more tended to have a lower proportion of safe assets.

In line with the tobit specification, households that think the economy will perform the same or better than the previous five years hold 3.15% and 3.70% higher proportions of risky assets, respectively, compared to individuals who are of the opinion that the economy will perform worse over the next five years. These results accord with those presented in the tobit model. It is found, however, that economic outlook does not have a statistically significant impact upon the probability of holding risky assets. Having a more optimistic economic outlook is associated with holding a lower proportion of safe assets and holding no safe assets.

The results of the zero-inflated beta model are not entirely consistent with the results of the tobit model; however, they accord with those studies in the previous literature that employ a two-part model. In this specification, for example, being female, the level of education and the ethnicity of the head of household do not exert statistically significant impacts upon the proportion of risky assets held contrasting with the findings of the tobit model. The income and net worth of the household are positively associated with the proportion of risky assets, which is consistent with the previous literature and the results of the tobit model. Amongst the attitudinal variables, however, some major contradictions occur between the results of zero-inflated beta model and the results of the tobit model. The health status of the head of household does not exert a statistically significant influence on the proportion of risky assets held; however, health status is positively associated with holding risky assets within the household's portfolio. In line with the previous literature, heads of households that display a greater willingness to bear financial risks for greater returns hold a greater proportion of risky assets and a lower proportion of safe assets. The 'shopping around' tendencies are inversely related

to the proportion of risky assets held, contrasting with the results of the tobit model that suggest that increased 'shopping around' tendencies have a positive relationship with the proportion of risky assets held. The results from the zero-inflated beta model indicate that households who believe that the economy will perform the same or better hold a higher proportion of risk assets within the financial portfolio and are associated with holding lower proportions of safe assets and bonds. The household's economic outlook, however, does not have a statistically significant impact on the proportion of retirement accounts held. These findings accord with the results of the tobit model.

The different results observed in the tobit and zero-inflated beta models could be attributed to two reasons. Firstly, the use of a two stage selection process in the zero-inflated beta model to disentangle participation in holding an asset category and the proportion of the asset held could lead to the different estimation results. This view is supported by the results presented in Bertaut and Starr-McCluer (2002) and Stavrunova and Yerokhin (2012), who obtain similar results to those reported in this chapter once the participation decision is separated from the decision relating to the proportion held. Secondly, the assumption of normality in the tobit model may be violated and, as a consequence, could lead to biased results. Here, the use of a beta regression model overcomes this problem and, hence, different results are obtained.

2.4.3 The Fractional Logit Model

2.4.3.1 Baseline Model

Table A2.7 presents the results of the fractional logit models for the baseline and full specifications for each asset classification. Across all the baseline specifications, it is found that the null hypotheses that the coefficients are simultaneously equal to zero are rejected.

Age has a negative impact upon the proportion of risky assets held: an additional year results in a reduction in the proportion of risky assets held by 0.14%, *ceteris paribus*. This contrasts with the findings of the tobit model and the findings of Rosen and Wu (2004). Age also exerts a negative influence on the proportions of safe assets and bonds held within the household's financial portfolio, yet age is positively related to the proportion of retirement accounts held. The findings suggest a concave relationship between age and the proportion of retirement funds held within the household's

financial portfolio. These findings tie in with Berkowitz and Qiu (2006) who report a positive and concave relationship between age and retirement assets.

Females hold a lower proportion of risky assets compared to male headed households. Being female reduces the proportion of risky assets held by 2.72% compared to males, *ceteris paribus*. Female headed households are associated with holding a higher proportion of safe assets and, in addition, females hold a lower proportion of retirement assets compared to males. This contrasts with the findings of Berkowitz and Qiu (2006), who find that being female does not exert a statistically significant impact upon the proportion of each asset classification held.

Having children present in the household reduces the proportion of risky assets held and being married or cohabiting does not exert a statistically significant impact on the proportion of risky assets held. The presence of children increases the proportion of safe assets held within the household's portfolio by 4.79%, *ceteris paribus*, and being married or cohabiting does not have a statistically significant impact upon the proportion of safe assets held.

As found in the tobit specification, higher levels of education are associated with higher proportions of risky assets, bonds and retirement accounts held and a lower proportion of safe assets. Heads of households with a college education hold 19.06% more risky assets than those with below high school level education. This is consistent with the previous literature reviewed in Section 2.2. In accordance with the results of the tobit model, increases in the level of education are associated with holding a lower proportion of safe assets within the household's portfolio. Possessing a college degree compared to not having high school education reduces the proportion of safe assets held within the household's financial portfolio by 32.66%, *ceteris paribus*. This finding contrasts with the results from the zero-inflated beta model, where the education of the head of household only influences participation in the risky asset category and not the proportion of risky assets held.

Heads of household who are of black or Hispanic origin hold a lower proportion of risky assets, 6.77% and 8.52% less, respectively, relative to white heads of households. Also, households with black or Hispanic heads hold a greater proportion of safe assets within the portfolio and a lower the proportion of bonds. This is consistent with the findings of Berkowitz and Qiu (2006), who find that white households hold a greater

proportion of risky, retirement assets and bonds within the portfolio, and hold a lower proportion of safe assets.

Both total income and net worth have a positive relationship with the proportion of risky assets held: a 1% increase in total income and net worth increases the proportion of risky assets held by 2.56% and 1.85%, respectively, *ceteris paribus*. Net worth and total income are both inversely associated with the proportion of safe assets held. A positive relationship between the year controls and the proportion of risky assets held is found, with a peak at 1998 relative to the omitted year of 1989. This result accords with the descriptive statistics presented previously and Bertaut and Starr-McCluer (2002).

2.4.3.2 Attitudinal Variables

Table A2.7 indicates that, in line with the tobit model and Rosen and Wu (2004), being in fair, good or excellent health increases and decreases the proportions of risky assets and safe assets held within the portfolio compared to being in poor health, respectively. This result also supports the findings of Cardak and Wilkins (2009) who report that being in poor health is associated with a reduction in the proportion of risky assets held by the household. One possible explanation for this is that poor health increases the background risk experienced by the household and so they compensate for this by reducing their financial risk exposure.

Households that display a willingness to take larger financial risks for larger returns, on average, hold a higher proportion of risky assets, *ceteris paribus*, compared to households that are not willing to take and risks financially. Households that display a willingness to undertake a substantial amount of risk for substantial returns hold 21.38% more risky assets, *ceteris paribus*, compared to households that are not willing to take any financial risks. Households that are willing to take higher financial risk in return for higher returns hold a lower proportion of safe assets and a higher proportion of retirement funds within the household's portfolio. This is in accordance with the findings of Cardak and Wilkins (2009) who find that more risk averse households hold a lower proportion of risky assets.

Households with longer time horizons hold a higher proportion of risky assets within their financial portfolio. This is consistent with the findings of the tobit specification yet contrasts with the findings from the zero-inflated beta model. Heads of households that state that they value the period of ten years or more into the future hold 10.73% less safe assets than households that value the next few months most. Similarly, households

with low time preference hold a higher proportion of retirement accounts, suggesting that the long term pay offs of these accounts are greater to these heads of households than the alternative short term gains. This is consistent with the findings of the tobit model and the previous literature, see for example, Cardak and Wilkins (2009) who find that households with longer saving horizons hold a higher proportion of risky assets.

Similarly, households that display a high degree of 'shopping around' tendencies for investments are likely to hold a higher proportion of risky assets within their financial portfolios. Economic expectations have a statistically significant impact upon the proportion of risky assets held. Compared to heads of household who are of the opinion that the economy will perform worse in the next five years, heads of household who feel that the economy will do the same or perform better will hold 1.49% and 1.53% higher proportions of risky assets within their household portfolio, respectively, *ceteris paribus*. These results support the results of the tobit model. Prior to discussing the results of the multivariate tobit, the performance of the univariate models is reviewed.

2.4.4 Model Performance of the Univariate Models

In this sub-section, the performance of the three models is compared. Subsequently, the information criteria of the models are reviewed and the predicted and the actual proportions of each asset held are compared. Table 2.2 shows the Akaike and Bayesian Information Criteria, AIC and BIC, respectively. These information criteria indicate the goodness of fit of the models and the lowest value indicates the preferred model.

Table 2.2: Information Criteria of the Univariate Models

	Doubled Censored Tobit Model		Zero-Inflated Beta Model		Fractional Logit Model	
Baseline Specification	AIC	BIC	AIC	BIC	AIC	BIC
Risky Assets	164,296.5	164,522.0	131,041.4	131,492.4	103,312.9	103,528.6
Safe Assets	187,807.9	188,033.4	108,497.6	108,948.6	122,963.2	123,178.9
Bonds	68,172.1	68,397.6	61,197.9	61,639.1	33,927.7	34,143.4
Retirement funds	153,718.7	153,944.2	108,234.1	108,685.1	91,190.6	91,406.3
Full Specification						
Risky Assets	156,320.6	156,742.2	123,356.6	124,199.7	100,125.1	100,536.8
Safe Assets	177,351.3	177,772.9	106,930.8	107,773.9	117,875.9	118,287.7
Bonds	67,054.2	67,475.7	59,331.7	60,165.06	33,608.3	34,020.1
Retirement funds	150,155.8	150,577.3	103,817.5	104,660.7	90,070.1	90,481.9

It is apparent from Table 2.2 that for risky assets, bonds and retirement funds the fractional logit model is characterised by the lowest information criteria for both the baseline and full specifications. When safe assets are considered, for both

specifications, the zero-inflated beta model is the preferred model. The double censored tobit model is never the preferred model compared to the alternatives analysed in this chapter. The superior model performance of both the fractional logit model and the zero-inflated beta model to the double censored tobit model could be attributed to the underlying functional form of the models. As discussed previously, a proportional dependent variable implies a non-linear relationship between the dependent and independent variables. Both the zero-inflated beta model and the fractional logit model have a non-linear relationship and consequently this could explain the improved model performance.

The predicted means of each model for each asset classification are now compared to the actual means. That is $E(\mathbf{x}'\boldsymbol{\beta})$ is estimated where $\boldsymbol{\beta}$ is the vector of the estimated coefficients of the full specification and $\mathbf{x}$ is the vector of independent variables estimated at the sample means. The actual means refer to the proportions calculated from the sample data. Table 2.3 shows the actual means of the sample and the predicted means of the three models employed for the baseline and full models.

Table 2.3: Predicted Means of the Double Censored Tobit Model, the Zero-Inflated Beta Model and the Fractional Logit Model

	Sample Mean	Sample Mean Conditional on Asset being Held	Doubled Censored Tobit Model		Zero-Inflated Beta Model		Fractional Logit Model	
Asset			Baseline	Full	Baseline	Full	Baseline	Full
RA	0.2195	0.5192	0.3513	0.3438	0.4921	0.4838	0.2120	0.2115
SA	0.5870	0.5886	0.5795	0.5843	0.3515	0.3614	0.6011	0.6021
B	0.0469	0.2893	0.1966	0.1945	0.3190	0.3350	0.0450	0.0450
RF	0.1466	0.3693	0.3217	0.3180	0.4690	0.4722	0.1429	0.1424

It appears that the fractional logit model provides the closest prediction to the actual mean in the samples across all of the asset classifications excluding safe assets, where the tobit model provides a closer prediction. It also appears that the zero-inflated beta model provides the worst prediction of the means out of all three models. Hence, the fractional logit model is arguably the preferred model as it provides the lowest information criteria and the best prediction of the sample means across all four asset categories.

2.4.5 Multivariate Tobit Model

Prior to analysing the multivariate tobit model, the correlation matrix presented in Table 2.1 is considered. It is apparent that there exists a negative correlation between the

proportion of retirement funds and the proportion of risky assets held and the proportion of bonds and the proportion of retirement funds. A positive correlation is displayed between the proportion of risky assets and bonds. These correlations potentially indicate that a multivariate analysis is more appropriate than univariate analysis as it will provide more efficient estimation. The results of the multivariate tobit model are now discussed.

2.4.5.1 Baseline Model

Table A2.8 presents the results of the baseline multivariate tobit model and Table A2.9 presents the results for the full specification. These tables show the coefficients and the corresponding marginal effects. The marginal effects of the model are generated by multiplying the coefficient by the scaling factor. As previously calculated, the scaling factors are 0.5784, 0.8380 and 0.6043 for the proportion of risky assets, the proportion of bonds and the proportion of retirement funds held, respectively.

To test the statistical significance of the model, a likelihood ratio test is implemented to test the null hypothesis that all of the parameter estimates are simultaneously equal to zero. The χ^2 statistic for the baseline specification is 78,441.97, indicating rejection of the null hypothesis that all parameters are equal to zero. All of the covariance matrix entries are individually significant at the 1% level. In order to test whether there is interdependence between each asset classification, a likelihood ratio test is employed. In this test, the null hypothesis is that the off-diagonal elements of the covariance matrix are equal to zero and, therefore, independence exists between the error terms. The alternative hypothesis is that the off-diagonal elements are not equal to zero and, therefore, interdependence exists between the asset classifications. A χ^2 statistic of 1,106.99 is generated, implying rejection of the null hypothesis and, therefore, interdependence between the asset classifications. It can also be stated that there is a positive correlation between the proportion of risky assets and the proportion of bonds held within the portfolio, whereas a negative correlation is present between the proportion of risky assets and retirement funds. Similarly, there is a negative correlation between the proportion of retirement funds and bonds held as indicated by the negative correlation coefficient.

Focusing on the independent variables, in line with the univariate tobit model, age is not found to play a significant role in determining the proportion of risky assets held. Being female reduces the proportion of risky assets held within the household portfolio by

4.88%, *ceteris paribus*, whilst having children present within the household reduces the proportion of risky assets by 2.21%, *ceteris paribus*. Being married or cohabiting, as in the standard univariate tobit model, increases the proportion of risky assets held by 1.53%, *ceteris paribus*. In addition, a positive relationship exists between the level of education and the proportion of risky assets held within the household's portfolio. Having education up to college level increases the level of risky assets held by 27.78%, *ceteris paribus*, compared to those with less than high school education. Similarly having high school education or a graduate qualification both increase the proportion of risky assets held by 14.26% and 32.60%, ceteris paribus, respectively. As previously found, being employed or retired increases the proportion of risky assets held by 1.63% and 2.71%, respectively, *ceteris paribus*. A 1% increase in the total income of the household increases the proportion of risky assets by 4.51%, *ceteris paribus*. Correspondingly, a 1% increase in the net worth of the household results in the proportion of risky assets increasing by 1.82%, *ceteris paribus*. This indicates that changes in the household's income result in a greater change in the proportion of risky assets than changes in the household's net worth. Having a black or Hispanic head of the household reduces the proportion of risky assets held by the household compared to having a white head of household. Being black reduces the proportion of risky assets held by 13.41%, *ceteris paribus*, and being Hispanic is found to reduce the proportion held by 17.54%, *ceteris paribus*. As in the univariate tobit case, there is a positive relationship between the year controls and the proportion of risky assets held, as compared to the base year of 1989.

2.4.5.2 Attitudinal Variables

Table A2.9 presents the coefficients and marginal effects of the multivariate tobit model for the full specification. It also reports the chi-squared statistics and correlation coefficients between the error terms of each asset classification.

The χ^2 statistic is 86,178.38, indicating rejection of the null hypothesis that all the coefficients are simultaneously equal to zero. All of the elements of the covariance matrix are found to be statistically significant at the 1% level. As in the baseline specification, there is a positive correlation between the error terms of the proportion of risky assets and the proportion of bonds held, whilst a negative correlation exists between the proportion of retirement funds held and risky assets. There also exists a negative relationship between the proportion of retirement assets and the proportion of bonds held within the household's financial portfolio. As in the baseline specification,

the χ^2 statistic of 2,275.37 is obtained, indicating rejection of the null hypothesis and, hence, interdependence between the error terms. This is found to be statistically significant at the 1% level.

With respect to the independent variables, the results are consistent with the findings of the univariate tobit specification. Age increases the proportion of retirement funds held within the household's financial portfolio and this is increasing at a decreasing rate. A negative relationship between the age of the head of the household and the proportion of risky assets and bonds held by the households is found. As in the univariate tobit models, having a female as the head of household and having children present in the household reduce the proportion of risky assets held. Being female has a statistically insignificant impact upon the proportion of risky assets held and is found to increase the proportion of bonds held within the household's portfolio. Having children present in the household reduces the proportion of all three asset categories held in the household's financial portfolio. Education, ethnicity, income and net worth all have the same relationship between the dependent variables as previously found in the univariate tobit models.

The health of the head of household has the same impact as previously found: being in excellent, good or fair health increases the proportions of risky assets and retirement funds held and health does not exert a statistically significant impact upon the proportion of bonds held. This is consistent with the majority of previous studies outlined in Section 2.2 and with the results of the univariate tobit specifications.

The risk attitudes of the head of household have the same effects as in the results from the univariate tobit models. Households that display a willingness to undertake higher financial risks for greater returns hold greater proportions of risky assets, retirement accounts and bonds within their financial portfolio. Displaying a willingness to take substantial financial risk for substantial returns, however, is negatively related to the proportion of safe assets held.

Households that have low time preference are found to hold a greater proportion of risky assets, bonds and retirement funds within the household financial portfolio. Valuing the period ten or more years in the future is associated with holding a proportion of 6.72% more risky assets, 7.18% more retirement funds and 7.00% more bonds, *ceteris paribus*. This is consistent with the findings of the univariate tobit specifications.

As previously found, households with heads, who believe the economy is going to perform the same or better in the next five years, hold a greater proportion of risky assets. Heads of households who anticipate that the economy will perform better than the previous five years hold lower proportions of bonds within the household's financial portfolio. Believing the economy will perform the same or better are not statistically significant determinants of the proportion of retirement funds held at the 1% level. This is consistent with the results from the univariate tobit model.

2.5 Conclusion

This chapter has analysed the determinants that influence the composition of a household's financial portfolio using data from the U.S. SCF between 1989 and 2007. The U.S. SCF contains a wide variety of information relating to household demographic and socio-economic characteristics along with detailed information concerning the household's financial assets. In line with Rosen and Wu (2004), the chapter separates household's financial assets into four distinct asset types: risky; safe; bonds; and retirement funds. The proportion of the household's total financial wealth held within each of these asset categories was then calculated and these formed the dependent variables analysed in this chapter. Initially, a double censored tobit model censored between zero and one was analysed as a reference case against which to compare the subsequent results. *Ceteris paribus*, education has a positive relationship with the proportion of risky assets held and a negative relationship with the proportion of safe assets held. Black or Hispanic headed households, on average hold a lower proportion of risky assets and a higher proportion of safe assets. Compared to being in poor health, being in fair, good or excellent health increases the proportion of risky assets and the proportion of retirement funds held. Also, being in good health reduces the proportions of bonds and safe assets held. In line with prior expectations, the risk attitudes give the expected results, that is, household heads that display a willingness to take higher financial risk for higher returns hold a higher proportion of risky assets and a lower proportion of safe assets. These results are generally consistent with the findings in the previous literature.

The tobit model is arguably the most commonly used approach to analyse financial portfolios at the household level in the existing literature. However, Maddala (1991) argues that the technique is fundamentally flawed. The problem arises because the dependent variable is not observationally censored between zero and one but rather it is

defined on this interval. Also, the tobit model imposes the strong assumption that the error term follows a normal distribution. As a consequence, two further models were explored that overcome the problems associated with the tobit specification. Firstly, the zero-inflated beta model was analysed. This model contains a logistic distribution to model the probability of holding zero assets and a beta distribution to model observations on the interval (0, 1). Significantly different results were obtained as compared to the tobit specification. It was found that many of the variables that were statistically significant in determining the proportions of assets held in the tobit model were statistically insignificant in the zero-inflated beta model. Such variables were found, however, to have a significant impact upon whether the household holds none of each asset category. An alternative model that can be used for dependent variables of a proportional nature is the fractional logit model. Initially presented by Papke and Wooldridge (1996), the fractional logit model is based on the assumption that the expected value, conditional on a set of covariates, follows a logistic function, thus ensuring the interval of zero and one is adhered to. In this specification, there were no major changes relative to the results obtained via the tobit model. This indicates that the major differences displayed in the zero-inflated beta model may be attributed to modelling the probability of holding zero assets independently of the proportion of the asset held. When a series of model performance measures were analysed, however, the fractional logit model is arguably the preferred model. It performs the best across both the Akaike and Bayesian information criteria for all but the safe asset classification, where the zero-inflated beta model is preferred. The fractional logit model also outperforms the alternative models when comparing the predicted means of each model to the sample means.

Although the zero-inflated beta regression model and the fractional logit model overcome the problems associated with applying a tobit model to proportional data, they still only model the different types of assets individually. Naturally, it is likely that there is a degree of correlation between the proportions of each asset classification held. As a result, a multivariate tobit model was employed to analyse the correlations between the asset classifications. The joint modelling of the different types of assets provides more efficient estimation of the coefficients and so is arguably preferred to the univariate cases. The estimated coefficients of the multivariate model are consistent with those of the univariate tobit models. Also, from the results of the multivariate tobit model, it is possible to observe the covariance matrix of the error terms of the dependent

variables. From this, a log likelihood test was used to test whether the off-diagonal elements are all simultaneously equal to zero. The correlation measures are significantly different from zero and they indicate that there is positive correlation between risky assets and retirement accounts and a negative correlation between risky assets and bonds and bonds and retirement accounts.

The empirical analysis presented in this chapter aims to verify the robustness of the results obtained in the existing literature by employing three econometric models which have not been used previously in this area. Both the fractional logit model and the multivariate tobit model reinforce the results of the tobit model and the previous literature. However, the results of the zero-inflated beta model contrasts with many of the results obtained in the existing literature and both the fractional logit model and the multivariate tobit model. This may be attributed to the zero-inflated beta model modelling the probability of holding zero assets separately to the proportion of assets held. Also, from the multivariate tobit analysis, there exists correlation between the error terms of the dependent variables. Consequently, multivariate analysis will provide a more efficient estimation of the model's coefficients.

It is important, however, to acknowledge the shortcomings of the empirical analysis presented in this chapter. This study could be improved by using panel data to track the same individuals over time. Despite the U.S. SCF containing a large amount of information on the financial assets held by the household, it is arguably limited as it is not a panel survey. For this reason it is not possible to control for heterogeneity in the data via, for example, fixed effects models. For example, Fan and Zhao (2009) find that the relationship between health status and both financial and non-financial assets disappears once a fixed effects model is implemented. The results indicate that this relationship is driven by heterogeneity. Also, Love and Smith (2010), find that once heterogeneity is controlled for, the impact of health status on the proportion of stocks held is significantly reduced. It should be recognised that controlling for such heterogeneity could significantly change the results presented in this chapter. The empirical analysis presented in this chapter, is also arguably limited as it not possible to comment on causality, which reflects the cross-sectional nature of the data.

2.6 Appendix to Chapter 2

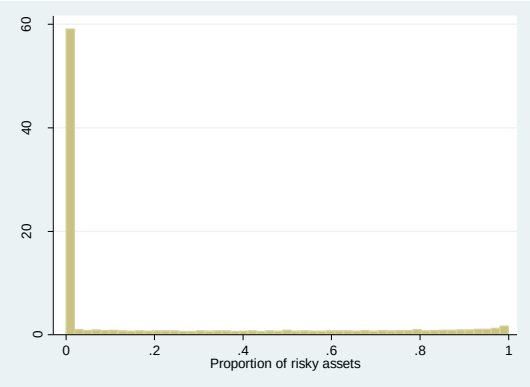


Figure A2.1: Proportion of Risky Assets

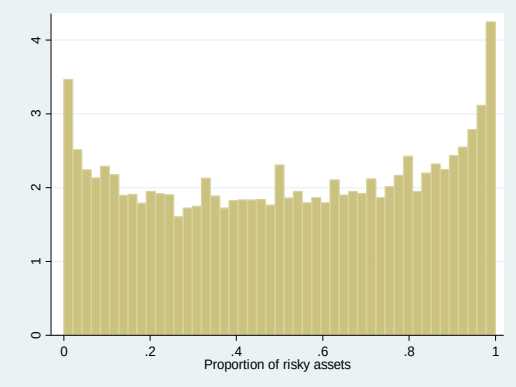


Figure A2.2: Distribution of Risky Assets Conditional on Holding Risky Assets

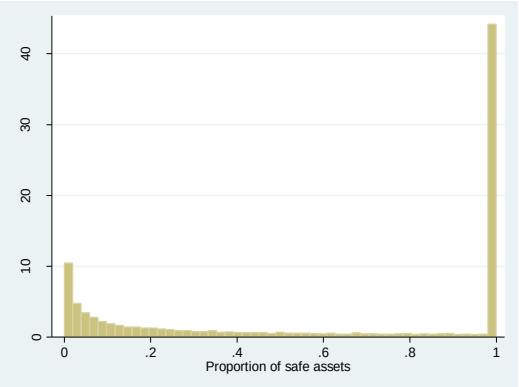


Figure A2.3: Proportion of Safe Assets

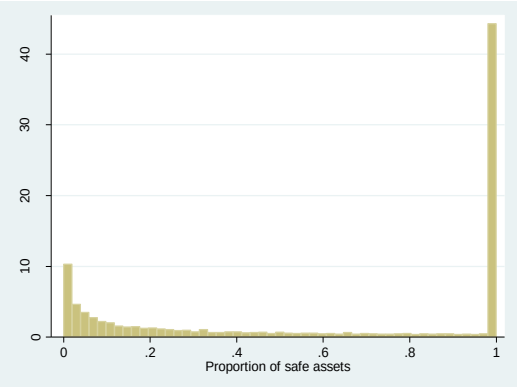


Figure A2.4: Distribution of Safe Assets Conditional on Holding Safe Assets

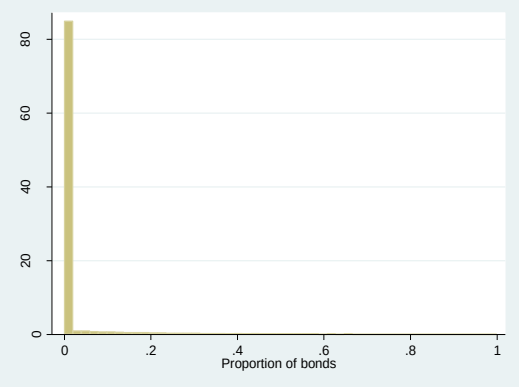


Figure A2.5: Proportion of Bonds

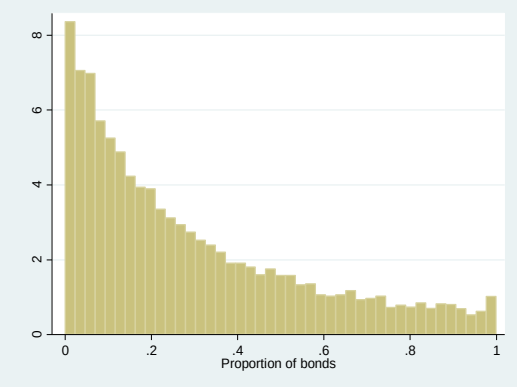


Figure A2.6: Distribution of Bond Holding Conditional on Holding Bonds

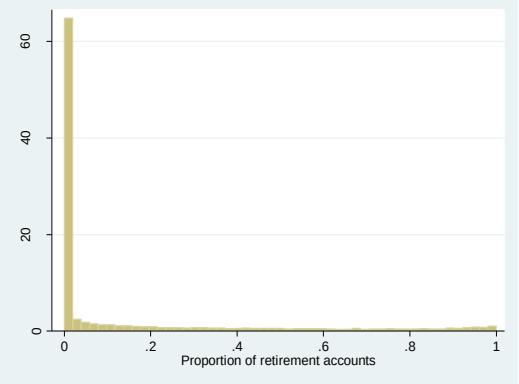


Figure A2.7: Proportion of Retirement Funds

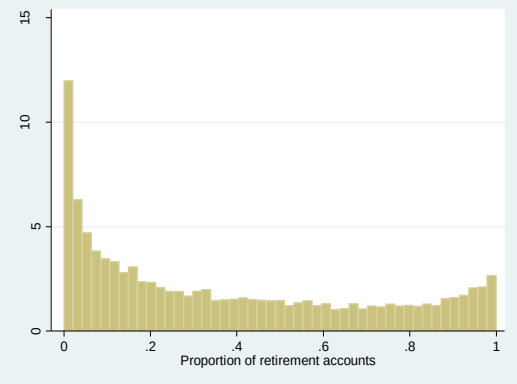
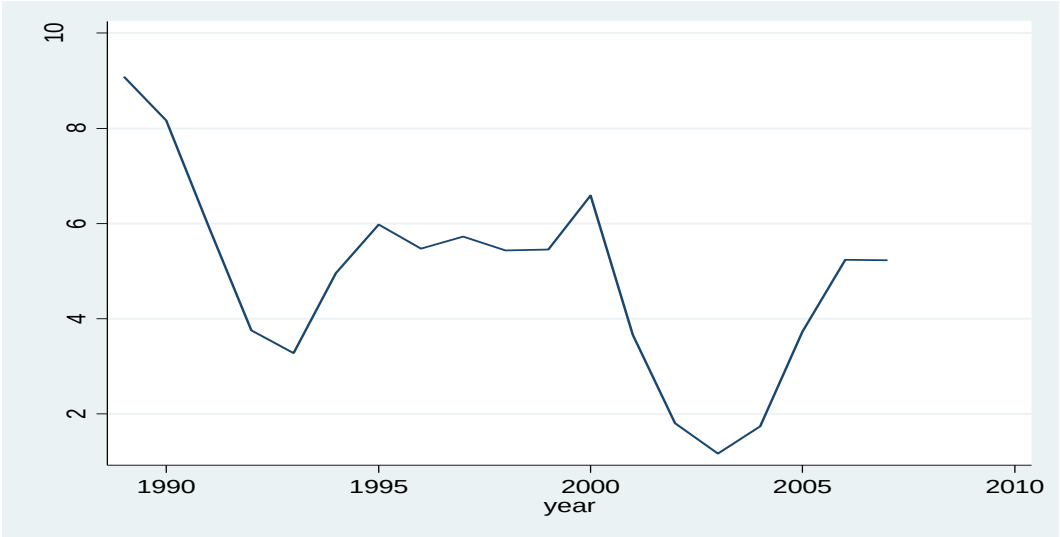


Figure A2.8: Distribution of Retirement Funds Conditional on Holding Retirement Funds

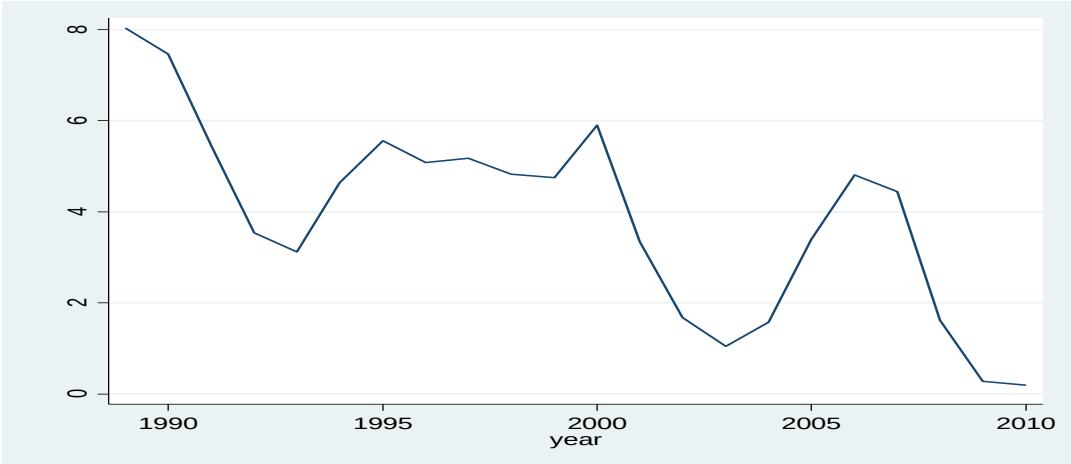
Source: http://moneycentral.msn.com

Figure A2.9: S & P 500 Stock Index between January 1989 and January 2007



Source http://www.federalreserve.gov/releases/h15/data/Annual/H15_CD_M6.txt

Figure A2.10: Average Rate of Return on a 6 Month Certificate of Deposit



Source: http://www.federalreserve.gov/releases/h15/data/Annual/H15_TB_M6.txt

Figure A2.11: Average Return on a 6 Month Treasury Bill

Table A2.1: Distribution and Descriptive Statistics of the Dependent Variables

				Percentile of Mean Proportion Held			
	Percentage of Household's Holding Asset	Mean Proportion Held in the Household's Portfolio	Standard Deviation	25th	50th	75th	Number of Obs.
All							133,787
RA_i	42.2567	0.2195	0.3259	0	0	0.4284	
SA_i	99.7225	0.5869	0.4215	0.1111	0.7168	1	
B_i	16.2011	0.0469	0.1490	0	0	0	
RF_i	39.6847	0.1466	0.2720	0	0	0.1528	
Year							
1989							14,212
RA_i	37.6372	0.1590	0.2801	0	0	0.2014	
SA_i	99.8311	0.6382	0.3990	0.2089	0.8659	1	
B_i	18.0974	0.0598	0.1714	0	0	0	
RF_i	39.9733	0.1430	0.2673	0	0	0.1449	
1992							17,792
RA_i	37.9215	0.1793	0.2972	0	0	0.2857	
SA_i	99.7752	0.6117	0.4150	0.1447	0.8169	1	
B_i	18.5252	0.0625	0.1740	0	0	0	
RF_i	39.2592	0.1465	0.2700	0	0	0.1618	
1995							19,627
RA_i	40.1946	0.2006	0.3125	0	0	0.3691	
SA_i	99.7707	0.5961	0.4189	0.1228	0.7502	1	
B_i	17.2161	0.0514	0.1574	0	0	0	
RF_i	38.6203	0.1519	0.2790	0	0	0.1656	
1998							19,959
RA_i	44.5113	0.2553	0.3490	0	0	0.5418	
SA_i	99.7345	0.5625	0.4309	0.0806	0.6364	1	
B_i	15.1711	0.0407	0.1385	0	0	0	
RF_i	38.6943	0.1414	0.2671	0	0	0.1389	
2001							20,742
RA_i	46.5047	0.2643	0.3519	0	0	0.5662	
SA_i	99.4166	0.5459	0.4316	0.0665	0.5706	1	
B_i	14.5068	0.0394	0.1335	0	0	0	
RF_i	41.3316	0.1504	0.2743	0	0	0.1656	
2004							20,854
RA_i	44.9266	0.2339	0.3270	0	0	0.4839	
SA_i	99.7602	0.5881	0.4205	0.1163	0.7192	1	
B_i	17.0135	0.0430	0.1371	0	0	0	
RF_i	38.6161	0.1350	0.2604	0	0	0.1266	
2007							20,601
RA_i	41.9883	0.2199	0.3279	0	0	0.4339	
SA_i	99.8301	0.5851	0.4208	0.1124	0.7126	1	
B_i	13.8003	0.0379	0.1342	0	0	0	
RF_i	41.2504	0.1572	0.2834	0	0	0.1696	

Table A2.2: Independent Variable Definitions

Variables	Description
Age	Age of head of the household.
Age Squared	Age of head of household squared.
Female	1 if head of household is female, 0 if male.
Children	1 if children are present in the household, 0 otherwise.
Married	1 if the head of household is married or cohabiting, 0 otherwise.
Education - *(Below high school level is omitted category)*	
High School	1 if head of household's highest level of education is high school level, 0 otherwise.
College	1 if head of household's highest level of education is college, 0 otherwise.
Grad School	1 if head of household's highest level of education is post-college, 0 otherwise.
Employment Status - *(Out of work force is omitted category)*	
Unemployed	1 if head of household is unemployed, 0 otherwise.
Employed	1 if head of household is employed, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Ethnicity - *(White is omitted category)*	
Black	1 if head of household is Black, 0 otherwise.
Hispanic	1 if head of household is Hispanic, 0 otherwise.
Financial Measures	
Natural Logarithm of Total Income	Natural logarithm of gross total income from all sources.
Natural Logarithm of Net Worth	Natural logarithm of net worth, where net worth is defined as total assets minus total liabilities.
Year - *(1989 is omitted category)*	
1992	1 if observation is from 1992, 0 otherwise.
1995	1 if observation is from 1995, 0 otherwise.
1998	1 if observation is from 1998, 0 otherwise.
2001	1 if observation is from 2001, 0 otherwise.
2004	1 if observation is from 2004, 0 otherwise.
2007	1 if observation is from 2007, 0 otherwise.
Attitudinal Variables	
Risk Attitudes - *(Heads of households reporting no willingness to take any financial risk is the omitted category)*	
Average Risk	1 if the head of household reports a willingness to take an average amount of financial risk for average returns, 0 otherwise.
Above Average Risk	1 if the head of household reports a willingness to undertake above average levels of risk for above average returns, 0 otherwise.
Substantial Amount of Risk	1 if the head of household reports a willingness to undertake a substantial amount of financial risk in return for a substantial return, 0 otherwise.
Self-Reported Health Status - *(Being of poor health is omitted category)*	
Fair Health	1 if the head of household reports being in fair health, 0 otherwise.
Good Health	1 if the head of household reports being in good health, 0 otherwise.
Excellent Health	1 if the head of household reports being in excellent health, 0 otherwise.
Investment Horizons - *(Next few month is omitted category)*	
Next Year	1 if next year is the household's most important period for planning saving and spending, 0 otherwise.
Next Few Years	1 if the next few years is the household's most important period for planning saving and spending, 0 otherwise
Five to Ten Years	1 if the period 5 to 10 years is the household's most important period for planning saving and spending, 0 otherwise.
Ten Years Plus	1 if ten plus is the household's most important period for planning saving and spending, 0 otherwise.

Table A2.2: Independent Variable Definitions *(Continued)*

Variables	Description
Economic Expectations - *(Economy will perform worse is in next five years is omitted category)*	
Better	1 if the head of the household believes the economy in the next 5 years will perform better than the previous five years, 0 otherwise.
Same	1 if the head of the household believe the economy in the next 5 years will perform the same as the previous five years, 0 otherwise.
Borrowing Shopping Tendencies - *(Displaying no shopping tendencies is the omitted variable)*	
Some Shopping – Borrowing	1 if the head of household displays some shopping tendencies when borrowing money or obtaining credit, 0 otherwise.
Moderate Shopping-Borrowing	1 if the head of household displays a moderate level of shopping tendencies when considering borrowing money or obtaining credit, 0 otherwise.
Above Average Shopping – Borrowing	1 if the head of the household displays an above average level of shopping when borrowing money or obtaining credit, 0 otherwise.
Great Deal of Shopping - Borrowing	1 if the head of household displays a great deal of shopping when borrowing money or obtaining credit, 0 otherwise.
Investment Shopping Tendencies - *(Displaying no shopping tendencies is the omitted variable)*	
Some Shopping – Investment	1 if the head of household displays some shopping tendencies when making saving and investment decisions, 0 otherwise.
Moderate Shopping-Investment	1 if the head of household displays a moderate level of shopping tendencies when making saving and investment decisions, 0 otherwise.
Above Average Shopping – Investment	1 if the head of the household displays an above average level of shopping when making saving and investment decisions, 0 otherwise.
Great Deal of Shopping – Investment	1 if the head of household displays a great deal of shopping when making saving and investment decisions, 0 otherwise.

Table A2.3: Summary Statistics of the Independent Variables

Variables	Mean	Standard Deviation	Min. Value	Max. Value
Age	51.1385	16.0934	17	95
Age Squared	2,874.15	1,727.07	289	9,025
Female	0.1922	0.3940	0	1
Children	0.4213	0.4938	0	1
Married	0.6939	0.4609	0	1
Education				
Below High School (Omitted Category)	0.0440	0.2052	0	1
High School	0.3027	0.4594	0	1
College	0.4295	0.4950	0	1
Grad School	0.2238	0.4168	0	1
Labour Force Status				
Out of Labour Force (Omitted Category)	0.0736	0.2611	0	1
Unemployed	0.0247	0.1551	0	1
Employed	0.7070	0.4551	0	1
Retired	0.1963	0.3972	0	1
Ethnicity				
White (Omitted Category)	0.8767	0.3287	0	1
Black	0.0758	0.2647	0	1
Hispanic	0.0474	0.2126	0	1
Financial Measures				
Natural Log. of Total Income	11.4192	1.8289	0	19.2169
Natural Log. of Net Worth	10.4933	5.7746	-14.8992	20.3911
Years				
1989 (Omitted Category)	0.1062	0.3081	0	1
1992	0.1330	0.3396	0	1
1995	0.1467	0.3538	0	1
1998	0.1492	0.3563	0	1
2001	0.1550	0.3619	0	1
2004	0.1559	0.3627	0	1
2007	0.1540	0.3609	0	1
Attitude Preferences				
Risk attitudes				
No Risk (Omitted category)	0.3054	0.4606	0	1
Average Risk	0.4297	0.4950	0	1
Above Average Risk	0.2102	0.4075	0	1
Substantial Amount of Risk	0.0547	0.2274	0	1
Health Status				
Poor Health (Omitted category)	0.0390	0.1936	0	1
Fair Health	0.1381	0.3450	0	1
Good Health	0.4442	0.4969	0	1
Excellent Health	0.3786	0.4850	0	1

Table 2.3: Summary Statistics of the Independent Variables (*Continued)*

Variables	Mean	Standard Deviation	Min. Value	Max. Value
Investment Horizons				
Most Important Period - Next Few Months (Omitted Category)	0.1504	0.3575	0	1
Most Important Period - Next Year	0.1120	0.3153	0	1
Most Important Period - Next Few Years	0.2467	0.4312	0	1
Most Important Period - Five to Ten Year	0.2942	0.4557	0	1
Most Important Period - Ten Years Plus	0.1965	0.3974	0	1
Investment Shopping Tendencies				
No Shopping Tendencies (Omitted Category)	0.4047	0.4908	0	1
Some Shopping – Investment	0.0699	0.2549	0	1
Moderate Shopping-Investment	0.2579	0.4375	0	1
Above Average Shopping – Investment	0.1030	0.3039	0	1
Great Deal of Shopping – Investment	0.1646	0.3708	0	1
Borrowing Shopping Tendencies				
No Shopping Tendencies (Omitted Category)	0.1919	0.3938	0	1
Some Shopping – Borrowing	0.0648	0.2462	0	1
Moderate Shopping-Borrowing	0.3084	0.4618	0	1
Above Average Shopping – Borrowing	0.1343	0.3409	0	1
Great Deal of Shopping – Borrowing	0.2467	0.4311	0	1
Economic Expectations				
Worse (Omitted category)	0.2505	0.4333	0	1
Same	0.4264	0.4946	0	1
Better	0.3231	0.4677	0	1

Table A2.4: The Determinants of Assets Holding - Tobit Model Results: Baseline and Full Model Specifications

The dependent variable is the share of financial wealth held in a particular asset category. Tobit models are left and right censored at zero and one, respectively. The sample is drawn from pooled data from the 1989 – 2007 waves of the U.S. Survey of Consumer Finances.

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full model		Baseline Model		Full model		Baseline Model		Full model		Baseline Model		Full model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Natural Log of Total Income	0.0795** (0.0012)	0.0460	0.0577** (0.0012)	0.0334	-0.0713** (0.0011)	-0.0313	-0.0491** (0.0011)	-0.0215	0.0477** (0.0017)	0.0399	0.0465** (0.0017)	0.0390	-0.0047** (0.0012)	-0.0028	-0.0155** (0.0012)	-0.0093
Natural Log. of Net Worth	0.0316** (0.0005)	0.0183	0.0266** (0.0005)	0.0154	-0.0347** (0.0004)	-0.0152	-0.0295** (0.0004)	-0.0129	0.1035** (0.0015)	0.0868	0.0987** (0.0015)	0.0827	0.0244** (0.0005)	0.0148	0.0207** (0.0005)	0.0125
Fair Health			0.0742** (0.0123)	0.0429			-0.0726** (0.0103)	-0.0319			-0.0426** (0.0145)	-0.0357			0.0543** (0.0121)	0.0328
Good Health			0.1336** (0.0118)	0.0773			-0.1481** (0.0099)	-0.0650			-0.0026 (0.0137)	-0.0022			0.1087** (0.0115)	0.0657
Excellent Health			0.1553** (0.0119)	0.0898			-0.1863** (0.0100)	-0.0818			0.0110 (0.0138)	0.0092			0.1411** (0.0117)	0.0853
Average Risk			0.3013** (0.0050)	0.1742			-0.3020** (0.0042)	-0.1326			0.0984** (0.0060)	0.0824			0.1897** (0.0047)	0.1146
Above Average Risk			0.4232** (0.0057)	0.2448			-0.3859** (0.0050)	-0.1694			0.0480** (0.0069)	0.0403			0.2089** (0.0056)	0.1262
Substantial Amount of Risk			0.3891** (0.0081)	0.2251			-0.3304** (0.0073)	-0.1450			-0.0514** (0.0099)	-0.0431			0.1651** (0.0081)	0.0998
Most Important Period - Ten Years Plus			0.1203** (0.0066)	0.0696			-0.1575** (0.0057)	-0.0691			0.0877** (0.0082)	0.0735			0.1232** (0.0065)	0.0745
Most Important Period - Five to Ten Years			0.0943** (0.0062)	0.0545			-0.1199** (0.0054)	-0.0526			0.0467** (0.0079)	0.0392			0.1006** (0.0061)	0.0608
Most Important Period - Next Few Years			0.0698** (0.0063)	0.0404			-0.0891** (0.0055)	-0.0391			0.0079 (0.0082)	0.0066			0.0912** (0.0063)	0.0551
Most Important Period - Next Year			0.0168* (0.0077)	0.0097			-0.0253** (0.0066)	-0.0111			-0.0056 (0.0099)	-0.0047			0.0256** (0.0076)	0.0155
Unemployed	-0.0011 (0.0149)	-0.0006	-0.0049 (0.0147)	-0.0028	-0.0362** (0.0132)	-0.0159	-0.0309* (0.0128)	-0.0136	-0.0038 (0.0201)	-0.0032	-0.0005 (0.0202)	-0.0004	0.0758** (0.0147)	0.0458	0.0683** (0.0148)	0.0413
Employed	0.0287** (0.0081)	0.0166	-0.0176* (0.0081)	0.0105	-0.1047** (0.0072)	-0.0459	-0.0485** (0.0071)	-0.0403	-0.0255* (0.0101)	-0.0214	-0.0257* (0.0103)	0.0244	0.1799** (0.0083)	0.1087	0.1379** (0.0084)	0.1110
Retired	0.0485** (0.0089)	0.0280	0.0181* (0.0089)	-0.0102	-0.1304** (0.0080)	-0.0572	-0.0919** (0.0078)	-0.0213	0.0346** (0.0104)	0.0290	0.0291** (0.0106)	-0.0216	0.2164** (0.0091)	0.1308	0.1837** (0.0092)	0.0833

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.4: The Determinants of Assets Holding - Tobit Results: Baseline and Full Model Specifications *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Age	0.0006 (0.0007)	0.0003	-0.0021** (0.0007)	-0.0012	-0.0246** (0.0007)	-0.0108	-0.0213** (0.0007)	-0.0093	-0.0038** (0.0010)	-0.0032	-0.0059** (0.0010)	-0.0050	0.0549** (0.0008)	0.0332	0.0520** (0.0008)	0.0314
Age Squared	0.0000 (0.0000)	0.0000	0.0001** (0.0000)	0.0000	0.0002** (0.0000)	0.0001	0.0001** (0.0000)	0.0001	0.0001** (0.0000)	0.0001	0.0001** (0.0000)	0.0001	-0.0005** (0.0005)	-0.0003	-0.0005** (0.0000)	-0.0003
Female	-0.0845** (0.0070)	-0.0489	-0.0369** (0.0068)	-0.0213	0.0688** (0.0061)	0.0302	0.0277** (0.0059)	0.0122	0.0251** (0.0086)	0.0211	0.0249** (0.0086)	0.0209	-0.0330** (0.0067)	-0.0199	-0.0120 (0.0067)	-0.0072
Children	-0.0387** (0.0041)	-0.0224	-0.0209** (0.0040)	-0.0121	0.0592** (0.0037)	0.0260	0.0415** (0.0036)	0.0182	-0.0240** (0.0048)	-0.0201	-0.0195** (0.0048)	-0.0163	-0.0451** (0.0040)	-0.0273	-0.0357** (0.0039)	-0.0216
Married	0.0265** (0.0058)	0.0153	0.0266** (0.0057)	0.0154	-0.0202** (0.0052)	-0.0089	-0.0136** (0.0051)	-0.0060	-0.0062 (0.0070)	-0.0052	-0.0189** (0.0070)	-0.0158	0.0202** (0.0057)	0.0122	0.0101* (0.0057)	0.0061
High School	0.2502** (0.0125)	0.1447	0.2083** (0.0125)	0.1205	-0.2883** (0.0102)	-0.1265	-0.2348** (0.0100)	-0.1030	0.0717** (0.0150)	0.0601	0.0559** (0.0152)	0.0468	0.1983** (0.0116)	0.1198	0.1583** (0.0116)	0.0956
College	0.4862** (0.0124)	0.2812	0.3700** (0.0124)	0.2140	-0.5471** (0.0102)	-0.2401	-0.4132** (0.0100)	-0.1814	0.1981** (0.0147)	0.1660	0.1666** (0.0149)	0.1396	0.3665** (0.0115)	0.2215	0.2752** (0.0116)	0.1663
Grad School	0.5706** (0.0127)	0.3300	0.4252** (0.0127)	0.2459	-0.6720** (0.0105)	-0.2950	-0.5050** (0.0103)	-0.2216	0.2558** (0.0149)	0.2144	0.2171** (0.0152)	0.1819	0.4651** (0.0118)	0.2811	0.3538** (0.0119)	0.2138
Black	-0.2330** (0.0086)	-0.1348	-0.1796** (0.0085)	-0.1039	0.2803** (0.0073)	0.1230	0.2252** (0.0071)	0.0988	-0.1410** (0.0144)	-0.1182	-0.1268** (0.0144)	-0.1063	-0.2397** (0.0083)	-0.1448	-0.2051** (0.0083)	-0.1240
Hispanic	-0.3037** (0.0112)	-0.1757	-0.2460** (0.0111)	-0.1423	0.3221** (0.0093)	0.1414	0.2525** (0.0091)	0.1108	-0.0600** (0.0157)	-0.0502	-0.0420** (0.0159)	-0.0352	-0.2564** (0.0105)	-0.1550	-0.2075** (0.0106)	-0.1254
1992	0.0298** (0.0074)	0.0172	0.0286** (0.0077)	0.0166	-0.0317** (0.0066)	-0.0139	-0.0185** (0.0067)	-0.0081	-0.0027 (0.0076)	-0.0022	-0.0031 (0.0081)	-0.0026	0.0049 (0.0070)	0.0029	-0.0182* (0.0074)	-0.0110
1995	0.0614** (0.0072)	0.0355	0.0002 (0.0082)	0.0001	-0.0359** (0.0064)	-0.0158	0.0369** (0.0072)	0.0162	-0.0714** (0.0075)	-0.0598	-0.1114** (0.0091)	-0.0933	-0.0087 (0.0068)	-0.0053	-0.0752** (0.0080)	-0.0454
1998	0.1608** (0.0071)	0.0930	0.0848** (0.0082)	0.0490	-0.0824** (0.0064)	-0.0362	0.0052 (0.0072)	0.0023	-0.1485** (0.0077)	-0.1245	-0.1898** (0.0093)	-0.1590	-0.0251** (0.0068)	-0.0151	-0.0997** (0.0080)	-0.0602
2001	0.1600** (0.0071)	0.0925	0.0887** (0.0081)	0.0513	-0.0855** (0.0063)	-0.0375	-0.0009 (0.0071)	-0.0004	-0.2010** (0.0078)	-0.1684	-0.2452** (0.0094)	-0.2055	-0.0039 (0.0067)	-0.0024	-0.0780** (0.0080)	-0.0471
2004	0.0649** (0.0071)	0.0376	0.0032 (0.0082)	0.0018	0.0279** (0.0064)	0.0123	0.1004** (0.0073)	0.0441	-0.2417** (0.0078)	-0.2025	-0.2759** (0.0095)	-0.2312	-0.0710** (0.0068)	-0.0429	-0.1372** (0.0081)	-0.0829
2007	0.0346** (0.0072)	0.0200	-0.0323** (0.0082)	-0.0187	0.0104 (0.0064)	0.0046	0.0909** (0.0072)	0.0399	-0.3011** (0.0080)	-0.2523	-0.3441** (0.0096)	-0.2884	-0.0095 (0.0067)	-0.0058	-0.0823** (0.0080)	-0.0497

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.4: The Determinants of Assets Holding - Tobit Results: Baseline and Full Model Specifications *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full model		Baseline Model		Full model		Baseline Model		Full model		Baseline Model		Full model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Great Deal of Shopping – Investment			0.0753** (0.0065)	0.0435			-0.0745** (0.0058)	-0.0327			0.0771** (0.0075)	0.0646			0.0375** (0.0065)	0.0227
Above Average Shopping – Investment			0.0770** (0.0071)	0.0445			-0.0844** (0.0064)	-0.0371			0.0531** (0.0085)	0.0445			0.0799** (0.0071)	0.0483
Moderate Shopping- Investment			0.0408** (0.0058)	0.0236			-0.0452** (0.0052)	-0.0198			0.0224** (0.0070)	0.0188			0.0463** (0.0058)	0.0280
Some Shopping – Investment			0.0079 (0.0081)	0.0045			-0.0253** (0.0072)	-0.0111			-0.0225* (0.0101)	-0.0189			0.0505** (0.0080)	0.0305
Great Deal of Shopping - Borrowing			-0.0256** (0.0055)	-0.0148			-0.0026 (0.0049)	-0.0011			-0.0102 (0.0061)	-0.0085			0.0350** (0.0054)	0.0212
Above Average Shopping - Borrowing			0.0047 (0.0063)	0.0027			-0.0365** (0.0057)	-0.0160			-0.0053 (0.0073)	-0.0044			0.0567** (0.0063)	0.0343
Moderate Shopping- Borrowing			-0.0238** (0.0052)	-0.0138			-0.0066 (0.0046)	-0.0029			0.0300** (0.0058)	0.0251			0.0275** (0.0052)	0.0166
Some Shopping – Borrowing			0.0113 (0.0078)	0.0065			-0.0149* (0.0070)	-0.0065			-0.0063 (0.0090)	-0.0053			0.0263** (0.0078)	0.0159
Expect the Economy to Perform the Same			0.0218** (0.0044)	0.0126			-0.0107** (0.0039)	-0.0047			-0.0290** (0.0050)	-0.0243			0.0085* (0.0043)	0.0051
Expect the Economy to Perform Better			0.0193** (0.0047)	0.0112			-0.0088* (0.0042)	-0.0039			-0.0322** (0.0054)	-0.0270			0.0006 (0.0046)	0.0004
Constant	-1.9015** (0.0253)	-	-1.9222** (0.0269)		3.2062** (0.0224)	-	3.2087** (0.0232)	-	-2.3200** (0.0345)	-	-2.2517** (0.0363)	-	-2.1796** (0.0267)	-	-2.2218** (0.0283)	-

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.5: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Baseline Specification

The dependent variable is the share of financial wealth held in a particular asset category. The sample is drawn from pooled data from the 1989 – 2007 waves of the Survey of Consumer Finances.

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Natural Log of Total Income	0.0443** (0.0037)	0.0111	-0.4191** (0.0124)	-0.0981	-0.0739** (0.0029)	-0.0165	-0.1209** (0.0217)	-0.0005	0.0678** (0.0071)	0.0146	-0.0617** (0.0093)	-0.0014	-0.2100** (0.0079)	-0.0522	-0.1206** (0.0071)	-0.0263
Natural Log. of Net Worth	0.0210** (0.0018)	0.0052	-0.1342** (0.0057)	-0.0314	-0.0446** (0.0015)	-0.0100	-0.0593** (0.0068)	-0.0002	-0.0207** (0.0070)	-0.0045	-0.7422** (0.0131)	-0.0173	-0.0817** (0.0053)	-0.0203	-0.1702** (0.0067)	-0.0371
Age	-0.0222** (0.0023)	-0.0056	0.0039 (0.0028)	0.0009	-0.0274** (0.0019)	-0.0061	0.0006 (0.0215)	0.0000	-0.0183** (0.0043)	-0.0039	0.0264** (0.0050)	0.0006	0.0613** (0.0027)	0.0152	-0.1966** (0.0032)	-0.0428
Age Squared	0.0002** (0.0000)	0.0001	-0.0001** (0.0000)	0.0000	0.0002** (0.0000)	0.0000	-0.0002 (0.0002)	0.0000	0.0002** (0.0000)	0.0000	-0.0003** (0.0000)	0.0000	-0.0006** (0.0000)	-0.0001	0.0019** (0.0000)	0.0004
Female	-0.0338 (0.0209)	-0.0085	0.2333** (0.0256)	0.0535	0.1143** (0.0155)	0.0258	-0.5307** (0.1723)	-0.0018	-0.0383 (0.0327)	-0.0082	-0.2312** (0.0417)	-0.0058	-0.0052 (0.0208)	0.0013	0.0667** (0.0259)	0.0144
Children	-0.0350** (0.0114)	-0.0087	0.1684** (0.0155)	0.0393	0.0969** (0.0087)	0.0217	0.2996* (0.1239)	0.0012	-0.0693** (0.0197)	-0.0149	0.0965** (0.0227)	0.0022	0.0171 (0.0110)	0.0042	0.2427** (0.0152)	0.0525
Married	-0.0674** (0.0169)	-0.0169	-0.0639** (0.0223)	-0.0149	0.0888** (0.0126)	0.0197	-0.8686** (0.1523)	-0.0042	-0.0154 (0.0268)	-0.0033	0.0316 (0.0345)	0.0007	0.0080 (0.0167)	0.0020	-0.1066** (0.0219)	-0.0230
High School	0.0349 (0.0513)	0.0087	-0.7589* (0.0452)	-0.1815	-0.2313** (0.0381)	-0.0509	-0.6655* (0.2698)	-0.0023	-0.1084 (0.0843)	-0.0232	-0.2406** (0.0751)	-0.0059	0.1432** (0.0385)	0.0357	-0.5904** (0.0439)	-0.1330
College	0.0501 (0.0504)	0.0125	-1.5046** (0.0455)	-0.3465	-0.4554** (0.0374)	-0.1004	-1.4795** (0.2731)	-0.0057	-0.2865** (0.0814)	-0.0613	-0.8219** (0.0739)	-0.0208	0.0717 (0.0378)	0.0178	-1.2061** (0.0440)	-0.2650
Grad School	0.0510 (0.0507)	0.0128	-1.8703** (0.0479)	-0.4362	-0.5907** (0.0376)	-0.1240	-2.5270** (0.3097)	-0.0064	-0.3528** (0.0814)	-0.0731	-1.1150** (0.0751)	-0.0363	0.0799* (0.0384)	0.0199	-1.6951** (0.0460)	-0.3935
Unemployed	-0.0979* (0.0459)	-0.0244	-0.0232 (0.0535)	-0.0054	0.0472 (0.0357)	0.0106	-0.0885 (0.3250)	-0.0003	-0.1138 (0.0903)	-0.0240	0.0832 (0.0957	0.0019	0.2375** (0.0464)	0.0593	-0.1582** (0.0562)	-0.0354
Employed	-0.1011** (0.0255)	-0.0253	-0.0307 (0.0301)	-0.0553	0.0756** (0.0205)	0.0168	-0.6493** (0.1880)	-0.0033	-0.0668 (0.0362)	-0.0145	0.1197* (0.0475)	-0.0038	0.2020** (0.0285)	0.0500	-0.5144** (0.0319)	-0.1824
Retired	-0.1749** (0.0268)	-0.0436	-0.2325** (0.0334)	-0.0072	0.0422 (0.0217)	0.0095	-1.1382** (0.2578)	-0.0030	-0.0347 (0.0362)	-0.0075	-0.1535** (0.0483)	0.0029	0.1177** (0.0297)	0.0293	-0.7863** (0.0352)	-0.1073
Black	0.0379 (0.0318)	0.0095	0.7851** (0.0324)	0.1637	0.1481** (0.0247)	0.0337	1.1233** (0.1616)	0.0074	0.4133** (0.0967)	0.0942	0.7280** (0.0800)	0.0129	0.0624* (0.0299)	0.0155	0.9035** (0.0330)	0.1659
Hispanic	-0.0187 (0.0450)	-0.0047	1.0102** (0.0409)	0.1994	0.1819** (0.0310)	0.0417	1.8049** (0.1571)	0.0180	0.2406* (0.1206)	0.0538	0.6322** (0.0951)	0.0114	0.2397** (0.0431)	0.0598	1.0447** (0.0411)	0.1831

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.5: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Baseline Specification *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
1992	0.1933** (0.0216)	0.0483	-0.0081 (0.0273)	-0.0019	-0.2074** (0.0167)	-0.0451	0.4019 (0.2582)	0.0018	0.0296 (0.0279)	0.0064	0.0618 (0.0351)	0.0014	0.0262 (0.0182)	0.0065	-0.0002** (0.0262)	0.0000
1995	0.2962** (0.0210)	0.0738	-0.0798** (0.0264)	-0.0188	-0.2629** (0.0161)	-0.0569	0.4328 (0.2529)	0.0020	-0.1374** (0.0281)	-0.0291	0.3372** (0.0353)	0.0071	0.1022** (0.0182)	0.0255	0.1355 (0.0257)	0.0290
1998	0.5581** (0.0202)	0.1377	-0.3195** (0.0262)	-0.0766	-0.4054** (0.0156)	-0.0860	0.3561 (0.2511)	0.0016	-0.2206** (0.0286)	-0.0461	0.7417** (0.0374)	0.0138	0.0550** (0.0179)	0.0137	0.1544** (0.0259)	0.0330
2001	0.5364** (0.0200)	0.1325	-0.3295** (0.0263)	-0.0790	-0.3998** (0.0154)	-0.0849	1.1209** (0.2289)	0.0068	-0.2422** (0.0341)	-0.0505	1.0732** (0.0386)	0.0184	0.1006** (0.0176)	0.0251	0.0908** (0.0258)	0.0196
2004	0.3204** (0.0198)	0.0798	-0.0954** (0.0268)	-0.0225	-0.1468** (0.0159)	-0.0323	0.4642 (0.2548)	0.0022	-0.2856** (0.0279)	-0.0592	1.1750** (0.0376)	0.0196	0.1520** (0.0179)	0.0379	0.3988** (0.0264)	0.0823
2007	0.3211** (0.0206)	0.0800	0.0788** (0.0269)	0.0183	-0.1555** (0.0162)	-0.0341	0.0694 (0.2739)	0.0003	-0.2491** (0.0301)	-0.0519	1.5994** (0.0401)	0.0241	0.2374** (0.0183)	0.0592	0.2171** (0.0268)	0.0460
Constant	-0.4180** (0.0850)	-	8.0414** (0.1197)	-	1.8836** (0.0685)	-	-0.7771** (0.6893)	-	-0.4784** (0.1574)	-	11.4644** (0.1665)	-	1.1664** (0.0909)	-	9.8654** (0.1054)	

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.6: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Full Specification

The dependent variable is the share of financial wealth held in a particular asset category. The sample is drawn from pooled data from the 1989 – 2007 waves of the Survey of Consumer Finances.

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Natural Log. of Total Income	0.0335** (0.0036)	0.0084	-0.3185** (0.0107)	-0.0737	-0.0590** (0.0028)	0.0133	-0.1155** (0.0243)	-0.0004	0.0778** (0.0071)	0.0171	-0.0590** (0.0096)	-0.0013	-0.1998** (0.0080)	-0.0497	-0.0762** (0.0059)	-0.0166
Natural Log. of Net Worth	0.0187** (0.0018)	0.0047	-0.1120** (0.0043)	-0.0259	-0.0406** (0.0015)	0.0092	-0.0545** (0.0072)	-0.0002	-0.0137* (0.0066)	-0.0030	-0.7257** (0.0141)	-0.0159	-0.0777** (0.0050)	-0.0193	-0.1359** (0.0050)	-0.0296
Fair Health	0.0830 (0.0457)	0.0207	-0.2252** (0.0471)	-0.0531	0.0363 (0.0346)	0.0082	-0.3887 (0.2766)	-0.0011	-0.1272 (0.0693)	-0.0275	0.2667** (0.0682)	0.0053	-0.0246 (0.0457)	-0.0061	-0.1625** (0.0471)	-0.0361
Good Health	0.0668 (0.0442)	0.0167	-0.4424** (0.0447)	-0.1027	-0.0449 (0.0331)	-0.0102	0.0918 (0.2488)	0.0003	-0.1337* (0.0655)	-0.0293	0.0694 (0.0633)	0.0015	-0.0625 (0.0436)	-0.0155	-0.3887** (0.0450)	-0.0851
Excellent Health	0.0567 (0.0445)	0.0142	-0.5528** (0.0457)	-0.1294	-0.1072** (0.0333)	-0.0241	-0.4139 (0.2682)	-0.0013	-0.1101 (0.0657)	-0.0241	0.0504 (0.0643)	0.0011	-0.0258 (0.0440)	-0.0064	-0.5337** (0.0457)	-0.1183
Average Risk	0.1866** (0.0185)	0.0466	-1.0419** (0.0189)	-0.2411	-0.2964** (0.0134)	-0.0665	-1.3373** (0.1324)	-0.0042	-0.3477** (0.0294)	-0.0757	-0.5697** (0.0297)	-0.0131	-0.0597** (0.0153)	-0.0148	-0.7115** (0.0181)	-0.1565
Above Average Risk	0.3780** (0.0198)	0.0942	-1.4614** (0.0230)	-0.3485	-0.4554** (0.0143)	0.0982	-0.9536** (0.1443)	-0.0024	-0.4961** (0.0311)	-0.1031	-0.3707** (0.0349)	-0.0090	-0.1046** (0.0171)	-0.0260	-0.9019** (0.0216)	-0.2094
Substantial Amount of Risk	0.5050** (0.0255)	0.1247	-1.2161** (0.0351)	-0.2950	-0.4301** (0.0186)	0.0907	-0.9391** (0.2445)	-0.0021	-0.5480** (0.0412)	-0.1091	0.2408** (0.0516)	0.0048	-0.1184** (0.0240)	-0.0293	-0.6579** (0.0331)	-0.1549
Most Important Period - Ten Years Plus	0.0085 (0.0204)	0.0021	-0.4895** (0.0264)	-0.1168	-0.0574** (0.0162)	0.0129	0.0203 (0.1592)	0.0001	-0.2452** (0.0385)	-0.0525	-0.4659** (0.0405)	-0.0118	-0.1307* (0.0208)	-0.0324	-0.5739** (0.0257)	-0.1314
Most Important Period - Five to Ten Year	-0.0034 (0.0199)	0.0008	-0.3690** (0.0244)	-0.0868	0.0005 (0.0158)	0.0001	-0.3279* (0.1591)	-0.0010	-0.2394** (0.0379)	-0.0517	-0.2917** (0.0392)	-0.0068	-0.0447 (0.0202)	-0.0111	-0.3718** (0.0238)	-0.0829
Most Important Period - Next Few Years	0.0145 (0.0205)	0.0036	-0.2504** (0.0247)	-0.0588	0.0294 (0.0164)	0.0067	-0.7322** (0.1800)	-0.0020	-0.3010** (0.0409)	-0.0643	-0.1002* (0.0404)	-0.0022	-0.0258* (0.0209)	-0.0064	-0.3247** (0.0243)	-0.0726
Most Important Period - Next Year	0.0300 (0.0255)	0.0075	-0.0699* (0.0299)	-0.0163	0.0200 (0.0199)	0.0045	-0.1155 (0.1844)	-0.0004	-0.1068* (0.0474)	-0.0232	0.0010 (0.0498)	0.0000	0.0584** (0.0260)	0.0145	-0.0096 (0.0298)	-0.0021
Unemployed	-0.0870 (0.0470)	0.0217	-0.0258 (0.0561)	-0.0060	0.0340 (0.0360)	0.0077	0.0629** (0.3193)	0.0002	-0.1157 (0.0911)	-0.0249	0.0656 (0.0978)	0.0014	0.2257** (0.0455)	0.0564	-0.1407* (0.0584)	-0.0313
Employed	-0.1259** (0.0257)	0.0315	0.0892** (0.0317)	-0.0367	0.1127** (0.0207)	0.0253	-0.4962** (0.1788)	-0.0026	-0.0493 (0.0364)	-0.0109	0.1293* (0.0486)	-0.0025	0.2033** (0.0284)	0.0503	-0.3727** (0.0333)	-0.1605
Retired	-0.1771** (0.0269)	0.0441	-0.1565** (0.0351)	0.0207	0.0642** (0.0218)	0.0146	-1.0621** (0.2632)	-0.002	-0.0279 (0.0367)	-0.0061	-0.1123** (0.0492)	0.0029	0.1292** (0.0295)	0.0322	-0.6957** (0.0363)	-0.0787

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.6: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Full Specification *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Age	-0.0196** (0.0023)	-0.0049	0.0124** (0.0030)	0.0029	-0.0270** (0.0019)	-0.0061	0.0016 (0.0206)	0.0000	-0.0126** (0.0043)	-0.0028	0.0396** (0.0052)	0.0009	0.0616** (0.0028)	0.0153	-0.1940** (0.0033)	-0.0422
Age Squared	0.0002** (0.0000)	0.0000	-0.0003** (0.0000)	-0.0001	0.0002** (0.0000)	0.0000	-0.0003 (0.0002)	0.0000	0.0001** (0.0001)	0.0000	-0.0005** (0.0000)	0.0000	-0.0006** (0.0000)	-0.0001	0.0018** (0.0000)	0.0004
Female	0.0221 (0.0210)	0.0055	0.1196** (0.0267)	0.0274	0.0702** (0.0156)	0.0160	-0.7192** (0.1785)	-0.0019	-0.0947** (0.0330)	-0.0206	-0.2478** (0.0421)	-0.0058	-0.0137 (0.0209)	-0.0034	-0.0120 (0.0265)	-0.0026
Children	-0.0249* (0.0114)	0.0062	0.1096** (0.0161)	0.0253	0.0865** (0.0087)	0.0196	0.2646* (0.1263)	0.0009	-0.0804** (0.0198)	-0.0176	0.0768** (0.0229)	0.0017	0.0084 (0.0111)	0.0021	0.2077** (0.0156)	0.0449
Married	-0.0442** (0.0169)	0.0110	-0.0940** (0.0230)	-0.0216	0.0824** (0.0126)	0.0185	-0.8298** (0.1548)	-0.0032	-0.0192 (0.0271)	-0.0042	0.0946** (0.0348)	0.0021	0.0083 (0.0169)	0.0021	-0.0858** (0.0224)	-0.0185
Black	0.0569 (0.0324)	0.0142	0.6765** (0.0341)	0.1414	0.1055** (0.0245)	0.0242	1.0256** (0.1692)	0.0053	0.3781** (0.0989)	0.0872	0.6591** (0.0812)	0.0112	0.0526 (0.0306)	0.0131	0.7958** (0.0335)	0.1492
Hispanic	-0.0312 (0.0452)	0.0078	0.8924** (0.0430)	0.1771	0.1430** (0.0319)	0.0329	1.6241** (0.1607)	0.0121	0.2816* (0.1213)	0.0644	0.5532** (0.0976)	0.0096	0.2330** (0.0430)	0.0582	0.9045** (0.0430)	0.1636
1992	0.2228** (0.0226)	0.0556	-0.0080 (0.0302)	-0.0019	-0.1984** (0.0177)	-0.0438	0.6493* (0.2716)	0.0027	0.0015 (0.0350)	0.0003	0.0256 (0.0380)	0.0006	-0.0504** (0.0194)	-0.0125	0.0239 (0.0286)	0.0052
1995	0.3977** (0.0248)	0.0989	0.2252** (0.0323)	0.0509	-0.2871** (0.0190)	-0.0627	0.8762** (0.2641)	0.0040	-0.0822* (0.0359)	-0.0179	0.6074** (0.0444)	0.0110	0.1684** (0.0227)	0.0420	0.4187** (0.0312)	0.0859
1998	0.6644** (0.0243)	0.1634	0.0307 (0.0320)	0.0071	-0.4173** (0.0189)	-0.0895	0.8811** (0.2713)	0.0040	-0.1809** (0.0359)	-0.0389	1.0244** (0.0463)	0.0165	0.1193** (0.0225)	0.0297	0.4817** (0.0313)	0.0978
2001	0.6507** (0.0240)	0.1602	-0.0013 (0.0319)	-0.0003	-0.4128** (0.0188)	-0.0887	1.6540** (0.2454)	0.0105	-0.2250** (0.0392)	-0.0481	1.3541** (0.0475)	0.0202	0.1608** (0.0222)	0.0401	0.4008** (0.0311)	0.0825
2004	0.4113** (0.0241)	0.1023	0.1943** (0.0330)	0.0441	-0.1629** (0.0190)	-0.0362	1.0887** (0.2750)	0.0054	-0.2350** (0.0360)	-0.0502	1.4205** (0.0477)	0.0209	0.2110** (0.0225)	0.0526	0.6732** (0.0320)	0.1328
2007	0.4342** (0.0243)	0.1079	0.4133** (0.0328)	0.0913	-0.1783** (0.0192)	-0.0395	0.5520 (0.2912)	0.0022	-0.2032** (0.0364)	-0.0436	1.9011** (0.0496)	0.0252	0.2993** (0.0229)	0.0747	0.5180** (0.0320)	0.1047

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.6: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Full Specification *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
High School	0.0409 (0.0529)	0.0102	-0.6750** (0.0467)	-0.1600	-0.2033** (0.0384)	0.0453	-0.8313** (0.2617)	-0.0024	0.0055 (0.0879)	0.0012	-0.1586* (0.0763)	-0.0036	0.1455** (0.0396)	0.0362	-0.4801** (0.0455)	-0.1075
College	0.0259 (0.0521)	0.0065	-1.2394** (0.0469)	-0.2855	-0.3685** (0.0378)	0.0824	-1.4173** (0.2649)	-0.0045	-0.1511 (0.0849)	-0.0331	-0.6701** (0.0751)	-0.0156	0.0861* (0.0391)	0.0214	-0.9354** (0.0454)	-0.2057
Grad School	0.0192 (0.0524)	0.0048	-1.5237** (0.0490)	-0.3620	-0.4789** (0.0380)	0.1032	-2.3394** (0.3193)	-0.0049	-0.2034* (0.0851)	-0.0438	-0.9301** (0.0763)	-0.0268	0.1060** (0.0396)	0.0264	-1.3513** (0.0470)	-0.3152
Great Deal of Shopping – Investment	-0.0992** (0.0185)	0.0247	-0.4306** (0.0269)	-0.1028	0.0120 (0.0140)	0.0027	-0.1809 (0.1834)	-0.0006	-0.0177 (0.0271)	-0.0039	-0.4633** (0.0381)	-0.0119	-0.1976** (0.0184)	-0.0488	-0.3051** (0.0261)	-0.0686
Above Average Shopping – Investment	-0.1629** (0.0201)	-0.0405	-0.4297** (0.0294)	-0.1031	0.0726** (0.0151)	0.0166	-0.9148** (0.2639)	-0.0021	-0.1512** (0.0308)	-0.0325	-0.3456** (0.0423)	-0.0087	-0.1300** (0.0203)	-0.0322	-0.4509** (0.0285)	-0.1036
Moderate Shopping-Investment	-0.1300** (0.0172)	0.0324	-0.2513** (0.0234)	-0.0590	0.0835** (0.0129)	0.0190	-0.2387 (0.1745)	-0.0007	-0.0148 (0.0282)	-0.0032	-0.1794** (0.0353)	-0.0041	-0.1057** (0.0172)	-0.0262	-0.2448** (0.0229)	-0.0543
Some Shopping – Investment	-0.0704** (0.0236)	0.0176	-0.0388 (0.0326)	-0.0090	0.1046** (0.0177)	0.0240	0.2819 (0.2174)	0.0010	-0.1417** (0.0373)	-0.0305	-0.0006 (0.0504)	0.0000	-0.0178 (0.0236)	-0.0044	-0.1787** (0.0318)	-0.0399
Great Deal of Shopping - Borrowing	-0.1079** (0.0157)	0.0269	0.0845** (0.0227)	0.0194	0.0318** (0.0121)	0.0072	-0.5348** (0.1762)	-0.0015	0.1070** (0.0213)	0.0237	0.1346** (0.0299)	0.0029	0.1450** (0.0144)	0.0361	-0.0017 (0.0218)	-0.0004
Above Average Shopping - Borrowing	-0.0898** (0.0176)	0.0224	-0.0166 (0.0263)	-0.0038	-0.0073 (0.0132)	0.0016	-1.1893** (0.2460)	-0.0026	0.0427 (0.0249)	0.0094	0.0190 (0.0346)	0.0004	0.1592** (0.0168)	0.0397	-0.0864** (0.0251)	-0.0190
Moderate Shopping-Borrowing	-0.0937** (0.0145)	0.0234	0.0724** (0.0212)	0.0167	0.0220* (0.0112)	0.0050	-0.2242 (0.1593)	-0.0007	0.1148** (0.0210)	0.0254	-0.0950** (0.0285)	-0.0021	0.1101** (0.0135)	0.0274	-0.0101 (0.0208)	-0.0022
Some Shopping – Borrowing	-0.0664** (0.0220)	0.0166	-0.1063** (0.0314)	-0.0249	-0.0460** (0.0173)	0.0103	-1.3337** (0.3529)	-0.0026	0.0316 (0.0321)	0.0070	0.1065* (0.0438)	0.0022	0.0375 (0.0210)	0.0093	-0.0753* (0.0314)	-0.0166

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.6: The Determinants of Assets Holding - Zero-Inflated Beta Model Results: Full Specification *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation		Proportion		Selection Equation	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Expect Economy to Perform - Same	0.1261** (0.0124)	0.0315	-0.0115 (0.0177)	-0.0027	-0.0243* (0.0095)	-0.0055	-0.5399** (0.1307)	-0.0017	-0.1298** (0.0185)	-0.0285	0.0159 (0.0241)	0.0003	-0.0309* (0.0116)	-0.0077	-0.0338* (0.0170)	-0.0074
Expect Economy to Perform - Better	0.1479** (0.0134)	0.0370	0.0206 (0.0191)	0.0048	-0.0490** (0.0102)	0.0111	-0.3061* (0.1372)	-0.0009	-0.1360** (0.0227)	-0.0297	0.1038** (0.0264)	0.0022	-0.0022 (0.0128)	-0.0005	0.0358 (0.0184)	0.0078
Constant	-0.6853** (0.0932)		8.0113** (0.1202)		1.9876** (0.0734)	-	0.8307 (0.7165)		-0.1915 (0.1694)	-	11.2923** (0.1779)	-	1.1190** (0.0996)	-	10.0641** (0.1131	

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.7: The Determinants of Assets Holding - Fractional Logit Model Results: Baseline and Full Specifications

The dependent variable is the share of financial wealth held in a particular asset category. The sample is drawn from pooled data from the 1989 – 2007 waves of the Survey of Consumer Finances.

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Margin Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Natural log. of Total Income	0.1864** (0.0081)	0.0256	0.1378** (0.0045)	0.0182	-0.2487** (0.0081)	-0.0573	-0.1794** (0.0062)	-0.0411	0.0960** (0.0110)	0.0011	0.1027** (0.0116)	0.0011	-0.1034** (0.0039)	-0.0112	-0.1229** (0.004)	-0.0130
Natural log. of Net Worth	0.1347** (0.0065)	0.0185	0.1084** (0.0050)	0.0143	-0.1437** (0.0051)	-0.0331	-0.1172** (0.0037)	-0.0269	0.4482** (0.0121)	0.0051	0.4504** (0.0132)	0.0048	0.0532** (0.0021)	0.0057	0.0429** (0.0020)	0.0045
Fair Health			0.2389** (0.0457)	0.0334			-0.1700** (0.0369)	-0.0396			-0.2448** (0.0729)	-0.0024			0.1675** (0.0502)	0.0186
Good Health			0.3955** (0.0439)	0.0531			-0.3981** (0.0353)	-0.0916			-0.0828 (0.0688)	-0.0009			0.3032** (0.0482)	0.0326
Excellent Health			0.4302** (0.0445)	0.0589			-0.5315** (0.0360)	-0.1234			-0.0461 (0.0696)	-0.0005			0.3995** (0.0488)	0.0440
Average Risk			0.8731** (0.0184)	0.1208			-0.8659** (0.0146)	-0.1993			0.1704** (0.0322)	0.0019			0.5269** (0.0187)	0.0576
Above Average Risk			1.2393** (0.023)	0.2054			-1.2048** (0.0174)	-0.2884			-0.1859** (0.0375)	-0.0019			0.5315** (0.0211)	0.0633
Substantial Amount of Risk			1.1823** (0.0269)	0.2138			-1.0090** (0.0264)	-0.2458			-0.5336** (0.0524)	-0.0046			0.3957** (0.0313)	0.0478
Most Important Period - Ten Years Plus			0.3024** (0.0221)	0.0425			-0.4535** (0.0202)	-0.1073			0.1600** 0.0419)	0.0018			0.2743** (0.0252)	0.0310
Most Important Period - Five to Ten Year			0.2473** (0.0212)	0.0338			-0.3262** (0.0188)	-0.0760			0.0547 (0.0408)	0.0006			0.2705** (0.0238)	0.0299
Most Important Period - Next Few Years			0.1962** (0.0217)	0.0268			-0.2333** (0.0191)	-0.0543			-0.0942* (0.0427)	-0.0010			0.2681** (0.0242)	0.0299
Most Important Period - Next Year			0.0558* (0.0266)	0.0075			-0.0561* (0.0235)	-0.0129			-0.0629 (0.0522)	-0.0007			0.0988** (0.0298)	0.0108
Unemployed	-0.0274 (0.0492)	-0.0037	-0.0225 (0.0500)	-0.0030	-0.1059* (0.0441)	-0.0247	-0.1022* (0.0455)	-0.0237	-0.0854 (0.1059)	-0.0009	-0.0835 (0.1079)	-0.0009	0.3234** (0.0558)	0.0392	0.2913** (0.0563)	0.0342
Employed	0.0616 (0.0265)	0.0085	-0.0843** (0.0275)	0.0000	-0.3116** (0.0246)	-0.0734	-0.0795** (0.0252)	-0.0181	0.1514 (0.0464)	0.0018	-0.0053 (0.0476)	-0.0001	0.6040** (0.0321)	0.0840	0.4811** (0.0325)	0.0474
Retired	0.0216* (0.0285)	0.0030	0.0002 (0.0294)	-0.0113	-0.2118** (0.0265)	-0.0482	-0.2376** (0.0270)	-0.0555	-0.0287** (0.0463)	-0.0003	0.1454** (0.0474)	0.0016	0.6670** (0.0339)	0.0597	0.5780** (0.0343)	0.0700

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.7: The Determinants of Assets Holding - Fractional Logit Model Results: Baseline and Full Specifications *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Age	-0.0099** (0.0025)	-0.0014	-0.0148** (0.0025)	-0.0020	-0.0660** (0.0023)	-0.0152	-0.0622** (0.0023)	-0.0143	-0.0112* (0.0051)	-0.0001	-0.0177** (0.0052)	-0.0002	0.1753** (0.0031)	0.0190	0.1690** (0.0031)	0.0179
Age Squared	0.0001** (0.0000)	0.0000	0.0002** (0.0000)	0.0000	0.0005** (0.0000)	0.0001	0.0004** (0.0000)	0.0001	0.0002** (0.0002)	0.0000	0.0003** (0.0000)	0.0000	-0.0016** (0.0000)	-0.0002	-0.0015** (0.0000)	-0.0002
Female	-0.2068** (0.0225)	-0.0272	-0.0887** (0.0228)	-0.0115	0.1622** (0.0204)	0.0368	0.0575** (0.0207)	0.0131	0.0216 (0.0216)	0.0002	-0.0039 (0.0447)	0.0000	-0.0830** (0.0246)	-0.0088	-0.0251 (0.0246)	-0.0026
Children	-0.0988** (0.0125)	-0.0135	-0.0536** (0.0126)	-0.0071	0.2092** (0.0120)	0.0479	0.1629** (0.0121)	0.0372	-0.0901** (0.0232)	-0.0010	-0.0897** (0.0233)	-0.0010	-0.1005** (0.0139)	-0.0108	-0.0778** (0.0140)	-0.0082
Married	0.0195 (0.01846)	0.0027	0.0369* (0.0187)	0.0048	0.0000 (0.0195)	0.0000	-0.0074 (0.0178)	-0.0017	-0.0426 (0.0350)	-0.0005	-0.0843* (0.0351)	-0.0009	0.0288 (0.0205)	0.0031	-0.0028 (0.0206)	-0.0003
High School	0.7266** (0.0503)	0.1096	0.6152** (0.0508)	0.0883	-0.7728** (0.0358)	-0.1829	-0.6767** (0.0369)	-0.1592	0.2218** (0.0850)	0.0026	0.1854* (0.0849)	0.0021	0.7096** (0.0517)	0.0855	0.5963** (0.0519)	0.0693
College	1.2986** (0.0502)	0.1906	1.0215** (0.0506)	0.1426	-1.4304** (0.0360)	-0.3266	-1.1587** (0.0369)	-0.2655	0.5806** (0.0834)	0.0069	0.5282** (0.0838)	0.0060	1.1235** (0.0513)	0.1308	0.8778** (0.0518)	0.0984
Grad School	1.4680** (0.0512)	0.2563	1.1339** (0.0515)	0.1833	-1.8408** (0.0376)	-0.4299	-1.4926** (0.0381)	-0.3542	0.6596** (0.0848)	0.0090	0.6049** (0.0851)	0.0078	1.3700** (0.0523)	0.1956	1.0803** (0.0528)	0.1434
Black	-0.5853** (0.0323)	-0.0677	-0.4792** (0.0328)	-0.0549	0.7430** (0.0264)	0.1525	0.6320** (0.0268)	0.1314	-0.4587** (0.0949)	-0.0043	-0.4333** (0.0957)	-0.0039	-0.6760** (0.0340)	-0.0589	-0.5904** (0.0340)	-0.0517
Hispanic	-0.7976** (0.0426)	-0.0852	-0.6916** (0.0431)	-0.0733	0.8596** (0.0331)	0.1707	0.7318** (0.0348)	0.1480	-0.4776** (0.1157)	-0.0044	-0.4230** (0.1151)	-0.0038	-0.6481** (0.0444)	-0.0561	-0.5245** (0.0448)	-0.0464
1992	0.1505** (0.0235)	0.0214	0.1599** (0.0249)	0.0220	-0.1547** (0.0208)	-0.0362	-0.1284** (0.0227)	-0.0298	-0.0523 (0.0344)	-0.0006	-0.0889* (0.0374)	-0.0009	0.0378 (0.0245)	0.0041	-0.0772** (0.0262)	-0.0080
1995	0.2477** (0.0228)	0.0360	0.1318** (0.0269)	0.0180	-0.1646** (0.0203)	-0.0385	0.0236 (0.0245)	0.0054	-0.4094** (0.0349)	-0.0040	-0.5313** (0.0432)	-0.0048	0.0263 (0.0242)	0.0029	-0.1524** (0.0294)	-0.0155
1998	0.5881** (0.0222)	0.0921	0.4513** (0.0260)	0.0663	-0.3392** (0.0203)	-0.0804	-0.1146** (0.0244)	-0.0265	-0.7870** (0.0376)	-0.0069	-0.9164** (0.0463)	-0.0074	-0.0589* (0.0242)	-0.0063	-0.2569** (0.0295)	-0.0254
2001	0.5624** (0.0221)	0.0874	0.4453** (0.0260)	0.0652	-0.3414** (0.0203)	-0.0809	-0.1355** (0.0244)	-0.0315	-0.9861** (0.0375)	-0.0083	-1.1397** (0.0461)	-0.0088	0.0077 (0.0239)	0.0008	-0.1847** (0.0292)	-0.0186
2004	0.2441** (0.0225)	0.0354	0.1357** (0.0266)	0.0185	0.0451* (0.026	0.0103	0.2332** (0.0249)	0.0521	-1.1732** (0.0371)	-0.0094	-1.2908** (0.0477)	-0.0096	-0.1724** (0.0243)	-0.0178	-0.3544** (0.0295)	-0.0342
2007	0.1627** (0.0229)	0.0232	0.0468 (0.0267)	0.0062	0.0141 (0.0208)	0.0032	0.2207** (0.0250)	0.0494	-1.3360** (0.0389)	-0.0103	-1.4878** (0.0479)	-0.0105	0.0226 (0.0240)	0.0025	-0.1715** (0.0292)	-0.0174

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.7: The Determinants of Assets Holding - Fractional Logit Model Results: Baseline and Full Specifications *(Continued)*

	Risky Assets				Safe Assets				Bonds				Retirement Funds			
	Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model		Baseline Model		Full Model	
Independent Variables	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.	Coefficient	Marg. Eff.
Great Deal of Shopping – Investment			0.1489** (0.0205)	0.0203			-0.2330** (0.0202)	-0.0545			0.2203** (0.0365)	0.0026			0.0083 (0.0240)	0.0009
Above Average Shopping – Investment			0.1395** (0.0224)	0.0191			-0.2308** (0.0220)	-0.0542			0.0574 (0.0423)	0.0006			0.1648** (0.0256)	0.0183
Moderate Shopping- Investment			0.0680** (0.0186)	0.0091			-0.1091** (0.0178)	-0.0252			0.0933** (0.0356)	0.0010			0.0944** (0.0217)	0.0102
Some Shopping – Investment			0.0010 (0.0257)	0.0001			-0.0342 (0.0246)	-0.0079			-0.1494** (0.0517)	-0.0015			0.1502** (0.0294)	0.0167
Great Deal of Shopping - Borrowing			-0.1034** (0.0172)	-0.0134			0.0338* (0.0170)	0.0077			0.0528 (0.0288)	0.0006			0.1956** (0.0195)	0.0215
Above Average Shopping - Borrowing			-0.0284 (0.0197)	-0.0037			-0.0807** (0.0194)	-0.0187			0.0955** (0.0347)	0.0011			0.2644** (0.0220)	0.0301
Moderate Shopping- Borrowing			-0.0949** (0.0162)	-0.0124			0.0081 (0.0159)	0.0019			0.2020** (0.0273)	0.0023			0.1502** (0.0187)	0.0163
Some Shopping – Borrowing			-0.0025 (0.0241)	-0.0003			-0.0355 (0.0243)	-0.0082			0.0220 (0.0443)	0.0002			0.1038** (0.0282)	0.0114
Expect the Economy to Perform – Same			0.1125** (0.0138)	0.0149			-0.0422** (0.0133)	-0.0097			-0.1792** (0.0236)	-0.0019			0.0287 (0.0155)	0.0030
Expect the Economy to Perform - Better			0.1139** (0.0149)	0.0153			-0.0403** (0.0144)	-0.0093			-0.2037** (0.0258)	-0.0021			0.0191 (0.0167)	0.0020
Constant	-6.2584** (0.0919)	-	-6.5735** (0.0974)	-	8.1233** (0.0861)	-	8.2767** (0.0864)	-	-9.9154** (0.1685)	-	-9.7122** (0.1792)		-7.0393** (0.0984)	-	-7.3437** (0.1067)	-

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.8: The Determinants of Assets Holding - Multivariate Tobit Model Results: Baseline Specification

The dependent variable is the share of financial wealth held in a particular asset category. The sample is drawn from pooled data from the 1989 – 2007 waves of the Survey of Consumer Finances.

	Risky Assets		Retirement Funds		Bonds	
Independent Variables	Coefficient	Marginal Effects	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Natural Log of Total Income	0.0780** (0.0012)	0.0451	-0.0063** (0.0011)	-0.0038	0.0475** (0.0016)	0.0398
Natural Log of Net Worth	0.0315** (0.0005)	0.0182	0.0252** (0.0005)	0.0153	0.1011** (0.0012)	0.0847
Age	0.0007 (0.0007)	0.0004	0.0539** (0.0008)	0.0326	-0.0032** (0.0010)	-0.0027
Age Squared	0.0000 (6.83×10^{-6})	0.0000	-0.0005** (7.51×10^{-6})	-0.0003	0.0001** (8.35×10^{-6})	0.0000
Female	-0.0844** (0.0069)	-0.0488	-0.0325* (0.0066)	-0.0196	0.0220* (0.0086)	0.0184
Children	-0.0382** (0.0040)	-0.0221	-0.0435** (0.0039)	-0.0263	-0.0236** (0.0048)	-0.0198
Married	0.0264** (0.0058)	0.0153	0.0190** (0.0056)	0.0115	-0.0047 (0.0070)	-0.0039
High School	0.2465** (0.0124)	0.1426	0.1924** (0.0112)	0.1163	0.0706** (0.0149)	0.0592
College	0.4802** (0.0123)	0.2778	0.3578** (0.0112)	0.2163	0.1973** (0.0146)	0.1654
Grad School	0.5635** (0.0126)	0.3260	0.4539** (0.1150)	0.2743	0.2542** (0.0149)	0.2130
Unemployed	-0.0003 (0.0148)	-0.0002	0.0737** (0.0147)	0.0445	-0.0055 (0.0201)	-0.0046
Employed	0.0282** (0.0080)	0.0163	0.1759** (0.0082)	0.1063	-0.0272** (0.0102)	-0.0228
Retired	0.0469** (0.0088)	0.0271	0.2127** (0.0090)	0.1285	0.0313** (0.0104)	0.0263
Black	-0.2318** (0.0085)	-0.1341	-0.2372** (0.0082)	-0.1434	-0.1413** (0.0143)	-0.1184
Hispanic	-0.3032** (0.0111)	-0.1754	-0.2544** (0.0105)	-0.1538	-0.0619** (0.0154)	-0.0519
1992	0.0305** (0.0074)	0.0177	0.0052 (0.0068)	0.0031	-0.0024 (0.0076)	-0.0020
1995	0.0620** (0.0072)	0.0359	-0.0095 (0.0067)	-0.0058	-0.0705** (0.0075)	-0.0591
1998	0.1612* (0.0071)	0.0932	-0.0260** (0.0067)	-0.0157	-0.1468** (0.0077)	-0.1230
2001	0.1601* (0.0070)	0.0926	-0.0054 (0.0066)	-0.0033	-0.1988** (0.0077)	-0.1666
2004	0.0666* (0.0071)	0.0385	-0.0708** (0.0067)	-0.0428	-0.2378** (0.0077)	-0.1993
2007	0.0356* (0.0071)	0.0206	-0.0105 (0.0066)	-0.0064	-0.2983** (0.0079)	-0.2500
Constant	-1.878** (0.0249)	-	-2.1244** (0.0260)	-	-2.3014** (0.0346)	-
Wald χ^2 (63), p-value	78,441.97, p-value = 0.000					
$\rho_{1,2}, \rho_{1,3}, \rho_{2,3}$	0.0425**, -0.1167**, -0.1054**					
$\chi^2(3)$: $\rho_{1,2} = \rho_{1,3} = \rho_{2,3} = 0$	1,106.99, p-value = 0.000					

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.9: The Determinants of Assets Holding -Multivariate Tobit model Results: Full Specification

The dependent variable is the share of financial wealth held in a particular asset category. The sample is drawn from pooled data from the 1989 – 2007 waves of the Survey of Consumer Finances.

	Risky Assets		Retirement Funds		Bonds	
Independent Variables	Coefficient	Marginal Effects	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Natural Log. of Total Income	0.0557** (0.0012)	0.0322	-0.0172** (0.0012)	-0.0104	0.0451** (0.0017)	0.0378
Natural Log. of Net Worth	0.0265** (0.0005)	0.0153	0.0217** (0.0005)	0.0131	0.0970** (0.0016)	0.0813
Fair Health	0.0711** (0.0122)	0.0411	0.0509** (0.0509)	0.0308	-0.0432* (0.0144)	-0.0362
Good Health	0.1286** (0.0117)	0.0744	0.1038** (0.0112)	0.0627	-0.0046 (0.0136)	-0.0038
Excellent Health	0.1499** (0.0118)	0.0867	0.1351** (0.0114)	0.0817	0.0082 (0.0138)	0.0069
Average Risk	0.2962** (0.0049)	0.1713	0.1868** (0.0046)	0.1129	0.0944** (0.0060)	0.0791
Above Average Risk	0.4176** (0.0056)	0.2416	0.2049** (0.0054)	0.1239	0.0436** (0.0069)	0.0365
Substantial Amount of Risk	0.3837** (0.0080)	0.2219	0.1628** (0.0079)	0.0984	-0.0576** (0.0099)	-0.0483
Age	-0.0018* (0.0007)	-0.0011	0.0507** (0.0008)	0.0306	-0.0053** (0.0010)	-0.0045
Age Squared	0.0001** (0.0000)	0.0000	-0.0005** (0.0000)	-0.0003	0.0001** (0.000)	0.0001
Female	-0.0368** (0.0067)	-0.0213	-0.0121 (0.0065)	-0.0073	0.0212* (0.0085)	0.0178
Children	-0.0200** (0.0039)	-0.0116	-0.0339** (0.0038)	-0.0205	-0.0187** (0.0048)	-0.0156
Married	0.0265** (0.0056)	0.0153	0.0086 (0.0055)	0.0052	-0.0173* (0.0069)	-0.0145
High School	0.2029** (0.0121)	0.1174	0.1503** (0.0112)	0.0908	0.0536** (0.0150)	0.0449
College	0.3628** (0.0120)	0.2098	0.2647** (0.0112)	0.1600	0.1644** (0.0148)	0.1377
Grad School	0.4168** (0.0123)	0.2411	0.3400** (0.0115)	0.2055	0.2132** (0.0151)	0.1786
Unemployed	-0.0048 (0.0146)	-0.0028	0.0663** (0.0143)	0.0401	-0.0031 (0.0205)	-0.0026
Retired	0.0164 (0.0087)	0.0095	0.1794** (0.0089)	0.1084	0.0248* (0.0105)	0.0208
Employed	-0.0173* (0.0080)	-0.0100	0.1341** (0.0081)	0.0810	-0.0271** (0.0102)	-0.0227
Black	-0.1779** (0.0083)	-0.1029	-0.2032** (0.0080)	-0.1228	-0.1266** (0.0140)	-0.1061
Hispanic	-0.2470** (0.0108)	-0.1429	-0.2065** (0.0181)	-0.1248	-0.0434** (0.0159)	-0.0363
1992	0.0298** (0.0076)	0.0173	-0.0166 (0.0072)	-0.0100	-0.0022 (0.0080)	-0.0019
1995	0.0023 (0.0081)	0.0014	-0.0747** (0.0078)	-0.0452	-0.1072** (0.0091)	-0.0898
1998	0.0867** (0.0081)	0.0502	-0.0982** (00078)	-0.0594	-0.1844** (0.0093)	-0.1545
2001	0.0905** (0.0080)	0.0523	-0.0776** (0.0077)	-0.0469	-0.2395** (0.0093)	-0.2007
2004	0.0070 (0.0081)	0.0041	-0.1348** (0.0078)	-0.0815	-0.2677** (0.0094)	-0.2243
2007	-0.0295** (0.0081)	-0.0171	-0.0818** (0.0077)	-0.0494	-0.3374** (0.0095)	-0.2827

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

Table A2.9: The Determinants of Assets Holding -Multivariate Tobit Model Results: Full Specification *(Continued)*

	Risky Assets		Retirement Funds		Bonds	
Independent Variables	Coefficient	Marginal Effects	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Most Important Period - Ten Years Plus	0.1161** (0.0064)	0.0672	0.1188** (0.0063)	0.0718	0.0835** (0.0081)	0.0700
Most Important Period - Five to Ten Year	0.0911** (0.0061)	0.0527	0.0970** (0.0060)	0.0586	0.0438** (0.0078)	0.0367
Most Important Period - Next Few Years	0.0679** (0.0062)	0.0393	0.0887** (0.0061)	0.0536	0.0058 (0.0081)	0.0049
Most Important Period -Next Year	0.0146 (0.0075)	0.0084	0.0249** (0.0074)	0.0150	-0.0077 (0.0099)	-0.0064
Great Deal of Shopping – Investment	0.0742** (0.0064)	0.0429	0.0362** (0.0063)	0.0219	0.0744** (0.0074)	0.0623
Above Average Shopping – Investment	0.0757** (0.0070)	0.0438	0.0776** (0.0069)	0.0469	0.0499** (0.0084)	0.0418
Moderate Shopping-Investment	0.0399** (0.0057)	0.0231	0.0458** (0.0056)	0.0277	0.0194** (0.0070)	0.0163
Some Shopping – Investment	0.0065 (0.0080)	0.0037	0.0499** (0.0078)	0.0301	-0.0245* (0.0100)	-0.0205
Great Deal of Shopping - Borrowing	-0.0254** (0.0054)	-0.0147	0.0330** (0.0053)	0.0199	-0.0102 (0.0060)	-0.0086
Above Average Shopping - Borrowing	0.0042 (0.0062)	0.0025	0.0534** (0.0061)	0.0323	-0.0060 (0.0072)	-0.0050
Moderate Shopping-Borrowing	-0.0241** 0.0051)	-0.0140	0.0251** (0.0050)	0.0151	0.0294 (0.0072)	0.0246
Some Shopping – Borrowing	0.0126 (0.0077)	0.0073	0.0254** (0.0075)	0.0154	-0.0070** (0.0090)	-0.0059
Expect Economy to Perform Same	0.0208** (0.0043)	0.0120	0.0097* (0.0042)	0.0059	-0.0304** (0.0050)	-0.0255
Expect Economy to Perform Better	0.0187** (0.0046)	0.0108	0.0012 (0.0045)	0.0007	-0.0338** (0.0054)	-0.0283
Constant	-1.8793** (0.0164)	-	-2.1415 (0.0274)	-	-2.2128** (0.0365)	
Wald χ^2 (123), p-value	86,178.38, p-value = 0.000					
$\rho_{1,2}, \rho_{1,3}, \rho_{2,3}$	0.0269**, -0.1826**, -0.1294**					
$\chi^2(3)$: $\rho_{1,2} = \rho_{1,3} = \rho_{2,3} = 0$	2,275.37, p-value = 0.000					

*denotes significance at the 5% level and **denotes significance at the 1% level. Standard errors are shown in parentheses.

3 Household Finances, Psychological Well-Being and Overall Life Satisfaction: The Effects of Household Assets, Debt, Net Worth and the Subjective Financial Situation

3.1 Introduction

The subject of well-being has drawn an increased amount of interest from a variety of academic disciplines in recent years, including psychology, economics and sociology amongst others. In the area of economics, subjective well-being is increasingly being exploited as a proxy for an individual's level of utility, with summaries of the existing literature presented in Di Tella and MacCulloch (2006), Clark *et al.* (2008), Dolan *et al.* (2008), Stutzer and Frey (2010) and MacKerron (2012). In addition to academic research, the concept of well-being has attracted the interest of the general public including the media and politicians. The increased level of interest is reflected by numerous newspaper and magazine articles relating to findings of well-being research and also, an increase in the number of books that explore this topic[16]. Politicians are attracted to the concept of well-being, with a view of using measures of it in conjunction with traditional measures of economic performance, such as GDP, as a measure of the economic and social performance of an economy. This idea resulted in the Stiglitz Commission (Stiglitz *et al*., 2009), a report by Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, commissioned by Nicholas Sarkozy in 2008, which reports on the measurement of economic and social progress of a country. Similarly, in 2010, the British Prime Minister, David Cameron, argued that GDP is an incomplete measure of an economy's development and that an economy's progress and development should take into account the well-being of society, in addition to more traditional measures. Consequently, the Office of National Statistics (ONS) was ordered to collect data on the level of well-being in Britain. In addition, Australia have developed the "Australian National Development Index" (ANDI), which is a collaboration of forty community organisations, church groups, companies and universities with a view of introducing a holistic measure of a country's progress. Within this, the well-being of the country will be accounted for. Analogous to the measures above, Diefenbacher and Zieschank (2009) suggest a need for a "National Welfare Index" (NWI), which will be used to

[16] For example, several articles in The Economist including "Wealth and Well-Being: The Pursuit of Happiness" (May 24th 2011, http://www.economist.com/blogs/dailychart/2011/05/well-being_and_wealth, accessed 16/8/2012, 13.33GMT), "Happiness: No Longer the Dismal Science?" (Apr 6th 2012, http://www.economist.com/blogs/ feastandfamine/2012/04/happiness, accessed 16/8/2012,13.33GMT) and "National Well-Being: The Importance of Being Happy" (July 24th 2012, http://www.economist.com/blogs/blighty/2012/07/national-well-being, accessed 16/8/2012,13.33GMT).

measure Germany's development and social progress. The NWI is more strongly related to more traditional measures of economics progress than measures of happiness. Several other measures, which capture well-being in Germany, among many other countries, are presented in Kroll (2011).

One area of an individual's life that could potentially have a dramatic impact on their level of well-being is their household's financial situation. In the past two decades, there has been a significant increase in the level of household debt in developed countries. For example, in Australia, since the early 1990s the level of household debt has increased at a significantly faster rate than household income. In 1996, on average, the ratio of household total debt to disposable income was one half, increasing, to one and a half times disposable income by 2006. This phenomenon has been seen across the developed world, with similar situations displayed in Britain, the USA and Germany amongst many others. In Britain, following significant reforms to the credit market in the late 1980s and early 1990s, household debt dramatically increased over the subsequent decades and until recently this increase in debt levels was in conjunction with a period of sustained growth. High household debt levels potentially have detrimental effects on an economy at both the micro and macroeconomic level. At the macroeconomic level, policy makers are concerned with the impact of household debt on aggregate economic performance, with many arguing that the current economic crisis is a direct consequence of a credit boom in combination with a housing bubble. At the micro level, debt, and the general financial situation of the household, could potentially have a significant impact on the level of well-being of individuals. Hence, this chapter will explore the effects the household's financial situation has on individual well-being from an empirical perspective.

In the existing literature, the relationship between income and well-being has attracted a large amount of attention. For example, Ferrer-i-Carbonell and Frijters (2004), Ferrer-i-Carbonell (2005), Clark and Oswald (1996) and Winkelmann and Winkelmann (1998) amongst many others, explore this relationship. Amongst other things, the axioms of classical utility theory suggests that more is always preferred to less and, as a result, increases in income would therefore be desirable for individuals. For an insatiable consumer, higher income allows a higher indifference curve to be attained and, as a result, higher levels of utility to be experienced. As a result, it is expected that increases in income will be associated with higher levels of wellbeing. This theoretical

relationship between well-being and income has been extensively explored in the existing empirical literature.

Arguably, however, income is not the most appropriate measure of a household's monetary resource. For example, following a permanent income argument, households who have a high level of net wealth, but low income, could potentially smooth their well-being in times of low income by drawing upon their wealth. This means that households with low income could still potentially record high levels of well-being. The empirical analysis presented in this chapter aims to ascertain the relationship between the household's financial situation, both monetary and subjective measures, and the well-being of the head of household. The financial measures will cover the monetary values of the household's assets, debt and net worth, while the subjective measures will cover how the household perceives their financial situation. Bridges and Disney (2010) and Wildman (2003) argue that such subjective measures will contain information beyond that contained in the financial measures. It is, therefore, important to include them in the analysis.

The empirical analysis presented in this chapter will draw upon data from Australia, Britain and Germany. There exist only a limited number of studies which consider the relationship between household finances, overall life satisfaction and psychological well-being, whilst accounting for time invariant individual effects. In addition, the analysis is implemented across three countries enabling a comparison between different economies. The data analysed for Australia comes from the 2002, 2006 and 2010 waves of the 'Household Income and Labour Dynamics for Australia' (HILDA) survey, due to these waves containing supplementary wealth modules. For Britain, the empirical analysis draws on data from the 2000 and 2005 waves of the 'British Household Panel Survey' (BHPS). These waves contain the relevant information on the household's assets and debt in addition to measures of well-being. The analysis for Germany focuses on the 2002 and 2007 waves of the 'German Socio-Economic Panel' (GSOEP) survey. As with the other surveys analysed, these waves contain information on the household's debt and assets and also measures of well-being, in addition to a wide variety demographic and socio-economic characteristics. In this chapter, a variety of econometric techniques are employed, according to the nature of the dependent variable. Following Ferrer-i-Carbonell and Frijters (2004), who assert that it is important to account for time invariant individual effects when analysing subjective

well-being, where possible, the econometric techniques used in this chapter will account for individual heterogeneity.

The empirical analysis presented in this chapter contributes to the existing literature in several distinct ways. The existing literature that explores the relationship between household finances and subjective well-being in Australia, only analyses cross sectional data, see for example, Headey and Wooden (2004) and Headey *et al.* (2008). However, following Ferrer-i-Carbonell and Frijters (2004), where possible, this chapter implements panel data techniques in order to control for time invariant individual effects. Similarly, a limited number of studies consider the relationship between a household's financial position and overall life satisfaction and psychological well-being in Germany, and consequently this chapter expands this existing literature. The empirical analysis also separates the household's net wealth to assess if the household's assets and different types of debt have differential impacts on the head of household's well-being. This will be done across the three countries considered. To my knowledge, Brown *et al.* (2005) is currently the only study that, analysing the BHPS, considers the impact of different types of debt on psychological well-being. This chapter extends the empirical analysis presented in Brown *et al.* (2005) in two distinct ways. Initially, a longitudinal analysis of the impact of household assets and debt on both overall life satisfaction and psychological well-being in Britain is explored, Brown *et al.* (2005) implement cross sectional analysis on psychological well-being. Secondly, the analysis presented in this chapter aims to ascertain the impact of different types of debt on overall life satisfaction and psychological well-being, in a longitudinal framework, across three countries to see if these relationships are consistent across different countries. In addition, the empirical analysis will include a variety of subjective financial measures, to assess whether it is the subjective or monetary financial measures that are determinants of an individual's well-being.

Focusing on the impact of the household's financial situation, the results indicate that, across all three countries analysed, the head of household's subjective financial situation has a strong positive association with both the head of household's overall life satisfaction and psychological well-being. This supports the findings of Bridges and Disney (2010) who report that subjective debt problems, opposed to "objective" debt levels influence the likelihood an individual reports being depressed. In contrast with the existing literature for Britain and Australia, the financial measures of the household's financial situation do not display a statistically significant relationship with

the level of well-being, once time invariant individual characteristics are accounted for. In contrast, the analysis for Germany reveals that, in line with Brown *et al.* (2005), it is unsecured, rather than secured debt, that has a detrimental impact on the head of household's well-being. The finding that it is the subjective financial measures rather than the monetary financial measures that influence an individual's well-being is analogous to the effects of health status. For example, Diener *et al.* (1999) find that an individual's subjective health status, rather than objective measures of health status, exerts an influence on their overall life satisfaction. Consequently, for all three countries considered, increasing the household's perceived financial situation, as opposed to the objective financial situation, could potentially dramatically increase well-being levels.

This chapter is structured as follows: Section 3.2 provides a critical review of the existing literature, whilst Section 3.3 outlines the data analysed and econometric techniques employed in the chapter. Section 3.4 presents the results, Section 3.5 discusses the results, and finally, Section 3.6 concludes.

3.2 Literature Review

This section will provide a critical review of the previous studies that consider the relationship between household finances and well-being. Initially, the methodological issues regarding the measurement, the interpretation and the analysis of well-being measures will be considered. The section then, by country, considers studies that explore the relationship between the household's financial situation and well-being.

3.2.1 Methodological Issues

The exploration of the determinants of subjective well-being has long been of interest to psychologists: see Argyle (1999) for a substantial review of the psychology literature. However, in the past two decades, well-being has become an important theme in economics and, consequently, there has been a significant increase in the number of economic studies concerned with overall life satisfaction and psychological well-being. In the economics literature, two main fields of analysis have developed: one area concerned with the overall level of well-being in an economy; and another concerned with the determinants of well-being at the individual level. For comprehensive reviews of the well-being literature see Clark *et al.* (2008), Dolan *et al.* (2008), Stutzer and Frey (2010) and MacKerron (2012). In particular, Dolan *et al*. (2008) focus on studies that

are published in 'economics' journals that contain original data analysis since 1990. The authors also include important results from the psychology literature. In the literature, many studies explore the relationship between subjective well-being and a variety of socio-economic and demographic characteristics. Age, health status, marital status, labour force status, income and gender consistently exert a statistically significant influence on subjective well-being.

Regardless of the attention subjective well-being has received from other fields; many economists have been reluctant to use self-reported measures of well-being, as a proxy for utility, for a number of reasons. Economists have long argued against measuring utility directly, but rather, to draw conclusions about it from observed individual behaviour. This view point stems from the seminal work of Samuelson (1938) in which behaviours and characteristics of individuals are treated as "revealed preferences". Consequently, two strands of literature have developed between the disciplines of economics and psychology, the economic literature concerning utility and the psychological literature regarding subjective well-being. Bertrand and Mullainathan (2001) cite the following as potential reasons for economists' unwillingness to use such variables: difficulties with the interpretation of the responses to well-being questions; problems with the ability to compare well-being measures across individuals; and difficulties in modelling such variables. It is well documented that a variety of factors can potentially affect the responses to questions regarding subjective well-being. For example, MacKerron (2012) outlines potential problems with responses to questions relating to subjective well-being. It is acknowledged that the responses to subjective health and well-being questions can vary significantly depending on both the ordering and the wording of the questions, potentially invalidating their reliability and making comparisons across studies difficult. Potential problems also exist regarding the interpretation of phrases in the questions about subjective well-being by the respondents, possibly due to cultural differences. For example, different cultures may interpret the term "happy" or "satisfied" in different ways.

Easterlin (1974) was arguably the foremost economist to exploit data on happiness, observing that, despite the average income of individuals increasing over time, there was not an observed increase in the reported level of happiness. A seminal paper in the literature on the economics of happiness was Frey and Stutzer (2002), who argue that well-being and utility can be directly measured. The study summarises the effects of income, labour market status, inflation and institutions on subjective well-being. The

authors use single item measures of subjective well-being that are contained in many national surveys. For example, such items are contained in the World Values Survey, the Gallup World Poll, the BHPS, the HILDA survey and the GSOEP survey amongst many others. Diener *et al.* (1999) test the reliability of such single item measures of subjective well-being and report an acceptable level of reliability and validity. This was conducted by the responses to questions regarding overall life satisfaction being tested against responses by family members and friends. They find that the responses to satisfaction questions are stable with a retest reliability of around 0.6. Single item measures of well-being are now widely used in the economics literature. For example, Thoudossiou (1998), Winkelmann and Winkelmann (1998), Winkelmann (2005), Clark (2003) and Headey *et al.* (2008), amongst many others, make use of them.

In addition to the single item measures of well-being, multiple-item measures of well-being are commonly used in the literature. A multiple item measure uses responses to a range of questions, rather than a single question, to construct a measure of well-being. Examples of multiple item measures of health status and well-being include the "General Health Questionnaire" (GHQ), the GHQ12 and the "Short Form 36" (SF-36) questionnaires. These types of measures are available in many nationally representative surveys, including the BHPS and the HILDA survey which contain the GHQ12 and SF-36 respectively. Some examples of studies that take advantage of multiple item measures of well-being include Brown *et al.* (2005), Nettleton and Burrows (1998), Taylor *et al.* (2007), Gardner and Oswald (2007) and Headey and Wooden (2004). In this chapter, a variety of single and multiple item well-being measures are analysed due to the information contained in the surveys analysed, these are outlined further in Section 3.3.

When exploring the determinants of well-being, stated preference measures of well-being can be advantageous to the more traditional revealed preference measures, however, both methods have their advantages and disadvantages. Stated preference measures are often criticised as it represents behaviour which is not observed and as a result fail to take into account market constraints experienced by the individual (Louviere *et al.* (2000)). However, stated preference measures can potentially capture an individual's expectations, adaptions and realisation of past situations and behaviours. As a consequence, it is important to account for these factors when measuring individual well-being. The subjective well-being measures assume individuals are in the best place to assess their individual level happiness. Individuals can react

differently to the same circumstances, and they evaluate their current conditions based on their unique expectations, values and previous experiences. As a result, the subjective element of measuring well-being is essential. In addition, stated preference measures allow information to be collected on abstract concepts and hypothetical situations which otherwise are unobservable in a revealed preference framework. Further discussion is provided in MacKerron (2012) and Dolan *et al.* (2006). Following the substantial empirical literature relating to well-being, the analysis presented in this chapter analyses subjective measures of well-being, opposed to using revealed preference measures.

The interpretation of subjective well-being measures is an important issue in the existing literature. Different interpretations and assumptions about the nature of the subjective well-being measures dictate the use of different econometric techniques. Ferrer-i-Carbonell and Frijters (2004) extensively explore whether the assumption of cardinality or ordinality has an impact on the estimated coefficients. The assumption of cardinality of the well-being dependent variable implies that OLS techniques can be used to analyse the data. The assumption of cardinality and OLS estimation is particularly prevalent in the psychology literature. For example, Argyle (1999) outlines around fifty studies that employ OLS techniques on cross-sectional data. In contrast, the assumption of ordinality is typically imposed in the economics literature. In general, ordered probit or logit models are employed to analyse the data, due to the discrete ordered nature of the subjective well-being measure. These techniques treat ordinal data as a discrete expression of a continuous latent variable of an arbitrary scale. Ferrer-i-Carbonell and Frijters (2004) compare the results of the determinants of subjective well-being under both the assumption of cardinality and ordinality and report no major differences in the results between each of the two techniques implemented. The same explanatory variables are statistically significant determinants of subjective well-being and they display the same relationship. Hence, the authors conclude that the interpretation of the nature of the measure of subjective well-being and how it is modelled does not have a dramatic impact on the results obtained.

Ferrer-i-Carbonell and Frijters (2004) go on to investigate the impact of unobserved, time invariant individual effects on the estimated coefficients. Initially, the authors compare the results of an OLS model and a fixed effects regression model and discover large disparities between the results in each specification. Once individual fixed effects are controlled for, many explanatory variables become statistically insignificant

determinants of subjective well-being. The authors then develop, and employ, an ordered logit model with individual fixed effects. The model allows ordinality to be assumed while controlling for individual time invariant effects. Once again controlling for individual heterogeneity has a dramatic impact on the results obtained compared to the standard model with many explanatory variables becoming statistically insignificant determinants of subjective well-being. It has since been shown by Baetschmann *et al.* (2011) that the fixed effects ordered logit model presented in Ferrer-i-Carbonell and Frijters (2004) is inconsistent and, consequently, they develop a new estimation procedure for a logit model with individual fixed effects that provides consistent estimates. The technique presented in Baetschmann *et al.* (2011) is employed, where applicable, in the analysis conducted in this chapter.

In contrast to Ferrer-i-Carbonell and Frijters (2004), Clark and Oswald (2002) report that, under the assumption of cardinality, the results obtained from panel and cross-sectional analyses have similar general structures. That is, the independent variables have the same significance levels and the same direction of impact on the dependent variable. The empirical analysis presented in this chapter will apply panel data models that control for individual fixed effects in accordance with Ferrer-i-Carbonell and Frijters (2004). Also, following Van Praag and Ferrer-i-Carbonell (2007), the chapter will implement a random effects specification in the appendix in order to provide a comparison between the different econometric specifications. Van Praag and Ferrer-i-Carbonell (2007) advocate the use of the random effects model because they argue that in a fixed effects specification, only changes in the independent variables impact on the dependent variables and any level effects of the independent variables are discarded. They argue that these level effects are important determinants of an individual's happiness. The next section will review the existing empirical literature in detail.

3.2.2 Empirical Studies

Several studies have explored the relationship between the household's financial situation and well-being. For example, Smith (1999), Meer *et al.* (2003), Wenzlow *et al.* (2004), Headey and Wooden (2004) and Headey *et al.* (2008) all explore the relationship between net worth and subjective well-being. Similarly, Drentea and Lavrakas (2000), Brown *et al.* (2005), Taylor *et al.* (2007) and Lenton and Mosley (2008) explore the association between well-being and debt. The majority of studies report a strong inverse relationship between debt and well-being; however, the direction of causality remains unclear. Due to the large quantity of empirical literature that

explores the area between the household's financial situation and their happiness, the existing literature will be considered by country with studies that analyse British data initially outlined.

The BHPS is frequently analysed to explore the relationship between the household's financial situation and well-being. The BHPS has been used to explore the relationship between debt and psychological well-being, for example, Nettleton and Burrows (1998) and Taylor *et al.* (2007), and also, Brown *et al.* (2005) use the BHPS to compare the impact of different types of debt on well-being.

Nettleton and Burrows (1998) aim to ascertain the relationship between mortgage arrears and the mental health of indebted homeowners using data from the first five waves of the BHPS. The homeowners' mental health is constructed from the GHQ12 and is measured via a Likert scale. This scale is measured on a zero to thirty six point scale, where zero represents excellent mental health and thirty six indicates very poor mental health. Initially, the study uses the changes in the health status between waves and hence the potential range of the dependent variable is [-36, 36]. A binary variable is then constructed to indicate whether the GHQ12 score has improved or remained static, or whether the respondent's mental health has deteriorated. In addition, the number of visits to the doctors across the period analysed is used as an indication of the health status of homeowners.

In the simple bivariate correlations, the onset of mortgage problems results in a deterioration of well-being. The study then controls for a variety of demographic and socio-economic characteristics via multiple regression analysis to model the change in GHQ12 score and a logistic regression in the binary dependent variable case. The onset of mortgage arrears exerts a negative impact on mental health for both men and women, with women experiencing a greater impact than men. The study also finds that mortgage arrears are associated with an increase in the number of visits to the doctors. It should be noted that the study does not find an explicit causal relationship between mortgage arrears and mental health problems; however, an association between the two is demonstrated.

One of the potential limitations of Nettleton and Burrows (1998) is the econometric specification employed. The paper fails to control for time invariant individual effects and, as argued in Ferrer-i-Carbonell and Frijters (2004), it is important to account for individual fixed effects when analysing measures of well-being. The problem is

accounted for by Taylor *et al.* (2007), who employ fixed effects models to assess the impact of housing payment problems on psychological well-being. In addition, the analysis presented in Nettleton and Burrows (1998) does not account for the impact of different types of debt on psychological well-being. The analysis presented in this chapter develops that of Nettleton and Burrows (1998) by exploring if the level of housing debt has an adverse effect on psychological well-being.

Taylor *et al.* (2007), analogous to Nettleton and Burrows (1998), assess the impact of unsustainable housing commitments on psychological health in Britain using data from the BHPS between 1991 and 2003. The study focuses on a sample of heads of households of working age that is, males aged between 16 and 64 years of age and females aged between 16 and 59 years of age. By definition, heads of households in the BHPS are responsible for housing costs and are consequently expected to bear the impact of any psychological costs caused by unsustainable housing commitments. Psychological well-being is measured by the GHQ12 on a Likert Scale, where higher values correspond to poor psychological well-being. The study makes use of two questions regarding the household's mortgage repayments. Initially, the household heads are asked, *'Have you had problems paying for your housing over the past two months?'* Respondents are then posed the question *"Over the past twelve months were you ever two months or more late with your rent/mortgage payments?"* These questions are used to identify households that are experiencing problems meeting their housing costs and those which have fallen into arrears with their rent or mortgage repayments. In an extension to Nettleton and Burrows (1998), Taylor *et al.* (2007) employ fixed effects analysis to control for the individual heterogeneity. The study reports a rejection of a random effects specification, in favour of a fixed effects specification, following a Hausman test, supporting the findings of Ferrer-i-Carbonell and Frijters (2004) who advocate the use of fixed effects models.

The study implements the analysis for males and females separately, due to differences in household structure, housing preferences and the fact that gender differences exist in the determinants of psychological well-being. In the male sub-sample, being in housing arrears increases an individual's GHQ score by an average of 1.95 units. Not saving and being in financial hardship have adverse effects on the psychological well-being of the individual. Unemployment is inversely related to psychological well-being, increasing the GHQ score, on average, by 1.6 points. Similarly, being divorced or widowed has a detrimental effect on psychological well-being, while, the income level

of the household is not a statistically significant determinant of the psychological well-being of the head of household.

For female headed households, having housing payment problems increases their GHQ score on average by 0.62 points. However, being in arrears does not have a statistically significant impact on the head of household's psychological well-being. Not saving regularly has a statistically significant negative effect on psychological well-being. It is found for females that longer term household payment problems and arrears have a greater impact on psychological well-being opposed to short term effects.

One potential shortcoming of the paper is that the study uses a dichotomous variable to indicate if the household is experiencing housing payment problems. The study could have used the level of housing debt to explore of the effect of the level of housing debt on well-being. The study also fails to take into account the impact of other types of debt, such as credit card debt, on the level of psychological well-being. One study that accounts for both the level of secured and unsecured debt is Brown *et al.* (2005).

One of the few studies that explicitly controls for the impact of different types of debt on well-being is Brown *et al.* (2005). Brown *et al.* (2005) explore the relationship between debt and psychological well-being in Great Britain. To my knowledge this is the only study that provides a comparison between the effects of different types of debt on psychological well-being. The study analyses a balanced panel from the 1995 and 2000 waves of the BHPS and, in accordance with Bertaut and Haliassos (2002), focuses on heads of households. The study measures the respondents' psychological well-being via the "inverse caseness" measure of the GHQ12 score where higher values represent increased levels of psychological well-being. Due to the discrete ordered nature of the dependent variable, an ordered probit model is employed. Brown *et al.* (2005) separate the total debt holdings into unsecured (non-mortgage) debt and secured (mortgage) debt, allowing the exploration of the effects of different types of debt on psychological well-being.

The study reports a positive relationship between the age of the head of the household and psychological well-being. Similarly, males have significantly higher GHQ12 scores and the labour income of the head of household is positively related to the level of psychological well-being; however, household income does not have a significant effect on the head of household's psychological well-being. Saving regularly increases the probability of reporting the highest level of psychological well-being by 4%.

Focusing on the relationship between debt and psychological well-being, Brown *et al.* (2005) find that the presence of outstanding credit, at either the household or individual level, has a negative impact on psychological well-being. Household heads that hold individual debt reduces the probability of reporting the highest level of psychological well-being by 6%. Unsecured debt has a greater influence on psychological well-being than secured debt, with the latter not displaying a statistically significant impact on psychological well-being. The individuals' financial expectations also play an important role in determining the head of household's psychological well-being. A head of household who believes a year from now their future financial situation will be worse than it is currently reports lower levels of psychological well-being. Similarly, individuals who view their current financial position as worse than it was a year ago report a lower level of psychological well-being.

The authors then evaluate the increase in monthly income required to offset changes in outstanding debt, in order to maintain a constant level of well-being. An increase of 10% in outstanding credit requires a 7% increase in monthly income for the average individual or alternatively, an 18% increase in savings. Finally, Brown *et al*. (2005) find evidence that the total value of investments, the size of recent windfalls and home owners' house valuations exert insignificant impacts on the household's psychological well-being.

The analysis presented in this chapter aims to build on the study of Brown *et al.* (2005) in several ways. Unlike Brown *et al*. (2005), the analysis in this chapter will account for the time invariant individual effects following Ferrer-i-Carbonell and Frijters (2004). Also, in accordance with Wildman (2003), satisfaction with current financial situation is an important determinant of well-being which will be explored in this chapter. However, Brown *et al.* (2005) only control for the expected change in the household's financial situation and their current financial situation relative to a year ago. At present, Brown *et al.* (2005) is the only study that compares the impact of different types of debt on well-being. This chapter aims to develop this, by exploring the relationship between secured and unsecured debt across three countries in order to provide a comparison of this relationship across different countries.

Rather than assessing the impact of debt on well-being, Gardner and Oswald (2007) explore the relationship between wealth and mental health using the BHPS. Analysing the 1998-2001 waves of the BHPS, the study exploits the longitudinal nature of the data

to assess the impact of lottery wins between the values of £1000 to £120,000 on health. The study measures mental well-being via the responses to the GHQ12 and is measured on a Likert scale. The study reports that individuals with a medium sized lottery win will eventually exhibit a significant increase in their levels of psychological well-being. Gardner and Oswald (2007) initially use descriptive statistics to assess the impact of a lottery win on health. The authors report that during the year of winning, psychological well-being, on average, deteriorated with an increase in the GHQ score of 0.5 points. However in subsequent years following a lottery win there is a significant increase in psychological well-being. The paper then analyses how a lottery win affects the change in the GHQ score via regression analysis. The study controls for a variety of demographic and socio-economic characteristics. In line with the results of the descriptive statistics, two years after the lottery win, the respondents displayed, on average, an increase of 1.4 points on the GHQ12 scale.

One of the major limitations of Gardner and Oswald (2007) is the size of the sample analysed; only 137 respondents experienced a lottery win of between £1,000 and £120,000, and consequently a relatively small sample is analysed. For this reason, a cautious interpretation of the results should arguably be adopted. The study could have been improved if a larger sample were used to reduce potential biases in the results. Similarly, there could potentially be a sample bias due to certain types of people who participate in lotteries.

The Families and Children Survey (FACS) has also been analysed to explore the relationship between the household's financial situation and well-being in Britain. For example, Bridges and Disney (2010) analyse the FACS, between 1999 and 2005, to explore the relationship between debt and psychological well-being. The FACS contains information on the health status of the household, including general health status and specific health problems. The authors make use of the self-reported response to whether the respondent has experienced mental illness, specifically, if they have experienced bad nerves and depression, have mental illness or suffer from a phobia, panics, or other nervous disorders. The responses to these questions are recoded to dichotomous variables and form the dependent variables analysed in the study. The FACS also collects information on the household's subjective financial well-being. Respondents were asked, *"Taking everything together, which phrase best describes how you and your family are managing financially these days?"* where the responses are measured on a six point scale and range from *"are in deep financial trouble"* to

"manage very well". From the response to this question, a dichotomous variable is constructed if they *"don't manage very well"*, *"have some financial difficulties"* and *"are in deep financial trouble",* to indicate if the household experiences financial stress. The FACS also asks whether the household has experienced problems with debt repayments over the past 12 months. From this, a binary variable is constructed to indicate whether the household has had a persistent debt problem.

The results presented in Bridges and Disney (2010) indicates that there exists a positive relationship between subjective debt problems and self-reported depression. Using a probit specification, the probability of reporting depression is strongly correlated with self-reported problems of indebtedness and financial stress. The authors conclude that perceived financial difficulties are a key determinant of well-being. The study then moves on to account for potential individual heterogeneity by employing a fixed effects logit specification.

In the fixed effects specification, self-reported problems of indebtedness have a significant positive impact on the probability of the individual experiencing depression, however this is not found to be statistically significant at the 10% level. Similarly, financial stress increases the likelihood of the onset of depression, but again this is not found to be statistically significant. These positive relationships found in the panel estimates are, however, much smaller than those relationships in the cross sectional probit estimations. This shows that accounting for individual heterogeneity has a dramatic effect on the parameter estimates.

The analysis presented in this chapter develops the study of Bridges and Disney (2010) in several ways. Bridges and Disney (2010) does not account for the level of debt held by the household, only whether the household holds debt. It could be advantageous to include the level of debt held, and also, to account for different types of debt held by the household. The study could also be developed by including the level of assets and net worth of the household.

Similar to Bridges and Disney (2010), Lenton and Mosley (2010) explore the relationship between debt and health in the UK using the FACS. Analysing the FACS between 2003 and 2005, Lenton and Mosley (2010) use a random effects ordered probit specification to explore this relationship. The paper initially investigates the impact of debt on health, finding that debt has negative impacts on both psychological and physical well-being. Lenton and Mosley (2010) report that the wealth of the household

only affects psychological well-being, not physical health, however, the empirical analysis employed fails to control for time invariant individual fixed effects.

Two further relevant studies that analyse the relationship between the household's financial situation and well-being in Britain are Reading and Reynolds (2001) and Jenkins *et al.* (2008). Reading and Reynolds (2001) explore the relationship between post maternal depression and debt amongst young women with children. The study analyses longitudinal data collected on 271 families from Britain with young children across a six month period. The level of depression was measured on the Edinburgh Postnatal Depression Scale (EPDS) and responses were collected twice in the survey. The EPDS is a ten item measure of depression in women and it is treated as a continuous scale, hence, OLS is employed to analyse the data. The study controls for the social support available to the respondent, which is based on the availability of a lift in the event of an emergency, whether the family had someone who had babysat for free in the past month, and if the family was part of a babysitting arrangement with other families. The study also controls for the child's health in addition to standard socio-economic and demographic characteristics.

The study finds that worries about debt are strongly related to depression with worries about debt being the strongest predicator of depression of any of the socio-economic independent variables. The study then controls for the possibility of reverse causality between depression and debt worries by looking at the effect debt worries in the first period have on depression in the second period. The authors find that the presence of earlier debt worries is strongly related to depression. Once the study controls for the depression level in the first period when modelling the depression level at the second period, the explanatory effect of prior debt worries has a statistically insignificant explanatory relationship with current depression levels.

Thus, although Reading and Reynolds (2001) find that worries about debt are strongly positively related to current levels of depression, the study is unable to identify a causal relationship between worries about debt and depression once the initial level of depression is controlled for. Despite the direction of causality being unclear, the study indicates that being indebted to the point that causes the individual worry is strongly and detrimentally associated with psychological well-being.

One potential shortcoming of the study by Reading and Reynolds (2001) is the data set analysed. The sample size is relatively small compared to the other studies presented in

this literature review. Similarly, the sample is only of young females who have children. This could potentially lead to sample selection bias.

Jenkins *et al.* (2008) explore the extent to which the relationship between low income and mental health problems is mediated by debt and financial hardship. The paper analyses cross-sectional data on 8,580 individuals aged between 17 and 74 years of age living in England, Scotland and Wales. The study finds that both low income and debt is associated with mental health issues. Low income families were more likely to have a mental health disorder, however, once debt and other factors are controlled for, the relationship between income and mental health disappeared. The study reports that 23% of people with mental health issues held debt, and those individuals who held six or more separate debts were six times more likely to have mental health issues. The study finds that low income and debt are both associated with mental illness; however the impact of income disappears once debt is controlled for.

A potential limitation of Jenkins *et al.* (2008) is the fact that the data analysed is cross-sectional in nature, and consequently limits the potential econometric methodology that can be employed. In this chapter, longitudinal data is analysed as it will allow the analysis to control for individual heterogeneity.

In the existing literature, many studies explore the determinants of overall life satisfaction and psychological well-being in Germany, for example, Winkelmann (2005), Boes and Winkelmann (2004), Ferrer-i-Carbonell (2005) and Winkelmann and Winkelmann (1998). However, only one study considers the impact of the household's financial situation on psychological well-being.

Keese and Schmitz (2012) assess the effect of household indebtedness on a variety of different health measures for Germany using the GSOEP survey between 1999 and 2009. The study considers the effect of indebtedness on three health measures, namely, general health satisfaction, mental health and obesity. The authors exploit three measures of indebtedness: the relative burden of loan repayments on the household budget; the income dedicated to loan repayments; and the ratio of credit card repayments to the household's net income. An OLS specification is employed to analyse these relationships. In the pooled regression model, all debt measures are strongly correlated with the health measures. Once individual fixed effects are accounted for, household debt displays a strong negative relationship with overall health satisfaction and mental well-being. The level of debt, however, is not found to be a

significant determinant of obesity. This once again outlines the importance of the accounting for individual fixed effects. The study of Keese and Schmitz (2012) only considers the relationship between health measures, and not overall life satisfaction. The analysis presented in this chapter will consider the impact of the household's financial situation on both mental health and overall life satisfaction in Germany.

Analysing data for the U.S., Drentea and Lavrakas (2000) explore the relationship between credit card debt and health. The study analyses a representative sample of over 900 adults from Ohio in 1997 and explores two measures of health status, namely, self-reported health status and physical impairment. The measure of self-reported health is based upon two questions, one relating to the respondent's overall life satisfaction and another relating to the respondent's health relative to others of similar age. From these two items, the responses were aggregated to form a two item scale of self-reported health status which ranges between two and twelve. The functional impairment measure is generated from the respondent's difficulty in performing everyday tasks. The authors consider how a variety of measures of debt, and the stress caused by them, impact on the measures of health. The study employs various measures of indebtedness, including: the debt to income ratio; carrying an unpaid balance; the amount of the individual's credit limit used; charging to more than two credit cards; the number of default repayments; and a debt stress index. The debt stress index is constructed from a series of questions relating to the stress caused to the individual[17]. In addition, the paper controls for the standard demographic and socio-economic variables used in the literature. The relationship between credit card debt and health status is explored using Hierarchical OLS analysis.

Drentea and Lavrakas (2000) find that age is negatively related to health status whilst gender does not exert a statistically significant impact. The number of years spent in education is positively associated with self-reported health status and employed individuals report higher levels of health satisfaction relative to those without a job. Consistent with previous studies, income has a positive and significant impact on health status; however, the effect is small. The debt to income ratio and the debt stress index both have negative impacts on self-reported health status. The other debt variables, however, do not have a significant impact on health status. Once the study controls for

[17] The respondents were asked *"overall how often do you worry about the total amount you owe?"* Also, *"how much stress does the debt you are carrying cause you?"* and *"how worried are you that you will never be able to pay back your debts*?" The responses were summed and then rescaled to obtain a 0-100 scale, with larger values indicating higher levels of stress caused by debt.

health risk and behavioural variables, such as smoking, BMI and drinking, the debt to income ratio has no explanatory power over self-reported health status.

Considering the level of physical impairment, as expected, age is positively related to the level of physical impairment. Black individuals and females are also more likely to be more physically impaired than white and male individuals respectively. Education is inversely associated with physical impairment as is being employed. Similarly, income is negatively related to the level of physical impairment. With respect to the debt variables, the debt to income ratio and the debt stress index are both positively related to physical impairment. Physical impairment is positively related to smoking and the individual's BMI measures.

The main shortcoming of the paper is that the data analysed is cross-sectional in nature. This limits the econometric analysis implemented in the study as it is not possible to assess the effect that poor health status has on socio-economic status and vice versa. Similarly, it is not possible to control for unobserved time invariant individual effects in cross-sectional analysis. Also, the study only considered the impact of credit card debt on health status, not total debt or total assets.

Drentea (2000) explores the relationship between credit card debt and anxiety amongst a sample of US individuals. The study analysed a representative survey of 1,037 individuals from Ohio in 1997. The analysis indicates that possessing credit card debt does not have a detrimental impact on anxiety. The author does find that increasing the debt to income ratio does significantly contribute to an individual's level of anxiety. In addition, the participant's perceived worries relating to their overall debt situation significantly influenced their anxiety levels. It was also found that the stress associated with debt explained away the impact of the individual's debt to income ratio on anxiety levels.

There are, however, two major limitations of the analysis presented in Drentea (2000), the first relating to the sample analysed. As a consequence of the data analysed being cross-sectional in nature, it is not possible to control for individual fixed effects. As argued by Ferrer-i-Carbonell and Frijters (2004), this could have a significant impact on the estimated coefficients. Also, the study only focuses on credit card debt and does not account for any other debt types. This analysis presented in this chapter in contrast will control for both secured and unsecured debt to assess whether different types of debt have different impacts on well-being.

Using longitudinal data, Meer *et al.* (2003) attempt to ascertain the causal relationship between health and wealth in the USA. The study uses the 1984, 1989, 1994 and 1999 waves of the Panel Survey of Income Dynamics (PSID) and analyses a sample of heads of household who are present for three consecutive waves. The study accounts for the potential endogeneity of wealth in the analysis by employing an instrumental variable approach. This endogeneity arises as it is possible that the wealth of the individual affects their health status, but also poor health will potentially have an impact on the individual's wealth, for example, due to loss of earnings. The authors use inheritance as an instrumental variable for a change in wealth. An OLS specification is employed to assess the predictive power of the inheritance on changes in wealth and a statistically significant relationship is found between them.

Meer *et al.* (2003) use a five point scale of individuals' health status. On the scale, one represents excellent health and five indicates poor health. A dichotomous variable is constructed, where one represents excellent, very good or good health and zero represents fair or poor health. This forms the dependent variable analysed in the study. The measure of wealth in the PSID is the household's net wealth and is constructed by the household's total assets minus the household's outstanding mortgage and non-mortgage debt.

The study initially implements a probit regression model to assess the impact of wealth on the individual's health. For this specification, a positive relationship is found between wealth and health status, however, the influence is only small. Once the instrumental variable approach is adopted, the point estimate of the effect of wealth on health remains approximately the same as in the probit model, however, it is not statistically significantly from zero. The study concludes that short run changes in wealth do not significantly affect the health status of the household.

One potential problem with the analysis of Meer *et al.* (2003) is the instrument of inheritance. One possible problem with the instrumental variable inheritance is that it may fail the exclusion restrictions for which they pose two potential reasons. The first point is that the death of a family member could indicate something about the recipients own health status and consequently, there could be potential correlation between the inheritance variable and the error term of the health equation. Also, a variable may be related to both inheritance and health status. For example, individuals with a "privileged" background are more likely to receive larger inheritances but also received

better medical care and so are more likely to be in good health. However, they perform several robustness checks and find being "privileged" does not affect the results previously obtained.

Another problem is related to the health measure. The study arbitrarily collapses the five point health measure into a dichotomous variable. Although the study checks the robustness by changing the threshold between poor and good health, it would arguably be advantageous to keep the information contained in the five point ordered health scale. This could have been done using an ordered probit or logit model. Also, as argued in Ferrer-i-Carbonell and Frijters (2004), it is important to control for time invariant individual effects when analysing self-reported health and well-being measures. The study only considers the effects of wealth on health status and does not decompose wealth into its constituent parts.

Amongst the existing studies that explore the relationship between the household's financial situation and their well-being in Australia, none control for time invariant individual effects or decompose net wealth into its constituent parts. Headey and Wooden (2004) explore the impact of household wealth and income on the head of household's subjective well-being and ill-being. The authors analyse the 2002 wave of the HILDA survey and they make a clear distinction between well-being and ill-being. The authors assert that well-being and ill-being are not the opposite ends to the same spectrum but rather two distinct concepts. The study analyses two measures of well-being and two measures of ill-being. The well-being measures relate to the individual's overall life satisfaction and the household's financial situation, which are both rescaled to zero to one hundred intervals. Ill-being is measured by a five item scale of mental health and a measure of financial stress which is constructed from eight questions relating to the household's ability to deal with various financial emergencies and to pay bills. Specifically, the eight questions include: the ability to pay bills; the need to pawn possessions; not having meals; doing without heating; receiving help from family, friends and welfare organisations; and difficulty in raising A$2,000 in an emergency. Again, consistent with the well-being measures, the measures of ill-being are rescaled to the interval of zero to one hundred. Consequently, OLS is implemented to analyse the determinants of well-being and ill-being. A measure of net wealth is controlled for, which is defined as the household's total assets minus total debt.

The primary results of Headey and Wooden (2004) concern the effects of income and wealth on well-being. Both income and net worth are positively related to both measures of well-being. Wealth exerts a larger impact on well-being than income for both measures of life satisfaction and financial satisfaction. Females report a higher level of overall life satisfaction. Age displays a "U-shaped" pattern with well-being and being in a relationship is positively related to well-being. Unemployment has a strong negative effect on overall life satisfaction and satisfaction with the financial situation. Finally, any form of disability is negatively related to overall life satisfaction.

The analysis of subjective ill-being reveals mixed results. Net worth is positively related to mental health; however, income does not have a statistically significant impact. Increases in income and net wealth reduce the financial stress experienced by the individual. Females report lower levels of mental health and being female has an insignificant relationship with financial stress. Age is negatively related to mental health and is positively related to financial stress. Education is not a significant determinant of either measure of ill-being, and as expected disability is positively related to mental health and financial stress. The study concludes that wealth is as important as income as a determinant of well-being in Australia.

The study of Headey and Wooden (2004) is, however, arguably limited in several ways. Firstly, the study only provides cross-sectional analysis of the impact of income and net worth on the household's well-being and ill-being. As argued by Ferrer-i-Carbonell and Frijters (2004), it is important to control for individual fixed effects when analysing measures of life satisfaction and well-being. Also, the paper only analyses the influence of net worth on the household's well-being and ill-being. The study could be developed by considering the effects of different types of debt on the household's well-being, following Brown *et al.* (2005) who find that it is unsecured debt that has a significant negative association with psychological health, rather than secured debt. In addition, Headey and Wooden (2004) fail to control for the household's subjective financial position in the analysis of overall life satisfaction and psychological well-being. The empirical analysis presented in this chapter exploits the panel nature of the HILDA survey and implements fixed effects analysis. Also, net wealth is decomposed into assets, secured and unsecured debt, to assess the different influences these factors have on an individual's level of well-being.

The only study that provides a comparison of the relationship between the household's financial situation and well-being across countries is Headey *et al.* (2008). Headey *et al*. (2008) explore the association between net worth and well-being in Australia in addition to four other countries. The authors analyse household panel data across five countries to explore the relationship between economic well-being and subjective well-being. These countries are namely, Australia, Britain, Germany, Hungary and the Netherlands. The analysis for Australia focuses on the 2002 wave of the HILDA survey due to this wave containing information on a variety of assets and debts of the respondents. Well-being is measured on an eleven point scale where zero represents totally dissatisfied with your situation and ten represents totally satisfied. The same scale was used to measure households' satisfaction with their financial situation. As a consequence of only one wave of the HILDA survey containing information on the wealth and assets of the household, Australia is omitted from the longitudinal analysis. The 1997 to 2000 waves of the BHPS were studied for the British analysis. In the cross-sectional analysis, the authors focus on the 2000 wave of the BHPS, as only this wave contains detailed information on the household's wealth levels. Due to this, however, in the longitudinal analysis, a control for net worth is not available. The BHPS also contains information on household consumption, overall life satisfaction and current satisfaction with household income. The GSOEP survey between the years of 1993 and 2002 is analysed for Germany. The GSOEP survey contains information on the income of the respondents, and a measure of wealth for the 2002 wave of the survey. Again, overall life satisfaction and satisfaction with income are included and are both measured on eleven point scales. The Tarki panel survey between 1992 and 1997 is analysed for Hungary. The survey contains detailed information on both the household's wealth and consumption. The consumption of the household is obtained from eleven questions relating to typical monthly and annual expenses on a variety of non-durable goods and housing. As in the GSOEP and the HILDA surveys, overall life satisfaction and satisfaction with their standard of living are measured on an eleven point scale. The Socio-Economic Panel (SEP) survey is analysed for the Netherlands and contains information on the individual's assets and debt. The study analyses the surveys between 1988 and 1997. A question on overall life satisfaction, on a dichotomous scale, is only asked twice in the 1988 and 1991 surveys. However, a question regarding the household's satisfaction with household income is asked throughout the survey and this is measured on a one to six point scale, where one represents 'with great difficulty' and six indicates 'very easily'.

A measure of net worth is constructed for each of the countries analysed and a measure of disposable income is available in each of the data sets considered. The measures of consumption are only available for Britain and Hungary and are based on household expenditure on non-durable goods. The study initially uses OLS in the cross-sectional analysis of the data. Both income and net worth exert positive and statistically significant impacts on the measures of life satisfaction across all of the five countries considered. Consumption does not exert a statistically significant impact on overall life satisfaction for Britain. However, consumption has a positive relationship with overall life satisfaction in Hungary. With respect to satisfaction with the household's material standard of living, again across all of the countries, income and wealth are positive and statistically significant determinants. A positive relationship between consumption and satisfaction with material well-being is present for both Britain and Hungary.

In the longitudinal analysis, fixed effects specifications were implemented to control for unobserved individual fixed effects. Once a fixed effects specification is used, income exerts a positive influence on subjective well-being across all of the countries considered. For Britain, consumption exerts a positive impact on the level of satisfaction with the household's standard of living. However, for Hungary, consumption has a negative impact. For the Netherlands and Hungary, net worth is positively related to satisfaction with the standard of living, once individual fixed effects are controlled for.

Unfortunately, Headey *et al.* (2008) are unable to control for unobserved individual effects in the empirical analysis conducted for Australia. Once these unobserved effects are controlled for, the impact of income and wealth on well-being in Australia may be significantly different to the associations found in the cross-sectional analysis. In addition, the study does not decompose the factors of net worth, to analyse if certain types of debt or assets have different impacts on well-being. Also, the study does not control for the subjective financial position of the household, a factor that consistently displays a significant relationship with well-being.

In a related area, Wilkins and Wooden (2009), using descriptive statistics, evaluate the likelihood that the recent increase in the level of household debt in Australia will develop into a problem for the economy. The authors assert that the recent decrease in Australian house prices could result in a large proportion of households possessing negative housing equity. This increase in negative housing equity could potentially

trigger a cycle of falling house prices due to an increase in mortgage defaults. Using the 2006 wave of the HILDA survey, the distribution of debt across households is explored. The authors focus on households that have negative housing equity, that is, a debt to equity ratio greater than one.

From the descriptive analysis, it is apparent that the distribution of household debt is highly skewed, with almost one third of households holding no-debt. The median level of total debt is A$14,000, with the mean level of total debt being A$111,900. The primary form of debt is owner-occupied housing and the debt level is strongly related to the levels of net-worth and income. This suggests that the richest sections of society hold higher levels of debt. It is also found that the typical low-income households do not hold any debt, perhaps due to their inability to obtain mortgages and loans as a consequence of their low incomes.

Wilkins and Wooden (2009) then assess how many Australians hold excessive levels of debt by considering three measures of indebtedness. These are, namely, the household's level of gearing (the debt to asset ratio of the household), the ratio of the household's debt to the household's disposable income and the debt service ratio of the property. The debt service ratio of the property refers to the ratio of the annual mortgage repayments of the household to the annual disposable income of the household. The study finds that the median household had a debt to asset ratio of just 8% and of those that hold debt, the median household had a debt to asset ratio of 24%. The statistics also reveal that less than 5% of households have negative net worth (debt exceeding assets). When the debt to disposable income ratio is considered, half of the households have debts that represent 27% or less of annual disposable income. Approximately 10% of households have debts that are four times that of annual disposable income. Just 4% of households report repayments on their property exceeding 50% of their annual income.

The household characteristics that are associated with a debt to asset ratio greater than 0.75, a debt to income ratio greater than 4 and a property debt service ratio of greater than 0.5 are then explored using descriptive statistics. Lone parents and single person households, renters, young people, indigenous people, and the unemployed are more likely to hold excessive debt when the debt to asset ratio is considered. The financial situation of the household does not appear to be related to the total debt levels or to the debt to income ratio.

The study by Wilkins and Wooden (2009) is, however, limited in several ways. The authors acknowledge that, although the HILDA survey has a panel design, the analysis is implemented on cross-sectional data. This limits the analysis as it is not possible to comment on the wealth dynamics of Australian households. This would be possible if the data from the 2002 wave of the HILDA survey is also analysed.

Summary

The empirical analysis presented in this chapter develops the existing literature in several ways. In the existing studies that explore household finances and well-being in Australia and Germany, only the impact of net worth on well-being has been examined. This chapter will decompose net wealth into total debt and total assets and will also further split total debt into secured and unsecured debt to explore whether overall debt or specific types of debt are related to overall life satisfaction and psychological well-being. In the existing literature, only Brown *et al.* (2005), analysing the BHPS, consider the impact of different types of debt on psychological well-being. The chapter will compare the impact of different types of debt across Australia, Britain and Germany, to assess if the relationship is consistent across different economies.

Secondly, the chapter will employ fixed effects panel estimators to Australian data to assess the impacts of net worth, total assets and debt on well-being once individual fixed effects are controlled for. In the existing literature for Australia, only cross-sectional analysis of these relationships has been presented. As argued by Ferrer-i-Carbonell and Frijters (2004), it is important to account for individual fixed effects as controlling for them can have a dramatic impact on the results related to modelling subjective well-being measures. The results related to Australia will then be compared to those of Britain and Germany, to explore the robustness of the findings in each of the surveys analysed.

Finally, the analysis will control for the head of household's subjective financial situation. This has been previously found to have a large effect on overall life satisfaction, however, the studies did not control for the debt levels, the value of the household's assets or their net worth. Also, none of the existing studies analysing Australian data include the household's subjective financial situation, which could have a significant impact on an individual's subjective well-being. The next section outlines the data analysed and econometric methodologies employed within this chapter. It also

specifies the dependent variables analysed and the explanatory variables included in the analysis.

3.3 Data and Methodology

3.3.1 Data

The empirical analysis presented in this chapter draws on panel data from three countries, namely, Australia, Britain and Germany. The analysis for Australia is based on the HILDA survey. The HILDA survey commenced in 2001 and is financed by the Australian Government with the Melbourne Institute of Applied Economic and Social Research being responsible for its design and management. The HILDA survey is a nationwide panel survey that contains a wide range of social, demographic and socio-economic information. Further details of the HILDA survey are described in Watson and Wooden (2002). This chapter focuses on the 2002, 2006 and 2010 waves as these waves contain a supplementary wealth module. The wealth module includes detailed information on the household's wealth, including the monetary values of a variety of assets and debts held by the household. The validity of the measures of wealth in the HILDA survey is extensively discussed in Headey *et al.* (2005), Marks *et al.* (2005) and Wilkins and Wooden (2009). In accordance with Bertaut and Haliassos (2002), Brown *et al.* (2005) and Nettleton and Burrows (1998), the analysis presented in this chapter will focus on the heads of households. The justification is that it is likely that the household head bears the majority of the psychological and well-being burdens caused by the household's financial situation. The HILDA survey, unlike the BHPS and the GSOEP survey, does not specify the reference person in each household. The technique to identify the head of household in this chapter is consistent with that employed by Marks *et al.* (2005) and Doiron and Guttmann (2009). The head of household in the HILDA survey is defined as the highest labour market income earner in the household, and if two people in the household earn the same then the oldest member of the household is selected[18]. The study analyses heads of households who are present for a minimum of two waves, accordingly, a sample of 1,828 heads of households is analysed and this translates into an unbalanced panel of 4,106 head of household/year observations[19].

[18] The results were not sensitive to different head of household definitions, such as the oldest member of the household and the oldest male in the household.
[19] Similar results are obtained when a balanced panel is analysed.

The analysis for Britain is based on a sample of heads of household from the BHPS. The BHPS is conducted by the Institute for Social and Economic Research and is a nationally representative longitudinal survey of private households in which the same households are interviewed on an annual basis. The first wave, conducted in 1991, contained a sample of approximately 5,500 households, corresponding to roughly 10,300 adults. The sample size of the BHPS was increased in 1999 when an additional 1,500 households from Scotland and Wales were included and similarly, in 2001, a further 2,000 households from Northern Ireland were added. The analysis presented in this chapter focuses on the 2000 and 2005 waves of the survey as these waves contain information on the wealth, debt and assets held by the households, and in addition suitable measures of well-being.

This chapter analyses a balanced panel of heads of household who responded to both the 2000 and 2005 waves of the survey. The 1995 wave of the BHPS also includes the measure of psychological well-being; however, the wave does not contain a measure of overall life satisfaction. For this reason, only the 2000 and 2005 waves of the BHPS are analysed. The head of household in the BHPS is defined to be the person who is legally or financially responsible for the accommodation of the household or it is the older of the two people if they are jointly responsible. Consequently, the sample consists of a balanced panel of 2,635 heads of household translating into 5,270 head of household/year observations. The BHPS contains a wide variety of information on socio-economic and demographic characteristics, and also self-reported health and well-being measures.

The analysis for Germany focuses on the GSOEP survey. The survey is a nationally representative panel survey of private households that commenced in West Germany in 1984 in which every household member above the age of 16 was interviewed. The survey was extended in 1990 to include East Germany. Wealth measures were included in the 2002 and 2007 waves of the GSOEP survey, and consequently are the focus of the chapter[20]. The GSOEP survey asks respondents about the value of their property, financial assets, life insurance, business assets and tangible assets in addition to their debt levels. Consistent with the other analysis implemented in this chapter, the head of household will be analysed for the German data. The head of household is defined as the individual in the household who best knows how the household acts under general

[20] The 1988 wave also includes information on the household's debt and assets, however, the 1988 wave does not include as much detail as the 2002 and 2007 waves.

conditions. As a result, a balanced panel of 7,796 household heads are analysed, translating to 15,592 head of household/year observations.

Despite differences arising across the three countries analysed relating to the definition of the head of household, all three definitions serve the purpose of hopefully identifying the person financially responsible for the household. The next section defines the dependent variables analysed in this chapter.

3.3.2 Dependent Variables

The dependent variables analysed in this chapter capture the head of household's overall life satisfaction and their psychological well-being. Unfortunately, due to limitations of the data, the dependent variables are not entirely consistent across the three surveys analysed. These differences arise for a number of reasons including being defined on different scales and the questions posed in the surveys using different wording and terminology. These disparities are outlined below. Arguably, there is, however, sufficient information contained in the surveys to compare the effects of the household's financial situation on the head of household's well-being. For reference purposes, in the subsequent sections of the chapter, the dependent variables will be labelled. Initially, the dependent variables analysed for Australia are defined. The section subsequently outlines the dependent variables analysed for Britain and Germany.

HILDA Survey

Overall Life Satisfaction (A1)

The measure of overall life satisfaction of the head of household in the HILDA is based on the question; "*All things considered, how satisfied are you with your life?"* The measure lies on an eleven point scale, where zero indicates "*totally dissatisfied"* and ten corresponds to *"totally satisfied".* The first five categories are combined due to lack of observations. This is consistent with Boes and Winkelmann (2004) who combine the first five categories into two categories. Consequently, the measure of overall life satisfaction is represented on a seven point scale and is ordinal in nature. In ordinal data, it is possible to observe the rankings of the data, however, cardinality does not hold. Following Frey and Stutzer (2002), self-reported satisfaction measures are widely used in the economics literature, for example, Headey and Wooden (2004), Headey *et*

al. (2008), Clark (2003), Winkelmann and Winkelmann (1998) and Winkelmann (2005). This variable is denoted by the label *A1*.

Figure A3.1 presents the distribution of *A1*, while Table A3.1 presents the associated summary statistics. From Figure A3.1 it is clear that the distribution is skewed, with more observations being at the higher end of the distribution. This phenomenon is consistent with the existing literature; see for example, Dolan *et al.* (2008). In addition, the overall life satisfaction measure is discrete and ordinal in nature and, following Ferrer-i-Carbonell and Frijters (2004), an ordered logit model with individual fixed effects will be used to ascertain the determinants of the dependent variable *A1*.

Looking at Table A3.1, it is clear that the average level of overall life satisfaction is 3.85, with male head's reporting an overall life satisfaction of 3.86 and females an overall life satisfaction level of 3.83. In the Australian sample there has been a small increase in the level of overall life satisfaction over the period analysed. The average levels of overall life satisfaction were reported to be 3.77, 3.88 and 3.89 in the years 2002, 2006 and 2010, respectively. Households with any outstanding debt report, on average, lower levels of overall life satisfaction. The average level of overall life satisfaction for households who hold no debt is 4.03, compared to 3.82 for those who have some liabilities. Similarly, those households, who have negative net wealth, report lower levels of overall life satisfaction on average, that is 3.55 compared to 3.86, respectively[21].

Psychological Well-Being (A2)

The variable relating to the head of household's mental health status is generated from the "Short Form 36" (SF-36) questionnaire. The SF-36 is a multi-purpose, short form health survey that contains 36 questions and is contained in all waves of the HILDA survey. The SF-36 yields eight profile scores relating to a variety of health areas including physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. The analysis presented in this chapter, in accordance with Headey and Wooden (2004), will focus on the mental health section of the SF-36 and this will form the basis of the measure of psychological well-being.

The mental health subsection of the SF-36 is a multiple item measure and is constructed from the responses to a range of questions. The questions posed are as follows: *"Have*

[21] Definitions of the explanatory variables are given below in Section 3.3.3.

you been a nervous person? Have you felt so down in the dumps that nothing could cheer you up? Have you felt calm and peaceful? Have you felt down? Have you been a happy person?" These questions are measured on a six point scale ranging from *"All of the time"* through to *"none of the time"*. These responses are combined and recoded to a zero to one hundred point interval and this forms the measure of the head of household's psychological well-being[22]. The dependent variable is denoted *A2*. A linear regression model with individual fixed effects will be employed to analyse the determinants of psychological well-being in Australia[23].

Figure A3.2 presents the distribution of the dependent variable *A2* for the entire sample analysed. The summary statistics of *A2* are presented in Table A3.1. The average mental health score of the entire sample is 76.96 with males reporting a higher score of 77.37 compared to 75.73 for females. Across the period analysed, the psychological well-being measure has stayed relatively constant, with the scores being 76.40, 77.22 and 77.13 for the years 2002, 2006, and 2010, respectively. As in the case for overall life satisfaction, in Australia, households who possess outstanding debt, report lower mental health scores, 76.61, compared to those who hold no debt, 78.78. Separating total debt into secured and unsecured debt indicates that holding unsecured debt is negatively related to psychological well-being, whereas households holding secured debt, on average, report higher levels of psychological well-being. As with the overall life satisfaction measures, households with negative net wealth report significantly lower levels of psychological well-being. Possessing negative net wealth is associated with an average psychological well-being measure four points lower than those with positive net wealth.

BHPS

Overall Life Satisfaction (B1)

As in the HILDA Survey, the BHPS contains a single item measure of overall life satisfaction and is contained in the "Self Completion" component of the BHPS. The question was asked as follows: *"Here are some questions about how you feel about*

[22] The raw responses are recoded to a zero to a one hundred scale according to the following transformation:
Transformed Scale = (Raw score – Min Possible Raw Score) * (100/Possible Range of Scores).

[23] A tobit model with Mundlak fixed effects was also employed and yielded similar results to the linear case. Of the sample analysed, 2 observations were left censored at 0 and 104 were right censored at 100, that is, 2.58% of the sample is censored. A tobit model was employed as a robustness check as the dependent variables are arguably censored in nature.

your life. Please tick the number which best describes how dissatisfied or satisfied you are with the following aspects of you current situation... life overall." The respondents were asked to indicate their ratings on a seven point scale where one indicates *"not satisfied at all"* and seven represents *"completely satisfied"* and, hence, the overall life satisfaction variable is ordinal in nature. The responses are recoded such that zero indicates "*not satisfied at all"* and six representing *"completely satisfied"*. An ordered logit model with individual fixed effects will be employed to analyse the dependent variable *B1* due to the discrete ordered nature of the variable.

The distribution of the overall life satisfaction measure is shown in Figure A3.3 and, consistent with the existing literature and the variable *A1*, the distribution of overall life satisfaction is skewed. Table A3.1 shows the summary statistics for *B1*. Across the whole sample, the average overall life satisfaction is 4.12, with males and females reporting average overall satisfaction measures of 4.21 and 3.92, respectively. The presence of household debt has a detrimental impact on the head of household's overall life satisfaction. Household heads that do not hold any debt report, on average, a significantly higher level of overall life satisfaction, 4.25, compared to those that hold debt, 4.00. The descriptive statistics indicate that well-being is negatively associated with holding both unsecured and secured debt; however, holding unsecured debt has a greater negative impact on overall life satisfaction than holding secured debt. Also, having negative net wealth has a large negative association with overall life satisfaction. Heads of household whose household debt exceeds their total assets report an overall life satisfaction of 3.66, compared to 4.22 for those who have positive net wealth.

Psychological Well-Being (B2)

The psychological well-being measure for Britain is based upon the "General Health Questionnaire 12" (GHQ12). The GHQ12 score, developed by Goldberg (1972), assigns an ordered ranking of the responses to the GHQ12 and is extensively used in the existing literature. For example, Nettleton and Burrows (1998), Taylor *et al.* (2007), Gardner and Oswald (2007), Clark and Oswald (1996), Clark and Oswald (1994), Shields and Wheatley Price (2005), Clark (2003) and Brown *et al*. (2005) all use measures of well-being derived from the GHQ12. The GHQ12 score is widely recognised to be a reliable measure of psychological well-being, see Argyle (1989).

In this chapter, an "inverse caseness" adaptation of the GHQ12 score is analysed[24]. Initially presented in Goldberg and Williams (1988) and subsequently used by Brown *et al.* (2005) and Shields and Wheatley Price (2005), the responses to each question of the GHQ12 are reassigned to a binary scale, where a response of one indicates a high level of psychological well-being and zero-indicates otherwise. The dependent variable is then constructed from summing these binary responses. Consequently, the measure of psychological well-being lies between zero and twelve, where higher values indicate higher levels of psychological well-being. Again, as with the measure of overall life satisfaction, the "inverse caseness" GHQ12 score is ordinal in nature and, consequently, a fixed effects ordered logit model is employed to analyse the determinants of psychological well-being in Britain.

Figure A3.4 presents the distribution of the dependent variable *B2* for the entire sample analysed while the descriptive statistics are presented in Table A3.1. The mean GHQ12 score of the sample is 10.18, with males reporting a mean score of 10.52 and females a score of 9.51. This result is consistent with the existing literature, for example, Clark and Oswald (1994), who that find females score worse on the GHQ. The GHQ12 measure does not vary much across the two waves analysed, with average scores being 10.14 and 10.23 in 2000 and 2005, respectively. Of households with some form of outstanding debt, the average GHQ12 score is 10.09. This compares to households who hold no outstanding debt, who report a mean GHQ12 score of 10.30. Holding unsecured debt is inversely related to psychological well-being, however, consistent with the dependent variable *A2*, holding secured debt has a positive association with psychological well-being. This positive association could reflect the benefits of owning their own home, irrespective of the level of housing debt. In accordance with Australia, negative net wealth is associated with lower levels of psychological well-being.

GSOEP Survey

Overall life Satisfaction (G1)

The measure of overall life satisfaction for Germany is analogous to that analysed for Australia. The question posed to the respondent was, "*How satisfied are you with your*

[24] The twelve questions asked in the GHQ12 are as follows; "*Have you recently: Been able to concentrate on whatever you're doing? Lost much sleep over worry? Felt that you are playing a useful part in things? Felt capable of making decisions about things? Felt constantly under strain? Felt you couldn't overcome your difficulties? Been able to enjoy your day-to-day activities? Been able to face up to your problems? Been feeling unhappy and depressed? Been losing confidence in yourself? Been thinking of yourself as a worthless person? Been feeling reasonably happy; all things considered?"*

life, all things considered?" Similar to the variable *A1*, this is measured on an eleven point scale where zero indicates "*completely dissatisfied"* and ten represents *"completely satisfied"*. Unlike the dependent variable *A1*, there are sufficient observations across all of the categories, such that it is not necessary to combine the lower categories[25]. As with the variables *A1* and *B1*, due to the discrete ordered nature of the variable, fixed effects ordered logit models will be employed to ascertain the determinants of overall life satisfaction. This dependent variable is denoted by *G1*.

Figure A3.5 shows the distribution of *G1* for the German sample. Once again the measure of overall life satisfaction is negatively skewed, consistent with the existing literature and the previous dependent variables *A1* and *B1*. Table A3.1 presents the summary statistics. The average overall life satisfaction score for the whole sample is 6.90, with males on average reporting higher scores than females, 6.97 compared to 6.79 for males and females, respectively. Across the period analysed, overall life satisfaction actually fell for heads of household in Germany. In 2002 the average level of overall life satisfaction was 7.01 compared to 6.79 in 2007. Interestingly, households with any form of outstanding debt, on average, report higher levels of overall life satisfaction than those who hold no debt, 7.11 compared to 6.80, respectively. However, further investigation indicates that holding unsecured debt appears to be negatively associated with overall life satisfaction, with households with unsecured debt reporting overall life satisfaction of 6.62 compared to 6.97 for those who do not hold any unsecured debt. Possessing secured debt exerts a large positive impact on overall life satisfaction. The average overall life satisfaction score of heads of households who possess secured debt is 7.22 compared to 6.78 for those with no secured debt.

Psychological Well-Being (G2)

The psychological well-being measure used in the analysis for Germany is the Mental Component Summary (MCS). The MCS is based upon the "Short Form-12" (SF-12) indicators that are included in the 2002 wave of the GSOEP. The SF-12 is a twelve item subset of the SF-36 health measures, and consequently, like the SF-36, the SF-12 contains information on eight health domains. These eight domains are then collected into those relating to mental health, and from these the MCS is constructed. The MCS is defined on the interval of zero to one hundred with the higher values representing

[25] The results of the analysis for Germany remain consistent if the dependent variable *G1* is collapsed in the same manner as the dependent variable *A1*.

higher levels of psychological well-being. A full description of the MCS is contained in Andersen *et al.* (2007), who describe the construction of the variable in detail.

Consequently, due to the MCS being available in one wave, it is impossible to employ panel data techniques to analyse the dependent variable *G2*. Therefore, a linear regression model with robust standard errors for the cross-section data for 2002 will be used to analyse the determinants of psychological well-being in Germany.

The distribution and descriptive statistics of the dependent variable *G1* are presented in Figure A3.6 and Table A3.1, respectively. The descriptive statistics indicate that males report higher levels of psychological well-being, on average, compared to their female counterparts, consistent with both *A2* and *B2*. Holding any type of debt has a small negative impact on psychological well-being, with the average psychological well-being score of households with outstanding debt being 50.05 compared to 50.47 for those households who do not hold any debt. Like the other psychological well-being measures, it appears that holding unsecured debt has a detrimental impact on psychological well-being in Germany. Households possessing unsecured debt, on average, report a psychological well-being score two points lower than those households with no unsecured debt, 50.67 compared to 48.51. In line with *B2*, holding secured debt is positively associated with psychological well-being. Similarly, households with negative net wealth report a lower level of psychological well-being, on average, compared to those whose value of total assets exceeds the value of total debt.

Despite several differences occurring between the dependent variables analysed for each country, it is argued that they provide sufficient information in order to compare and contrast the impact of the household's financial situation on the head of household's overall life satisfaction and psychological well-being. The next section presents the econometric methodologies used to analyse the dependent variables exploited in this chapter. Initially, an ordered logit model with individual fixed effects is presented with the section briefly going on to outline a linear regression model and a fixed effects linear regression model.

3.3.3 Methodology

As outlined above, the dependent variables analysed take a variety of forms and consequently, a variety of econometric techniques are employed depending on the

nature of the dependent variable analysed. Initially, an ordered logit model with individual fixed effects is presented and this will be used to analyse discrete ordered dependent variables, that is, dependent variables *A1, B1, B2* and *G1*[26]. A linear regression model is then presented which will be used to analyse the dependent variable *G2*, as only one wave of information is available. Finally, following Headey and Wooden (2004) and Headey *et al.* (2008), a linear regression model with individual fixed effects is presented, which will be used to analyse the dependent variable *A2*.

3.3.3.1 The Fixed Effects Ordered Logit Model

As described in the previous section, the dependent variables *A1, B1, B2* and *G1* are represented on a discrete ordinal scale, and consequently, a fixed effects ordered logit model will be used to analyse these well-being measures. This section draws heavily on Baetschmann *et al.* (2011), who present the formulation and estimation techniques of the fixed effects ordered logit model. The fixed effects ordered logit model is specified as follows. Let $y^*_{i,t}$ be the unobserved latent variable for individual i at time t, with i = 1, ... , N and t =1, ..., T. This latent variable is assumed to be a linear function of a set of observable characteristics, represented by the vector $\mathbf{x}_{i,t}$ and β denotes a vector of parameters to be estimated. In addition, let the set of unobservable characteristics be represented by α_i and $u_{i,t}$, where it is specified that α_i indicates the unobserved time invariant effects, which are potentially correlated with the observable characteristics $\mathbf{x}_{i,t}$ and $u_{i,t}$ represents unobserved effects that are allowed to vary over both time and individuals, and is assumed to follow a white noise process. That is to say;

$$y^*_{i,t} = \beta' \mathbf{x}_{i,t} + \alpha_i + u_{i,t}, \; i = 1, ..., N, \; t = 1, ..., T. \qquad (3.1)$$

The dependent variable $y^*_{i,t}$ is unobserved in practice; however, it is possible to observe:

[26] The appendix presents the results from a random effects probit specification and a linear regression model with random effects. This will allow a comparison between different econometric specifications to explore if different assumptions regarding the unobserved time invariant individual effects have an impact on the estimated coefficients; that is random effects compared to fixed effects.

$$
\begin{aligned}
y_{i,t} &= 1 \quad \text{if } y^{*}_{i,t} \leq \mu_1 \\
y_{i,t} &= 2 \quad \text{if } \mu_1 < y^{*}_{i,t} \leq \mu_2 \\
y_{i,t} &= 3 \quad \text{if } \mu_2 < y^{*}_{i,t} \leq \mu_3 \\
&\vdots \\
y_{i,t} &= J \quad \text{if } \mu_{J-1} < y^{*}_{i,t} \leq \mu_J
\end{aligned} \tag{3.2}
$$

where the parameters of μ are the threshold parameters in the model. It is defined that $\mu_1 = -\infty$ and $\mu_J = +\infty$ whilst the threshold parameters, μ_j, are strictly increasing in J.

Following Ferrer-i-Carbonell and Frijters (2004), it is possible to introduce threshold parameters that are specific to the individual. The fixed effects ordered logit model requires that the error terms, $u_{i,t}$, are independently and identically distributed *(i.i.d.)* with a standard logistic function. Let F(.) denote the cumulative distribution function of the residual term, $u_{i,t}$, and assume that the distribution of $u_{i,t}$ is conditional on $\mathbf{x}_{i,t}$ and α_i then it follows;

$$
F(\varepsilon_{i,t} \mid x_{i,t}, \alpha_i) = \frac{1}{1+e^{\varepsilon_{i,t}}} = \Lambda(\varepsilon_{i,t}) \tag{3.3}
$$

Therefore, using equation 3.3, the probability of individual i at time t observing outcome j is given as;

$$
\Pr ob(y_{i,t} = j \mid \mathbf{x}_{i,t}, \alpha_i) = \Lambda(\mu_{j+1} - \mathbf{x}_{i,t}'\beta - \alpha_i) - \Lambda(\mu_j - \mathbf{x}_{i,t}'\beta - \alpha_i) \tag{3.4}
$$

This varies from the standard ordered logit model, as the probability of observing outcome j is now dependent, along with $\mathbf{x}_{i,t}$ and β, on the unobserved individual effect α_i and the threshold parameters μ_{j+1} and μ_j.

Baetschmann *et al.* (2011) outline two problems with direct maximum likelihood estimation. The first is a problem with identification. The component μ_j cannot be separated from α_i, only $\mu_j - \alpha_i = \alpha_{i,j}$ can be identified and, therefore, can be estimated consistently for instances where *T* tends towards infinity. Secondly, under the assumption of fixed-*T* asymptotics, due to an incidental parameter problem, $\alpha_{i,j}$ cannot be estimated consistently. As a consequence, in short panels, this can result in substantially biased estimators of the coefficients, $\hat{\beta}$, as stated in Greene (2004).

To consistently estimate the coefficients of β, it is required that the J levels of $y_{i,t}$ are required to be dichotomised, that is collapsed into binary outcomes. In this chapter, the procedure outlined in Baetschmann *et al.* (2011) is used to estimate the coefficients. The method proposed in Baetschmann *et al.* (2011) jointly estimates all dichotomisations, subject to $\beta^j = \beta \forall j = 1, 2, ..., J$. From this, the quasi- log likelihood becomes;

$$\log L(b) = \sum_{j=2}^{J} \log L^j(b) \tag{3.5}$$

A full proof is provided in Baetschmann *et al.* (2011). This estimation method is called the "Blow-Up and Cluster" (BUC) estimator. The estimator initially "blows-up" the sample size by replacing every observation in the sample by *J-1* copies of itself, and then dichotomises every *J-1* copy of the individual at a different cut off point. The Conditional Maximum Likelihood logit is then estimated using the entire sample, giving the BUC estimates. The standard errors are clustered at the individual level as some individuals can potentially contribute several terms to the log-likelihood function. The BUC estimator avoids the problem of small sample sizes associated with cut off values. The fixed effects ordered logit model is implemented in STATA using the "bucologit" command used by Dickerson *et al.* (2012).

In a fixed effects ordered logit specification, it is not possible to calculate the marginal effects of the estimated coefficients. This is a consequence of the fixed effects being conditioned out of the likelihood function (see Dickerson *et al.*, 2012). It is, however, possible to interpret the sign and magnitude of the estimated coefficients.

3.3.3.2 Linear Regression Model

The dependent variable *G2* is analysed using a linear regression specification following Keese and Schmitz (2012). Due to limitations of the data, only cross sectional data is available, to analyse the measure of psychological well-being for German heads of household. Let y_i be the dependent variable, $\mathbf{x}_i$ the vector of observable household and head of household characteristics, β the corresponding parameters and ε the error term. As the variable *G2* is only available for one year, the error term does not contain time invariant and time variant components. This gives the linear model:

$$y_i = \beta' \mathbf{x}_i + \varepsilon \tag{3.6}$$

This relationship is estimated via a standard OLS estimation. Further details are presented in Greene (2012).

3.3.3.3 The Linear Model with Individual Fixed Effects

Following Ferrer-i-Carbonell and Frijters (2004), it is important to account for the unobserved, time invariant individual effects when analysing self-reported measures of health and satisfaction. As a result, following Headey and Wooden (2004) who analyse the same psychological well-being measure via an OLS specification, the dependent variable *A2* will be analysed using a fixed effects model to control for unobserved time-invariant heterogeneity[27]. Let $y_{i,t}$ be the dependent variable, $\mathbf{x}_{i,t}$ be a vector of head of household and household characteristics and β is the vector of parameters. Let the error term be decomposed into two parts, unobserved time invariant factors, represented by a_i, which are assumed to be correlated with the observed independent variables $\mathbf{x}_{i,t}$, and the time variant unobserved effects, denoted by $u_{i,t}$. This yields:

$$y_{i,t} = \beta' \mathbf{x}_{i,t} + a_i + u_{i,t}, \ t = 1, 2, ..., T, \text{ and } i = 1, ..., N \tag{3.7}$$

The fixed effects model is constructed by averaging across time for each individual, i, that is;

$$\bar{y}_i = \beta' \bar{\mathbf{x}}_i + a_i + \bar{u}_i \tag{3.8}$$

where $\bar{y}_i = \frac{\sum_{t=1}^{t=T} y_{i,t}}{T}$ and so on. Subtracting equation 3.8 from equation 3.7 gives;

$$y_{i,t} - \bar{y}_i = \beta(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i) + (u_{i,t} - \bar{u}_i) \tag{3.9}$$

This is the fixed effects or within transformation, which eliminates the unobserved individual fixed effects. The fixed effects estimator will be unbiased if $u_{i,t}$ is strictly uncorrelated across all time periods.

Marginal Effects

In the fixed effects regression model, the coefficients indicate the marginal effects of the respective independent variable. The partial differential with respect to the k^{th} independent variable, gives the marginal effect, which is β_k. It is important to consider the marginal effects of the explanatory variables where possible as it allows

[27] As a robustness check, due to the censored nature of the data, a Tobit model with Mundlak fixed effects was also employed. The results found from the linear model with individual fixed effects are consistent with those from the tobit specification with Mundlak fixed effects.

interpretation of the variables whilst holding all other things constant, that is, *ceteris paribus.*

3.3.4 Independent Variables

This section outlines the explanatory variables used in the empirical analysis. The explanatory variables are chosen following the existing empirical literature relating to the determinants of subjective well-being. Initially, the variables relating to the household's financial situation are outlined; including the household's total assets, their total debt, levels of secured and unsecured debt and the household's level of net wealth. The variables that capture the head of household's subjective financial situation are then defined. The section goes on to describe the demographic and socio-economic variables that are controlled for in the analysis. The independent variable definitions are presented in Tables A3.2, A3.4 and A3.6 for Australia, Britain and Germany, respectively, with the associated summary statistics presented in Tables A3.3, A3.5 and A3.7.

Monetary Financial Measures

In this chapter, several measures are used to capture the household's financial situation. Initially, the total assets held by households are defined for the three countries analysed. The section subsequently goes on to present the variable definitions of the household's total debt, secured debt, unsecured debt and the household's net worth. Figures A3.7, A3.8 and A3.9 present the distributions of the monetary financial variables considered in this chapter for Australia, Britain and Germany, respectively. It should be noted that, in order to compare the descriptive statistics across the countries analysed, the monetary values are converted to the British Pounds in 2005 prices ($£_{2005}$). However, within the regression analysis, the household's monetary financial variables are inflated to the most recent time period considered for each country and are measured in that country's currency.

In the existing literature, there is some discussion relating to whether the changes in the households financial situation is anticipated or unexpected has a differential impact on an individual's level of well-being, see for example Clark and Apouey (2013). If a change in a household's financial situation is anticipated then it is expected to have a limited impact on the head of household's well-being levels as they may alter their behaviour prior to their financial position changing. Unexpected changes in the household's financial position are expected to have an impact on an individual's well-

being levels. As the analysis presented in this chapter controls for individual heterogeneity, it relies upon changes in the independent variables. Unfortunately, the analysis is not able to distinguish between anticipated or unexpected changes in the household's financial position. It is however argued that the individual's subjective financial position captures these expected and anticipated changes in the household's financial position as they capture an individual's expectations and adaptions to their previous circumstances.

Total Assets

In the HILDA survey, the value of the household's total assets is given by summing the value of the household's financial and non-financial assets. The total value of the household's financial assets is given by the value of the household's bank accounts, their superannuation, the value of their cash investments and equity investments, trust funds and life insurance. The household's non-financial assets comprise of home assets, other property assets, business assets, collectables and the value of the household's vehicles. This chapter uses the derived variables contained in the HILDA survey, which are as described in detail in the HILDA user manual (Summerfield *et al.,* 2011). The monetary values of the 2002 and 2006 waves are inflated to the 2010 level and subsequently included in the regression analysis. Household total assets in Australia are denoted by Ta^A. The mean value of household total assets is £$_{2005}$357,361 (A$$_{2010}$ 989,866), while the median level is £$_{2005}$253,549 (A$$_{2010}$ 702,314) indicating that the distribution is positively skewed.

In line with Brown and Taylor (2008), the value of total assets of the household for the BHPS is constructed by summing the value of the household's savings accounts, the total value of the household's investments and the value of any of the properties owned by the household. All the monetary variables in the BHPS are inflated to 2005 price levels. The household's total assets for Britain are denoted by Ta^B. The mean level of household total assets in Britain is £$_{2005}$128,750, whilst the median value is £$_{2005}$94,402 indicating a highly skewed distribution.

Similar to the BHPS measure, the value of the household's total assets in Germany is constructed by summing the value of the household's financial assets, tangible assets

and any property owned by the household[28]. These are then inflated to 2007 prices. The value of household total assets in Germany is represented by Ta^G. The mean value of household assets in the German sample is £$_{2005}$115,866 (€$_{2007}$179,647), with a median of £$_{2005}$32,248 (€$_{2007}$50,000), indicating a highly skewed distribution.

In order to take the skewed nature of total assets into account, following Gropp *et al.* (1997) and Brown *et al.* (2005), the natural logarithm is taken. In the case where household total assets are positive, the natural logarithm is simply taken and in the cases where household total assets equal zero the natural logarithm is also defined to be zero, as there are no assets values between zero and one. This gives the natural logarithm of household total assets to be $ln(Ta^i)$ if $Ta^i > 0$ and 0 if $Ta^i = 0$, where i = A, B and G indicate Australia, Britain and Germany, respectively. The distributions of the natural logarithm of household total assets are presented in Figures A3.7, A3.8 and A3.9 for Australia, Britain and Germany, respectively.

Secured Debt

With regard to the level of household debt, the HILDA survey contains information on both the level of the household's secured (mortgage) and unsecured (non-mortgage) debt. The household's secured debt refers to the household's home debt and other property debt, which we denote by Sd^A. In line with household total assets, the natural logarithm is taken to account for the highly skewed nature of the household's secured debt. The mean level of household secured debt is £$_{2005}$58,694 (A$$_{2010}$ 162,577), while the median level is £$_{2005}$28,882 (A$$_{2010}$ 80,000), again indicating a skewed distribution. Of the sample analysed, 62.4% of households hold some form of secured debt.

For Britain, the measure of outstanding secured debt is generated from the response to the question *"approximately how much is the total amount of your outstanding loans on all the property you (or your household) own, including your current home?"* This forms the basis for the measure of mortgage debt held by the households, and is represented by Sd^B. Of the households analysed, 40.0% of households hold some form of secured debt, corresponding to a mean level of secured debt of £$_{2005}$23,455.

[28] The GSOEP wealth module contains derived variables that use imputed variables to account for missing responses. Consequently, five versions of each derived variable are included and their value is dependent on the imputation method used. This chapter uses the method presented in Brown and Taylor (2008) and constructs its own measures of the household's financial variables. The analysis was replicated with the imputed variables and similar results were found.

The level of secured debt for the German sample is generated by summing the total debt on any property owned by the household. The question covers the household's primary residence and other property: *"If you still have a loan taken out on your house/apartment, how high is the remaining debt (excluding interest)?"* The responses to this question form the basis for measuring the household's level of secured debt. The household's secured debt for Germany is denoted by Sd^{G}. The proportion of German households that hold secured debt is 27.0%, with the average level of secured debt being £$_{2005}$21,399 (€$_{2007}$33,178).

In accordance with household total assets, the natural logarithm of household secured debt is taken, where $ln(Sd^{i})$ if $Sd^{i} > 0$ and 0 if $Sd^{i} = 0$, where i = A, B and G indicate Australia, Britain and Germany, respectively. Figures A3.7, A3.8 and A3.9 present the distributions of the natural logarithm of household secured debt for Australia, Britain and Germany.

Unsecured Debt

The unsecured debt of households in the HILDA survey is given by summing the household's credit card debt, their Higher Education Contribution Scheme (HECS) debt, and other personal debt, and is denoted by Ud^{A}. 61.8% of households hold some form of unsecured debt, with the mean level being £$_{2005}$14,301 (A$$_{2010}$ 39,612).

For Britain, the definition of outstanding unsecured debt is based upon the question, *"How much in total do you owe?"* This question specifically relates to unsecured (non-mortgage) debt as mortgage debt is covered in a separate question. The level of unsecured debt is denoted by Ud^{B}. Of the households analysed for Britain, the mean value of unsecured debt is £$_{2005}$1,907, while only 35.2% households possess any unsecured debt.

The level of unsecured debt for Germany is constructed from responses to the question, *"Leaving aside any mortgages on house or property or house-building loan: Do you currently still own money on loans that you personally were granted by a bank, other organization, or private individual, and for which you personally are liable? How high are your outstanding debts?"* This question clearly relates to the household unsecured debt. Those who respond *"no"* to the initially question are assigned the value of zero, while the household's level of unsecured debt is given by summing the levels of

unsecured debt of each individual in the household. 19.3% of the sample analysed hold some form of unsecured debt, with the average value of unsecured debt of households analysed being £$_{2005}$3,615 (€$_{2007}$5,606).

As above, the natural logarithm of household unsecured debt is taken using the same procedure as above. As before, this gives the natural logarithm of unsecured debt to be defined as $ln(Ud^i)$ if $Ud^i > 0$ and 0 if $Ud^i > 0$, where i = A, B and G are defined as before.

Total Debt

Household total debt is given by summing household unsecured and secured debt, that is $Ud^i + Sd^i = Td^i$, where i = A, B and G indicate Australia, Britain and Germany, respectively.

For Australia, 83.9% of households hold some form of debt, with the average level of total household debt being £$_{2005}$72,486 (A$$_{2010}$ 200,782). Of the British sample, 54.6% hold some form of debt, with the average value of total debt being £$_{2005}$25,363. The German sample indicates that 32.7% of households hold some form of liabilities, with the average value of total debt being £$_{2005}$23,284 (€$_{2007}$36,102). The same method of taking the natural logarithm is applied as above.

Net Wealth

In addition to controlling for the impact of total assets and debt on well-being, the net financial position of the household is considered. Barwell *et al.* (2006) argue that the state of the household's balance sheet is given by the relative size of assets to debt, that is, net wealth. Household net worth is the value of total assets of the household minus the household's total debt, that is, $nw^i = Ta^i - Td^i$, where i = A, B and G indicates Australia, Britain and Germany, respectively.

The mean value of net worth of the Australian households analysed in this chapter is £$_{2005}$284,397 (A$$_{2010}$787,760), while the median is £$_{2005}$185,323 (A$$_{2010}$513,331). Of the sample analysed, 2.2% of households possess negative net wealth, which could potentially have a dramatic detrimental impact on the head of household's well-being. The mean value of household net worth in Britain is £$_{2005}$103,387. Of the sample analysed, 11.9% of the sample analysed has negative net wealth. The average value of

household net wealth for the German sample is £$_{2005}$92,581 (€$_{2007}$143,545). Of the sample, only 5.1% of households have negative value of net worth.

The natural logarithm of household net worth is taken; however, this is potentially problematic as household net worth can take either positive or negative values. In the case where $nw^i > 0$, the natural logarithm is simply taken and if $nw^i = 0$, then the natural logarithm of net worth is defined to be zero, $ln(nw^i) = 0$ if $nw^i = 0$. If household net worth is negative, that is $nw^i < 0$, then the natural logarithm is defined to be, $(-1)ln(|nw^i|)$, where the superscript i = A, B and G indicates Australia, Britain and Germany, respectively. The distributions of household net worth for Australia, Britain and Germany are shown in Figures A3.7, A3.8 and A3.9, respectively.

Subjective Financial Measures

In the existing literature, perceptions about changes in the financial situation, perceptions about the current financial situation and expected future financial situation are all found to be significant determinants of well-being, for example, see Bridges and Disney (2010), Brown *et al.* (2005), Wildman (2003), Graham and Pettinato (2001), Hayo and Seifert (2003), Mentzakis and Moro (2009) and Louis and Zhao (2002). In addition, Jessop *et al.* (2005) find that financial concerns are associated with lower levels of mental health. It is argued that subjective measures of financial status contain information beyond that captured in the monetary financial measures. Therefore, a variety of controls that capture the household's perceptions are included in the analysis presented in this chapter. All three countries contain subjective information on the household's current financial situation, which are outlined below, while the BHPS also contains additional information on the past and expected financial situations. As presented in Van Praag and Ferrer-i-Carbonell (2007), based upon the idea of domain satisfaction, it is expected that overall life satisfaction will be related to subjective financial satisfaction.

In the existing literature, subjective financial satisfaction is defined as satisfaction with one's present financial situation. Analogous to well-being measures, both multiple and single item measures have been used to capture an individual's financial satisfaction. This chapter employs single item measures to capture the household's subjective financial satisfaction, in accordance with Bridges and Disney (2010) and Wildman (2003), who employ single item measures. The household's subjective financial

position is likely be correlated with the household's monetary financial measures; however, it is argued that it captures information beyond that contained in monetary financial measures. Consequently, such measures are included in the econometric analysis presented in this chapter. As previously stated, the variable definitions for Australia, Britain and Germany are presented in Tables A3.2, A3.4 and A3.6 respectively, with the corresponding summary statistics presented in Tables A3.3, A3.5 and A3.7.

The subjective financial position is thought to capture the comparison, adaptation and expectation effects of the household's financial position. Hedonic adaption suggests that an individual's well-being can adapt and become accustomed to their financial position, in addition to their levels of consumption and material goods they possess over time. As a result, as suggested by Easterlin (1974), individuals get to use to their income and consumption levels. Similarly, individuals can revise their expectations and aspirations over time given. It is argued that an individual's perceived financial status captures their comparison effects, adaption effects and expectations, and therefore the subjective financial position captures information beyond that contained in the monetary levels of the household's finances.

The HILDA survey contains information on the head of household's satisfaction with the household's current financial situation. The question posed to the respondent was; *"Given your current needs and financial responsibilities, would you say that you and your family are... prosperous, very comfortable, reasonably comfortable, just getting along, poor or very poor*?" From this question, a series of binary variables are constructed indicating if the response is *"prosperous"*, *"very comfortable"*, *"reasonably comfortable"* or *"just getting along"*. Due to the small number of observations contained in the lowest category, *"poor"* and *"very poor"* form the omitted category and, consequently, the effects of the other subjective financial variables are compared to this category. Of the sample of heads of household, 2.3% report being *"prosperous"* and 17.6% report being *"very comfortable"*. 57.4% of the sample report being *"reasonably comfortable"* and 20.9% report that they are *"just getting along"* financially.

The head of household's perceived current financial situation for Britain is based upon the question; *"How well would you say you yourself are managing financially these days? Would you say you are... Living comfortably, doing alright, just about getting by,*

finding it quite difficult, or finding it very difficult?" From this question, four binary variables are constructed with the omitted category being finding it *"very difficult"*. 32.0% of the sample indicated that they were currently *"living comfortably"* and 36.5% stated that they are *"doing alright"*. 25.3% of the sample stated that they are *"getting by"* and 4.3% and 1.9% of the heads of household report to be *"finding it quite difficult"* and *"finding it very difficult"*, respectively.

For the BHPS, variables regarding their expected future change in financial situation are generated from the question; *"Looking ahead, how do you think you will be financially a year from now, will you be... Better off, worse off than you are now, or about the same?"* From this, two binary variables are constructed to indicate if the head of household believes they will be *"better off"* than they are now and if they believe they will be *"about the same"*. Believing that they will be *"worse off"* a year from now is the omitted category. 23.8% of respondents believed that they would be *"better off"* financially a year from being asked and 65.4% of respondents believed that they will be *"about the same"* financially.

The BHPS variables that indicate the perceived change in financial situation are generated from the following question; *"Would you say that you yourself are better off or worse off financially than you were a year ago? Better off, worse off or about the same."* From this question, two binary variables are constructed, one to represent if the head of the household believes that they are *"better off"* than a year ago and the other to indicate if they believe they are *"about the same"*. The omitted category is if they believe that they are *"worse off"* than a year ago. 24.8% of heads of household believe that they were *"better off"* than in the previous year, and 52.4% believed they were the same financially as in the previous year.

Like the HILDA survey, the GSOEP survey only contains information relating to the household's current financial situation. In line with Delken (2008) and Hofmann and Hohmeyer (2013), subjective financial position is generated from the question, *"What is your attitude towards the following areas – are you concerned about them? Your own economic situation"*. The three possible responses are *"not at all concerned, concerned and very concerned"*. Two binary variables are constructed to indicate *"not concerned"* and *"concerned"*, whilst *"very concerned"* forms the omitted category. 48.8% of household heads report being *"concerned"* about their own economic

situation whilst 30.6% report that they are *"not concerned"* with their own economic situation.

Baseline Independent Variables

A variety of household and head of household characteristics are controlled for based on the existing literature. These include age, gender, marital status, labour market status, income, educational attainment, household size and self-rated health status. The variable definitions for Australia, Britain and Germany are presented in Tables A3.2, A3.4 and A3.6, respectively, and the corresponding summary statistics are displayed in Tables A3.3, A3.5 and A3.7.

Age

Studies in the existing literature consistently find a "U-shaped" relationship between age and well-being. For example, Theodossiou (1998), Winkelmann and Winkelmann (1998), Frey and Stutzer (2002), Clark (2003), Graham (2005), Winkelmann (2005), Oswald (1997) and Shields and Wheatley Price (2005) all find this relationship. However, recently, Frijters and Beatton (2011) report that the "U-shaped" pattern displayed in age is not robust once individual fixed effects are accounted for. They find a strong negative association between age and well-being.

Following the studies outlined above, the effects of age on well-being will be controlled for in this chapter. Both the age and age squared of the head of the household will be included to capture the potential non-linear relationship between well-being and age. The average ages of the heads of household for Australia, Britain and Germany are 43.73, 53.21 and 51.95 years old, respectively.

Gender

Following Alesina *et al.* (2004), Oswald and Wu (2010), Blanchflower and Oswald (2008), Headey and Wooden (2004), Ferrer-i-Carbonell (2005), Marks and Flemming (1999), Clark and Oswald (1996) and Brown *et al.* (2005), the gender of the head of the household is controlled for in the analysis. In this chapter, a binary variable is included that takes a value of one if the head of the household is female and zero if they are male. In the fixed effects specifications, the female variable is omitted due to the variable not changing over time, it will however be included in the analysis of the variable *G2* and the random effects specifications presented in the Appendix. Females comprise of

25.3% of the sample analysed for Australia. Of the British head of households analysed, 33.1% are females whilst 37.1% of household heads are female in the German sample.

Relationship Status

It is consistently found in empirical studies that the relationship status of the individual exerts a significant impact on an individual's well-being. Following Dolan *et al*. (2008), Wildman and Jones (2002) and Stack and Eshleman (1998), the marital status of the head of the household is controlled for in the analysis presented in this chapter.

A series of variables are included to capture the effects of the head of household's marital status. Dichotomous variables are included to indicate if the head of household is divorced or separated, if the head of household is widowed and if the head of household has never married. The effect on well-being of these variables is relative to the head of household being married. Of the Australian sample, 15.3% have never married, 12.03% are divorced or separated and 1.7% are widowed. For Britain, 19.15% of household heads have never married, 18.8% are divorced or separated and 15.0% of household heads are widowed. In the German sample, 15.6% of heads have never married, 13.7% are divorced or separated and 9.1% report being widowed.

Labour Market Status

The influence labour market status has on well-being has long been of interest to economists and it is well documented that unemployment is negatively associated with well-being. Frey and Stutzer (2000, 2002), Theodossiou (1998), Clark (2003), Clark and Oswald (1996), Winkelmann and Winkelmann (1998) and Kassenboehmer and Haisken-DeNew (2009) all demonstrate the detrimental effect unemployment has on well-being and happiness. Following these studies, the head of household's current labour market status is included in the empirical analysis presented in this chapter.

Following Clark and Apouey (2013), dichotomous variables are constructed that indicate if the head of household is unemployed, retired or not in the labour force, where being employed is the omitted category. In the Australia sample, 1.3% of heads of household are not in the labour force and 1.1% of household heads are unemployed.

Of the sample analysed, 2.4% of the sample is retired[29]. Table A3.5 indicates that, for the BHPS, 9.3% of household heads are not in the labour force, 2.2% are unemployed and 32.2% of household heads are retired. Of the German sample, 5.1% of heads of household report being unemployed, and 13.9% report not being in the labour force. 20.2% of heads are retired.

Education

In the existing empirical literature, the relationship between education and well-being remains unclear. For example, Blanchflower and Oswald (2004), Clark (2003) and Flouri (2004) all find contrasting results regarding the relationship between education and well-being. In this chapter, the level of the education of the head of household is controlled for, however, due to the different education systems in each of the countries analysed, different education variables are used in the analysis for each of the countries. For the HILDA survey, a series of three binary variables are included to indicate the level of education of the head of household. These are, namely, if the head of household has a degree or further degree, if the head of household has a vocational degree and if the head of household has a high school education. These are then compared to the omitted category of having below high school education. In the Australian sample, 40.1% and 34.4% have a degree or vocational qualification as their highest level of education, respectively. 10.4% of household heads have high school level education as the highest, with the remaining 15.1% of the sample are defined to have below high school education.

For the British analysis, four dichotomous variables are included to indicate the highest level of education of the head of household: GCSEs; A-Levels; a vocational degree; and a degree or further degree. The omitted category is if the head of household has a level of education below that of GCSE level. 14.5% had a degree or higher degree as their highest level of education. 29.8% and 9.5% of heads of household reported a vocational degree or A-levels as their highest level of educational attainment, respectively. Finally, 14.7% report GCSEs as their highest level of educational attainment.

Like the other countries considered, four dichotomous variables are constructed to indicate the highest level of education attained by the head of household for the German sample. The binary variables are constructed from the "Comparative Analysis of Social

[29] The high proportion of heads of households being employed, compared to the other countries, will arise due to how the head of household is specified. As the head of household is defined to be the individual in the household with the highest labour market income, a large proportion will undoubtedly be employed.

Mobility in Industrialised Nations" (CASMIN) education classification. The four variables indicate if the head of household has an intermediate general qualification, a general maturity certificate, a vocational qualification and a higher tertiary qualification. These are equivalent to the British GCSEs, A-Levels, vocational degree and degree, respectively. 16.9% hold a tertiary degree, while 15.2% held a vocational qualification as their highest educational level. 1.8% reported having an intermediate general qualification and 2.1% had an A-level equivalent education.

Household Size

Following Luttmer (2005), Winkelmann (2005), Boes and Winkelmann (2004), Clark and Oswald (2002) and Van Praag *et al.* (2010), the number of people in the household is controlled for. This includes the number of adults and children living at the household. In line with Luttmer (2005), Boes and Winkelmann (2004), Winkelmann (2005) and Van Praag *et al.* (2010), across all three countries, the analysis presented includes the natural logarithm of household size in order to account for the positively skewed nature of the variable.

The average household size in the Australian sample is 2.83 people. The average household size of the British sample is the smallest of the three countries considered here, being 2.26 people whilst the average household size in the German analysis is 2.47 people.

Household Income

The influence of income on well-being has been extensively explored in both the economics and psychology literatures, with a small positive relationship frequently found. Following Ferrer-i-Carbonell (2005), Frey and Stutzer (2000, 2002), Gerdtham and Johannesson (2001), Gardner and Oswald (2007), Shields and Wheatley Price (2005) and Winkelmann and Winkelmann (1998), who consider cross-sectional data, and Ferrer-i-Carbonell and Frijters (2004), Frijters *et al.* (2004) and Luttmer (2005) using longitudinal data, the income of the household is controlled for in the empirical analysis.

Following Headey and Wooden (2004), the analysis for Australia includes the household's annual disposable income, which is defined as the household's total income from all sources minus the estimated taxes of the household. In some instances this calculation yields a non-positive response, consequently, in line with Schurer and Yong

(2012) and Saunders and Hill (2008) these non-positive values are omitted from the analysis. The natural logarithm of disposable income is taken. For the Australian sample, the average household disposable income is $A\$_{2010}$ 88,572 with a median annual disposable household income of $A\$_{2010}$ 77,583.

In accordance with Brown *et al.* (2005), the measure of income exploited in the BHPS is the household's gross income for the previous month from all sources. The household's income is inflated to 2005 prices. The natural logarithm of income is included in the analysis. The mean monthly income is $£_{2005}$ 2,326.

The income measure for Germany is based upon the household's post government tax total household income from the previous year. It is equivalent to the household's disposable income used in the Australian analysis. It is constructed from the household's total income from all sources minus taxes and government transfers from the previous year, for all individuals in the household. The average annual post government household income of the sample is $€_{2007}$ 37,289. The analysis presented in this chapter includes the natural logarithm of household income.

Self-Assessed Health

Numerous studies find that overall life satisfaction is strongly influenced by self-reported, rather than objective, current health status. For example, Clark (2003), Gerdtham and Johannesson (2001), Clark and Oswald (2003) and Roberts *et al.* (2011) all find a positive relationship between self-assessed health and psychological well-being. Similarly, Okun *et al.* (1984) find that good health is positively associated with higher levels of life satisfaction; however, Watten *et al.* (1997) find a weak relationship between objective measures of health status and well-being. This weak positive relationship is potentially attributed to individuals becoming accustomed to their health status. Diener *et al.* (1999) suggest that people's perceptions are more important than objective measures for happiness. Consequently, self-reported health status is included in the analysis of the level of overall life satisfaction[30].

For Australia, the measure of self-reported health status is based on the question, *"In general would you say your health is: excellent, very good, good, fair, poor?"* From this question, four dichotomous variables are constructed to indicate *"excellent"*, *"very*

[30] The self-assessed health status of the head of the household is not included in the analysis of the head of household's psychological well-being, as the individual's self-perceived health status is likely to be strongly correlated with their self-reported mental well-being.

good", "good" or *"fair health"*. The omitted category is defined as *"poor health"*. In the Australian sample, 13.7% of household heads report being in excellent health and 40.9% report being in very good health. 35.7% of household heads report being in good health, whilst 8.9% report being in fair health.

The self-reported health status of the heads of household for Britain is constructed from the question, *"Please think back over the past 12 months about how your health has been. Compared to people your own age, would you say that your health has been on the whole... Excellent, Good, Fair, Poor or Very Poor?* The responses to this question form the basis of four dichotomous variables to indicate *"excellent", "good", "fair"* and *"poor health"*. *"Very poor"* is defined to be the omitted category. The majority of household heads, 20.8% and 46.8%, report having either *"excellent"* or *"good health"*, respectively. 22.6% of household heads report having *"fair"* health compared to 7.8% of heads who report having *"poor"* health. This distribution of self-assessed health status is similar to that of Australia, where 54.6% of the sample report having either *"excellent"* or *"good health"*.

Self-rated health status in the GSOEP survey, as in the other two countries analysed, is measured by the internationally recognised five point scale question, *"How would you evaluate your present health? Is it: very good; good; fair; poor; or very poor?"* As above, a series of dichotomous variables are constructed to indicate being in very good, good, fair or poor health, with very poor being defined as the omitted category. 7.0% of household heads report their current health status to be *"very good"*, whilst 39.6% and 35.4% report their current health status as *"good"* and *"fair"*, respectively. 14.4% of the sample report having *"poor"* health, whilst 3.7% are report having *"very poor"* health.

Independent Variable Specifications

A series of different independent variable specifications are implemented in the analysis of this chapter. Initially, Specification 1 provides a baseline specification which includes age, gender, income, education, household size, relationship status, labour force status and self-assessed health status. Specification 2 introduces the head of household's subjective financial measures in addition to the baseline specification. In addition to the variables contained in Specification 1, Specification 3 includes the effects of the total assets and total debt of the household, whilst Specification 4 incorporates the subjective financial situation in addition to the household's total assets

and total debt. Specification 5 separates the household's total debt into secured and unsecured debt with Specification 6 including the household's subjective financial position in addition to secured and unsecured debt. This separation of total debt levels into secured and unsecured debt will allow the exploration of whether different types of debt display different relationships with the head of household's well-being. Specification 7 focuses on the household's level of net worth and, finally, Specification 8 includes the head of household's perceived financial situation along with the household's net worth. Including the household's level of net wealth will indicate if the relative size of household debt to household assets is a significant determinant of overall life satisfaction and psychological well-being. These specifications are consistent across the three countries analysed.

3.4 Results

In this section the various results relating to the three countries analysed in this chapter are discussed. Initially, the results for Australia are presented with the results for Britain and Germany subsequently considered. For each country, the results relating to both the head of household's overall life satisfaction and psychological well-being are discussed.

3.4.1 Australia

The results for the fixed effects ordered logit model relating to overall life satisfaction and psychological well-being are presented in Tables A3.8 and A3.9, respectively. The results relating to the overall life satisfaction are initially considered, and the section subsequently presents the results of modelling the head of household's psychological well-being.

3.4.1.1 Overall Life Satisfaction (*A1*)

Baseline Specification

Initially, the results from Specification 1 are presented, with the alternative specifications subsequently considered. The results indicate that age does not display a "U-Shaped" pattern with overall life satisfaction, as age does not exert a statistically significant influence on the head of household's overall life satisfaction. This result accords with the analysis presented in Frijters and Beatton (2011), who find that once individual fixed effects are controlled for, well-being does not have a "U-shaped" pattern in age. However, unlike Frijters and Beatton (2011), age does not display a

strong negative relationship with overall life satisfaction, this difference could possibly be attributed to the different samples analysed. This result conflicts with the majority of the existing studies, which report a "U-shaped" relationship between age and overall life satisfaction. For example, Winkelmann and Winkelmann (1998), Frey and Stutzer (2002), Oswald (1997) and Blanchflower and Oswald (2004, 2008) all report a "U-shaped" age relationship. The difference potentially arises due to the econometric methodology employed in this chapter that controls for individual heterogeneity, as the standard convex pattern between age and overall life satisfaction is present in the random effects specification presented in Section 3.7.1 (see Table A3.14).

In contrast to Blanchflower and Oswald (2004), Clark *et al.* (2008), Winkelmann and Winkelmann (1998) and Marks and Flemming (1999), amongst others, who find the level of the household's income exerts a positive impact on the overall life satisfaction of the head of household, household income is not found to exert a significant relationship with overall life satisfaction.

The highest level of education does not display a statistically significant relationship with overall life satisfaction. This result is consistent with the findings of Flouri (2004) and Meier and Stutzer (2006), who also fail to find a relationship between education and overall life satisfaction. As argued by Meier and Stutzer (2006), the lack of a relationship between overall life satisfaction and education is potentially due to employing an econometric methodology that accounts for individual fixed effects. As the head of household's level of education is not likely to change much over the time period analysed, once individual fixed effects are accounted for, a statistically significant relationship is not likely.

In contrast to Luttmer (2005) and Powdthavee (2008, 2010), who report that household size is negatively associated with well-being, the analysis presented for Australia indicates that household size is not a statistically significant determinant of the head of household's overall life satisfaction.

The relationship status of the head of household has the expected relationship with overall life satisfaction. Compared to being married, being divorced or separated has a negative impact on overall life satisfaction. This result is consistent with existing empirical studies. Similarly, never been married is inversely related to overall life satisfaction, compared to being married, however being widowed does not have a statistically significant relationship with overall life satisfaction. These results are

consistent with the existing literature: for example, Frijters and Beatton (2011), Blanchflower and Oswald (2004) and MacKerron (2012) report that marriage is positively associated with overall life satisfaction.

In contrast to the existing literature, labour force status is not a significant determinant of the overall life satisfaction of the head of household in Australia. Compared to being employed, not being in the labour force, retired or unemployed do not exert a statistically significant relationship with overall life satisfaction. This result is inconsistent with the existing literature, where unemployment has a negative impact on overall life satisfaction, see for example Winkelmann and Winkelmann (1998) and Frey and Stutzer (2002). This anomaly could be the result of the definition of the head of household, as the primary criterion is the individual who has the highest labour market income, consequently, this results in a relatively small proportion of unemployed individuals.

In line with the existing literature, self-reported health status displays a large and statistically significant relationship with overall life satisfaction. These results are in accordance with Gerdtham and Johannesson (2001), Boes and Winkelmann (2004) and Diener *et al.* (1999), who all report self-assessed health status to be a significant determinant of overall life satisfaction.

Subjective Financial Measures

Considering Specification 2 of Table A3.8 reveals that the subjective measures of the household's financial situation have a positive and significant impact on the head of household's life satisfaction. Heads of households who report their current financial situation as *"prosperous"*, *"very comfortable"* or *"relatively comfortable"* report significantly higher levels of overall life satisfaction compared to those who report their current situation as *"poor"* or *"very poor"*. As shown in Specifications 4, 6 and 8, this relationship is consistent irrespective of the inclusion of the other financial measures. This result accords with the existing literature where subjective financial measures are found to influence both overall life satisfaction and psychological well-being, see, for example, Wildman (2003), Graham and Pettinato (2001), Hayo and Seifert (2003) and Louis and Zhao (2002). Analysing data from the BHPS, Wildman (2003) finds that current financial situation is positively related to psychological well-being. Graham and Pettinato (2001), find that an individual's economic satisfaction is positively related to happiness. In addition, analysing a sample of Eastern European individuals Hayo and

Seifert (2003) find that economic satisfaction explains a significant proportion of the variation in overall life satisfaction. Specification 2 also reveals that the effects of the other independent variables are robust to the inclusion of the subjective financial measures. In addition, the results support the findings of Bridges and Disney (2010), who find that subjective measures of debt problems, rather than, "objective" measures exert an influence on the probability of reporting being depressed. Similarly, Mentzakis and Moro (2009) argue that the subjective financial measures capture the relative position of the household and they find that they are positively related to overall life satisfaction in Britain.

Monetary Financial Measures

Specifications 3 through to 8 include the monetary financial measures of the household's financial situation, that is, monetary values of assets, debt and net worth. Considering Specifications 3 and 4 reveals that both total assets and total debt display the expected relationships with overall life satisfaction; that is, positive and negative associations, respectively. However, these relationships are not found to be statistically significant. This indicates that, the once individual heterogeneity is accounted for, the level of debt and assets held by the household are not determinants of the head of household's overall life satisfaction. This result conflicts with the existing literature where it is found that household asset levels are positively related to overall life satisfaction whilst household debt levels negatively affect overall life satisfaction. The results presented in Table A3.14, from the random effects specification, indicate that the level of total assets has a positive and statistically significant impact on overall life satisfaction, whereas the debt levels do not exert a statistically significant effect. In contrast, as discussed above, the subjective measure of the household's current level of prosperity exerts a large positive impact on the head of household's overall life satisfaction.

Specifications 5 and 6 separate total debt into secured and unsecured debt. Focusing on these variables reveals however that, neither debt type has a statistically significant effect on overall life satisfaction. This conflicts with the results of Brown *et al*. (2005) who report that unsecured debt is negatively associated with well-being in Britain. The discrepancy in the results could potentially be attributed to the fact that the analysis relates to a different country and the difference could be a consequence of different econometric methodologies employed. However, the random effects analysis, presented

in Table A3.14, reveals that once again neither secured nor unsecured debt has a negative impact on overall life satisfaction.

It is apparent from Specifications 7 and 8 that, as with the previous monetary financial measures analysed, the household's level of net worth does not influence the head of household's level of overall life satisfaction. This suggests that the household's relative size of assets and debt is not a determinant of the head of household's overall life satisfaction. Once again, the subjective measures of both health status and financial prosperity are positively and significantly related to overall life satisfaction. This result contrasts with the findings of Headey and Wooden (2004) and Headey *et al.* (2008), who report that the wealth of Australian households exerts a strong positive relationship with well-being. Once again, this lack of a relationship is not a consequence of accounting for individual heterogeneity as there is not a statistically significant relationship between overall life satisfaction and overall life satisfaction in the random effects specification. The difference between the results obtained in this chapter and the existing literature potentially arise due to the sample being analysed.

3.4.1.2 Psychological Well-Being *(A2)*

Table A3.9 presents the results of the fixed effects linear regression estimation of the determinants of the psychological well-being of Australian heads of household. The coefficients of age imply that mental health has a "U-shaped" pattern in age, however; the result is not statistically significant. As previously argued, this result could potentially arise due to the due to the econometric specification employed. As reported in Frijters and Beatton (2011), controlling for individual effects can cause the "U-shaped" age pattern to disappear, even though the pattern exists in the underlying data. This argument is supported by the fact that a convex age pattern is present in the random effects linear regression specification presented in Section 3.7.1.

In line with the results relating to overall life satisfaction, the level of household disposable income is not a statistically significant determinant of the head of household's mental well-being. This result is in line with Headey and Wooden (2004), who analysing the SF-36 mental health component score, find that equivalised income is not a significant determinant of mental health.

In line with Headey and Wooden (2004), Thoudossiou (1998), Clark (2003) and Flouri (2004), the highest level of educational attainment does not exert a statistical impact on the head of household's level of mental health. This result accords with the analysis of

overall life satisfaction and as previously outlined, this could arise due to the head of household's education level not changing over time.

The analysis reveals that the number of people present in the household has a positive and statistically significant association with the head of household's mental well-being. In the existing literature, psychological well-being is enhanced by having children present in the household. For example, Wildman (2003) and Shields and Wheatley Price (2005) both find a positive relationship between having children and psychological well-being. The number of people present in the household could potentially capture this effect.

The relationship status of the head of household does not exert a statistically significant impact on mental health. This result conflicts with the existing literature which finds that marriage improves psychological well-being while divorce is detrimental to psychological well-being, see for example, Wildman and Jones (2002), Wildman (2003) and Clark (2003). One potential explanation for this difference in results may be due to the econometric specification implemented. In the random effects specification presented in Section 3.7.1, compared to being married, being divorced, widowed or never married are all negatively related to the level of psychological well-being.

In line with the existing literature, compared to being employed, unemployment has a large detrimental effect on the mental health status of the head of household. Compared to being employed, unemployed household heads, on average, report a psychological well-being score approximately five points lower. This result accords with Clark (2003), Clark and Apouey (2013), Gardner and Oswald (2007), Shields and Wheatley Price (2005) and Theodossiou (1998) who find that unemployment is inversely related to psychological well-being. Being either not in the labour force or retired are not found to be significant determinants of mental health.

Subjective Financial Measures

Focusing on Specification 2 indicates that once the subjective financial measures are included, the relationship between mental health status and unemployment disappears. This potentially suggests that the subjective financial situation mediates the relationship between mental health and unemployment.

In line with the existing literature, the subjective financial situation has a large positive statistically significant relationship with mental well-being. For example, Hayo and

Seifert (2003), Wildman and Jones (2002), Mentzakis and Moro (2009) and Wildman (2003) all report that better perceptions of their financial situation are associated with higher levels of well-being. This positive association is also present in Specifications 4, 6 and 8, which also include the household's monetary financial measures.

Compared to the omitted category, reporting being prosperous increases the head of household's psychological well-being score by approximately 11.5 points, across Specifications 2, 4, 6 and 8. Moreover, the subjective financial measures exert the largest impact on psychological well-being of any of the other explanatory variables.

Monetary Financial Measures

Specifications 3 and 4 both indicate that total assets and total debt do not exert a statistically significant influence on the head of household's mental health. This result accords with those presented in the analysis of overall life satisfaction. Similarly, Specification 4 indicates that the relationship between the subjective financial measures and psychological well-being is robust to the inclusion of the measures of assets and debt.

Once total debt is separated into unsecured and secured debt, unsecured debt displays a negative relationship with mental health, whereas secured debt displays a positive relationship with mental health. However, both of these relationships are not found to be statistically different from zero. This result conflicts with the findings presented in Brown *et al.* (2005) who find that the level of unsecured debt is negatively associated with psychological well-being. Similarly, total assets fail to have a statistically significant relationship with the head of household's mental health level. Specification 6 reveals that the subjective financial variables remain positively related to mental health status.

Specifications 7 and 8 include the household's level of net worth. Once again, the analysis reveals that the monetary financial measures are not statistically significant determinants of the head of household's level of mental health. This contradicts the findings of Headey and Wooden (2004) who find that net worth has a statistically significant positive impact on mental well-being.

3.4.2 Britain

In this section, the results for the analysis relating to Britain are presented. As with the previous section, initially, the results relating to the head of household's overall life

satisfaction are outlined with the section going on to consider the results associated with the analysis of psychological well-being.

3.4.2.1 Overall Life Satisfaction *(B1)*

Table A3.10 presents the results from the fixed effects ordered logit analysis relating to the dependent variable *B1*. As stated above, it is not possible to report the marginal effects of the independent variables in a fixed effects ordered logit specification; however, it is possible to interpret the sign and significance of the coefficients.

Focusing on Specification 1 reveals that, once individual fixed effects are accounted for, age does not display a statistically significant relationship with overall life satisfaction. This result accords with the findings presented for Australia however, as explained above, this finding is at odds with the existing literature, where age consistently displays a "U-shaped" pattern in overall life satisfaction. As outlined above, this conflict could potentially arise as a consequence of the econometric methodology employed and the treatment of individual heterogeneity. This is supported by the random effects specification, presented in Section 3.7, where a "U-shaped" pattern, consistent with the existing literature, is present.

The natural logarithm of household monthly income does not display a statistically significant relationship with overall life satisfaction, according with Clark and Oswald (1994) who, analysing data from the BHPS, find no relationship between the level of income and overall life satisfaction. The result, however, contradicts the majority of the existing literature which generally report small and diminishing returns to income see, for example, Blanchflower and Oswald (2004) and Clark *et al.* (2008).

In line with the results for Australia, the head of household's level of education is not a statistically significant determinant of overall life satisfaction, supporting the findings of Flouri (2004), Meier and Stutzer (2006) and Powdthavee (2008). As previously stated, this lack of relationship could potentially arise due to the econometric methodology employed.

In line with the results presented for Australia and Van Praag *et al.* (2010), household size does not exert a statistically significant impact on the head of household's overall life satisfaction. The result contradicts the findings of Powdthavee (2008), Powdthavee (2010) and Luttmer (2005) who find that household size is a significant determinant of overall life satisfaction.

In contrast to the existing literature, being unemployed, not in the labour force or being retired do not exert statistically significant impacts on the level of overall life satisfaction, compared to being employed. The existing literature consistently finds that unemployment has a detrimental impact on an individual's level of overall life satisfaction see, for example, Winkelmann and Winkelmann (1998).

The relationship status of the head of household exerts a statistically significant impact on overall life satisfaction. Compared to being married, being divorced or separated has a detrimental effect on the overall life satisfaction of the head of household. These results are robust across the specifications presented in the chapter. Similarly, being widowed is negatively associated with overall life satisfaction. The results presented in this chapter accord with those presented in Meer *et al.* (2003), who find that being divorced or widowed have negative impacts on self-reported health status. Similarly, the results support Frijters and Beatton (2011) and Gardner and Oswald (2007), who find that marriage is positively related to overall life satisfaction and mental well-being, respectively.

In accordance with the existing literature, the health status of the head of the household exerts a large positive influence on overall life satisfaction. For example, Frijters and Beatton (2011), Okun *et al.* (1984), Powdthavee (2008) and Boes and Winkelmann (2004) all find that the self-reported health status of an individual displays a large positive association with overall life satisfaction.

Subjective Financial Measures

Looking at Specification 2 indicates that the head of household's perceived current financial situation has a large positive impact on overall life satisfaction. Heads of household who report their current financial situation to be *"comfortable"*, to be *"doing alright"* or *"getting by"*, compared to *"finding it difficult"*, all exert positive and statistically significant impacts on overall life satisfaction. This result is in line with the existing literature, for example Wildman (2003) and Mentzakis and Moro (2009), who find that the current subjective financial situation is positively associated with the household's psychological well-being and subjective well-being.

In contrast, if the head of household expects their future financial situation to improve, compared to expecting it to become worse, does not have statistically significant impact on overall life satisfaction. In addition, the head of household's future financial

expectations do not have a statistically significant impact on their overall life satisfaction. The change in the household's financial situation compared with the previous year does not have a statistically significant relationship with overall life satisfaction. The relationships between the subjective measures of the household's financial status and overall life satisfaction are robust across all of the specifications implemented.

Monetary Financial Measures

Focusing on the household's financial situation, as presented in Specifications 3 to 8 of Table A3.10, reveals that none of the monetary financial measures exert a statistically significant effect on overall life satisfaction. The results for the total debt and total assets of the household are presented in Specifications 3 and 4. In both specifications, total debt and total assets do not display a statistically significant impact on the overall life satisfaction of the head of the household. In line with Australia, Specification 4 indicates that the strong positive relationship between the household's subjective financial situation and overall life satisfaction is robust to the inclusion of the household financial measures.

Similarly, once total debt is separated into secured and unsecured debt, the relationship between the household's financial situation and overall life satisfaction remains statistically insignificant. This indicates that the type of debt held does not influence the overall life satisfaction of the head of household. This contradicts the results presented in Brown *et al.* (2005), who report that it is unsecured, not secured, debt that has a detriment effect on psychological well-being.

The results for the level of net wealth of the household are presented in Specifications 7 and 8. As with the other monetary financial measures, no statistically significant relationship is displayed, while the subjective measures retain a positive impact on the level of overall life satisfaction. These results are contradictory to the existing literature which finds that higher levels of net wealth are associated with higher levels of overall life satisfaction. For example, Headey *et al.* (2008), Headey and Wooden (2004) and Gardner and Oswald (2007) all find that wealth exerts a positive impact on the level of well-being.

3.4.2.2 Psychological Well-Being *(B2)*

Table A3.11 presents the results of the fixed effects ordered logit analysis relating to the dependent variable *B2*. As previously mentioned, self-assessed health status is omitted from the independent variable specifications as it is likely to be highly correlated with psychological well-being. Initially, the results of Specifications 1 and 2 are considered. Specifications 3 through to 8 are then considered which include the household's financial measures.

Focusing on Specification 1 of Table A3.11 indicates that age does not exert a statistically significant impact on the mental health of the head of household. This result contradicts the findings of Gathergood (2012), Clark and Apouey (2010), Headey and Wooden (2004) and Gardner and Oswald (2007) who all find that psychological well-being is negatively associated with age. One potential reason for this difference is due to controlling for individual fixed effects. As presented in the random effects specification in Section 3.7.1 in the Appendix, a negative association between age and psychological well-being is found.

The monthly income of the household does not influence the head of household's psychological well-being, supporting the findings of Wildman and Jones (2002), Wildman (2003), Clark (2003), Clark and Oswald (1994) and Theodossiou (1998) who all find that psychological well-being is not affected by the level of income. The majority of studies attribute this lack of a relationship to relative income, rather than absolute income being related to well-being.

Education exerts a positive impact on psychological well-being. Possessing a degree or A-levels as the highest level of education, exerts a positive influence on the psychological well-being of the head of household, compared to having less than GCSEs. Possessing GCSEs or a vocational degree does not have statistically significant impacts on the level of psychological well-being. A positive relationship between education and well-being is also found by Clark (2003) and Shields and Wheatley Price (2005). The finding however contradicts Clark and Oswald (1994) and Theodossiou (1998) who find that education has a negative and non-existent relationship with well-being, respectively.

Looking at the variables that capture the head of household's labour force status indicates that, compared to being employed, both unemployment and not participating in the labour force have detrimental effects on the head of household's psychological

well-being. This result is consistent with the existing literature, for example, Clark (2003), Clark and Oswald (1994) and Theodossiou (1998) all find that unemployment is negatively associated with psychological well-being.

Of the variables that capture the head of household's relationship status, compared to being married, being widowed reduces the level of psychological well-being. However, this result is only marginally significant at the 10% level. Being divorced or separated is not found to be a determinant of psychological well-being. Similarly, compared to being married, never marrying does not display a statistically significant relationship with psychological well-being. This result contradicts the existing literature that generally finds that marriage improves well-being, while being separated or divorced has a detrimental effect on well-being. Similarly, household size does not affect the head of household's psychological well-being. This contradicts the existing literature that generally finds that household size is a significant determinant of well-being.

Subjective Financial Measures

Specification 2 includes the subjective measures of the household's financial situation. Household heads who report being *"comfortable"*, *"doing alright"* financially and *"getting by"* report higher levels of psychological well-being compared to finding it difficult. This result accords with the findings from the analysis of overall life satisfaction and the results are robust to the inclusion of the household's financial measures. This result accords with the existing literature which generally finds that the subjective current financial situation has a positive impact on psychological well-being, for example, see Wildman and Jones (2002), Wildman (2003) and Hayo and Seifert (2003).

In line with the analysis of the head of household's overall life satisfaction, expected future changes in the household's financial situation are not statistically significant determinants of psychological well-being. This contradicts the finding of Brown *et al.* (2005) who report that expecting the household's financial situation to worsen has a detrimental effect on the head of household's psychological well-being. Similarly, Wildman and Jones (2002) find that positive changes in the household's financial situation have a positive impact on psychological well-being. Considering the household's perceived change in the household's financial situation from the previous year however exerts a positive impact on psychological well-being. Compared to the household's financial situation becoming worse, either remaining the same or

improving has a positive impact on the individual's psychological well-being. This result accords with the findings of Brown *et al.* (2005), Wildman and Jones (2002) and Wildman (2003).

Monetary Financial Measures

Focusing on the financial variables reveals some interesting results. Specifications 3 and 4 indicate that the total level of assets held by the household does not exert a statistically significant impact on the head of household's psychological well-being. This result accords with the findings presented in Brown *et al.* (2005) who find that the level of assets held by the household is not a statistically significant correlate of psychological well-being. The level of total debt, however, has detrimental effects on the level of psychological well-being. This result is consistent with Brown *at al.* (2005), who find that debt is negatively associated with psychological well-being.

Specifications 5 and 6 decompose total debt into secured and unsecured debt to explore the impact of different types of debt. This decomposition reveals that individually neither unsecured nor secured debt exhibit a statistically significant relationship with psychological well-being. This result contrasts with the results of Brown *et al.* (2005) who find that it is unsecured, not secured debt, which has a detrimental effect on psychological well-being.

As in the analysis of overall life satisfaction, the level of household net wealth is not found to be a statistically significant determinant of psychological well-being. This result contradicts the findings of Headey and Wooden (2004), who find that wealth has a positive impact on individual well-being and psychological health.

3.4.3 Germany

3.4.3.1 Overall Life Satisfaction *(G1)*

Table A3.12 presents the results of the fixed effects ordered logit analysis relating to the dependent variable *G1*. Initially, Specification 1 will be considered, with the subjective financial measures included in Specification 2. The effect of the household's monetary financial situation is then discussed.

Focusing on Specification 1 indicates that, once individual fixed effects are accounted for, in line with the analysis presented for Australia and Britain, age does not exert a statistically significant effect on overall life satisfaction. This result accords with

analysis presented by Frijters and Beatton (2011), who find that the "U-shaped" age pattern in overall life satisfaction disappears once individual effects are accounted for.

Household size is not a significant determinant of overall life satisfaction. In line with Blanchflower and Oswald (2004) and Clark *et al.* (2008), household income exerts a positive influence on overall life satisfaction. The analysis presented in this chapter reveals that the head of household's highest level of education does not exert a statistically significant impact on overall life satisfaction. This result is consistent with the results of Flouri (2004) and Meier and Stutzer (2006), who argue that the lack of relationship between education and overall life satisfaction is not significant as the head of household's level of education is unlikely to change in later life.

The relationship status of the head of household has the expected impact on overall life satisfaction. Compared to being married, being divorced exerts a negative impact on the head of household's level of life satisfaction, while never being married or being widowed are not statistically significant determinants of overall life satisfaction. These results accord with the existing literature as outlined previously. This result is also consistent with the analysis presented for both Australia and Britain.

In accordance with the vast majority of the existing literature, see Winkelmann and Winkelmann (1998) and Blanchflower and Oswald (2004), compared to being employed, being unemployed exerts a negative and statistically significant impact on the head of household's level of overall life satisfaction. Both not being in the labour force or retired do not have a statistically significant relationship with overall life satisfaction.

A positive relationship between self-assessed health status and overall life satisfaction is displayed, with better self-rated health being associated with a higher level of overall life satisfaction. This result accords with Boes and Winkelmann (2004) and Gerdtham and Johannesson (2001) who both report positive relationships between self-rated health status and overall life satisfaction.

Subjective Financial Measures

Looking at Specification 2 of Table A3.12 reveals that the relationships presented in Specification 1 are robust to the inclusion of the household's subjective financial variables. In line with the results presented for Australia and Britain, the subjective financial measures have a positive and statistically significant impact on the head of

household's level of overall life satisfaction. Compared to being *"very concerned"* about their current financial situation, being *"concerned"* or *"not concerned"* both display a positive relationship with the head of household's level of overall life satisfaction. This result is in line with Bridges and Disney (2010) who find that it is worries relating to debt which have a statistically significant impact on the likelihood of reporting depression, opposed to objective debt levels.

Monetary Financial Measures

Specification 3 includes the household's level of total assets and total debt. It is clear from Table A3.12 that the household's levels of total assets and debt exert positive and negative impacts on overall life satisfaction, respectively. Both these results are found to be statistically significant at the five percent level. Specification 4, in addition to the level of total debt and total assets, includes the subjective measures of the household's finances. The subjective measures retain a positive relationship with overall life satisfaction, as does the level of total assets. However, the level of total debt is not a significant determinant of overall life satisfaction once the subjective measures are included.

Specifications 5 and 6 separate total debt into secured and unsecured debt. The results reveal that it is unsecured, not secured debt that exerts a negative impact on overall life satisfaction. The level of secured debt does not exert a statistically significant impact on overall life satisfaction. This result is robust to the inclusion of the subjective financial measures. This finding accords with Brown *et al*. (2005), who report that unsecured, rather than secured debt, has a detrimental effect on psychological well-being using the BHPS.

Specifications 7 and 8 include the household's level of net wealth. Both Specifications 7 and 8 reveal that the level of net wealth has a positive and statistically significant relationship with overall life satisfaction. This result is robust to the inclusion of the subjective financial measures, which remain positively related to overall life satisfaction.

3.4.3.2 Psychological Well-Being *(G2)*

Due to the limitations of the data, the mental health measure is only analysed for the 2002 wave of the GSOEP. Consequently, as previously explained, a linear regression model is employed following Headey and Wooden (2004) and Keese and Schmitz

(2012). As fixed effects estimation is not employed, it is possible to estimate the impact of being female on psychological well-being.

Table A3.13 presents the OLS estimation results of the determinants of psychological well-being of household heads from the 2002 wave of the GSOEP survey. The analysis indicates that, on average, female's report a mental health score two points lower than male household heads. Mental health displays a "U-shaped" pattern in age, which is consistent with the existing literature, as indicated by negative and positive coefficients on the age and age squared, respectively. Household size reduces the head of household's level of mental well-being, however, the effect is significantly reduced once the head of household's subjective financial situation is included in the analysis.

Household income exerts a positive and significant impact on psychological well-being, again consistent with the existing literature, which does not employ panel data techniques. A 1% increase in the household's post government income increases the head of household's mental health score by 1.85 points, in Specification 1. In the baseline specification, in line with Clark (2003), education is not a significant determinant of psychological well-being; however, once the subjective financial measures are included, the effects of education exert a negative effect on psychological well-being.

Considering the impact of relationship status on psychological well-being indicates, as expected, that being divorced or separated, widowed, or single, are all inversely related to psychological well-being. Not being in the labour force is also detrimental to the head of household's level of psychological well-being. Unemployment is, however, not a significant determinant of psychological well-being, and, therefore, this finding contradicts the results presented in the existing literature.

Subjective Financial Measures

Focusing on the financial variables indicates that the subjective financial measures exert a large and positive impact on mental well-being. Compared to being *"very concerned"* about the household's finances, reporting *"not concerned"* increases the psychological well-being score by approximately 7 points. This supports the findings for Australia and Britain, where the subjective financial position is an important determinant of psychological well-being and overall life satisfaction.

Monetary Financial Measures

The monetary financial measures have the expected impact on psychological well-being. The level of the household's total assets exerts a positive and statistically significant impact of the head on household's psychological well-being. As expected, the total debt of the household has a detrimental impact on psychological well-being. The separation of total debt into secured and unsecured debt, in line with Brown *et al.* (2005), indicates that unsecured debt exerts a negative impact on psychological well-being, whereas the relationship between the household's level of secured debt and psychological well-being is not statistically significant. Specification 5 indicates that a 1% increase in the level of unsecured debt reduces the psychological well-being score by 0.17 points. This relationship is moderated by the inclusion of the subjective financial variables. The household's net worth is positively associated with the head of household's psychological well-being, consistent with Headey and Wooden (2004).

3.5 Discussion

This section will provide further discussion of the results. It will compare and contrast the determinants of overall life satisfaction and psychological well-being across the three countries analysed. In addition, this section will compare the results obtained from both the random and fixed effects models employed.

The analysis presented in this chapter indicates that across Australia, Britain and Germany many significant differences occur in the determinants of overall life satisfaction and psychological well-being. Considering the determinants of overall life satisfaction reveals that, across all three countries, age, household size and the education of the head of household do not exert statistically significant impacts on the head of household's overall life satisfaction once individual heterogeneity is accounted for. These results contrast with the findings presented in the existing literature where these variables are generally found to be determinants of overall life satisfaction. This contradiction could possibly be as a consequence of the econometric methodology used. For example, in the random effects analysis presented in the appendix, age, in all three countries, displays the standard "U-shaped" pattern with overall life satisfaction, in line with the majority of the existing literature. The findings of this chapter, however, reinforce the findings of Ferrer-i-Carbonell and Frijters (2004), who find significant differences between random and fixed effects estimators.

Household income is positively associated with overall life satisfaction in Australia and Germany but not in Britain. Across all three countries, compared to being married, being divorced or separated are negatively related to overall life satisfaction. Interestingly, labour force status is only significantly related to overall life satisfaction in Germany, where, in line with the existing literature, being unemployed exerts a negative impact on overall life satisfaction. In Britain and Australia, none of the labour force status controls exert statistically significant impacts on overall life satisfaction. As predicted and in accordance with the existing literature, self-assessed health status has a strong positive relationship with overall life satisfaction across all three countries analysed.

Comparing the results related to the psychological well-being measures indicates that for both Britain and Australia, age is not found to display a statistically significant relationship with psychological well-being, whereas the analysis for Germany reveals a "U-shaped" pattern in age, which is consistent with the existing literature. The discrepancy can be attributed to the econometric methodology employed and how individual heterogeneity is accounted for.

The analysis for both Australia and Britain indicates that the income of the household does not significantly contribute to psychological well-being, whereas in Germany, income exerts a positive impact on psychological well-being. The size of the household does not have a significant impact on psychological well-being in Britain; however, it displays a positive association with mental well-being in Australia. Interestingly, the size of the household has a detrimental impact on psychological well-being for the German sample. For both Australia and Britain, the relationship status of the head of household does not exert a statistically significant impact on psychological well-being, whereas in Germany marriage is positively associated with psychological well-being. Across all three countries, not being in the labour force is inversely related to psychological well-being. In both Britain and Australia, unemployment is negatively associated with psychological well-being; however, this relationship disappears once the current subjective financial situation is included in the analysis. This suggests that the negative association between unemployment and psychological well-being is potentially caused by unemployment causing the individual to feel worse-off financially, and so the relationship disappears once the head of household's subjective financial position is controlled for.

The subjective financial measures display a large positive association with both overall life satisfaction and psychological well-being, across all three countries analysed. Despite differences in the measures of the household's subjective financial situation, the analysis presented in this chapter reveals that this relationship is consistent across all three countries analysed. This shows that it is potentially possible to increase both overall life satisfaction and psychological well-being by making people feel financially better off.

Focusing on the monetary financial measures exposes several differences across the three countries analysed. For both Australia and Britain, the household's monetary financial measures do not exert a significant impact on overall life satisfaction or psychological well-being. One exception is that the household's total debt level is negatively related to psychological well-being in Britain. In contrast, for Germany, the household's monetary financial measures are significant determinants of the head of household's overall life satisfaction and psychological well-being. The analysis indicates that the higher is the level of the household's total assets, the higher the level of overall life satisfaction, on average. Total debt is negatively associated with overall life satisfaction; while the decomposition of total debt into secured and unsecured debt reveals that it is unsecured debt, not secured debt that is negatively associated with overall life satisfaction and psychological well-being. In addition, the household's level of net worth is positively associated with both overall life satisfaction and psychological well-being.

One possible explanation for this lack of relationship between the monetary financial measures and well-being is if the changes in the household's monetary financial position were expected. If the changes in the financial position were anticipated, then it is not unsurprising, following Clark and Apouey (2013), that it fails to have a significant impact on well-being levels as individuals could alter their behaviours long before the changes in the household's financial position. Unfortunately, it is not possible to distinguish between anticipated and unexpected changes in the household's financial position. It is potentially argued that the subjective financial measures capture the head of household adaptions and expectations; therefore it is these variables which have a significant impact on individual well-being.

In addition, the differences observed across the countries analysed, in particularly Germany, could be attributed to cultural and institutional differences in each of the

countries. In Germany, home ownership is considerably lower than many developed countries, with renting being much more prevalent in Germany, see for example, Andrews and Caldera Sánchez (2011). As a result it of these low home ownership rates, it is potentially unusual for individuals to hold either secured or unsecured debt, and consequently, there are potentially relative debt effects which could result in the level of debt having a detrimental impact on an individual's level of well-being. In addition, these potential institutional differences are captured by changes in the level of household debt in each country considered. According to the OECD[31], in both Australia and Britain, the level of household debt has substantially increased since the year 2000. In contrast, Germany has seen a steady decline in the level of household debt levels across the period of 2000 to 2010. This difference in the aggregate debt levels, outlines the potential fundamental differences across the countries considered, and potentially explains the different empirical results obtained in this chapter.

This finding that the subjective, opposed to monetary, financial measures of household finances are determinants of overall life satisfaction and psychological well-being is analogous to the findings regarding the relationship between health status and well-being. Diener *et al.* (1999) present findings, with regard to the impact of health status on overall life satisfaction, that indicate that it is the individual's self-reported health status, not the individual's objective health status that has a significant impact on overall life satisfaction. This phenomenon appears to be consistent with the relationship between overall life satisfaction and household finances.

One possible explanation put forward to explain why subjective measures, rather than objective measures, are important determinants of overall life satisfaction is that of adaption. In the context of health, self-rated measures reflect the individual's objective health status as well as one's level of emotional adjustment. Similarly, in the context of household finances, household heads could become used to their objective financial situation and this level of adaption is reflected in their subjective, self-rated financial measures.

An alternative suggestion is that the head of household's subjective financial position potentially captures two additional factors, that is, the household's relative financial position and also the perceived control over their financial position. Mentzakis and Moro (2009) use the subjective financial position to capture the household's relative

[31] Statistics available at http://www.oecd.org/std/fin-stats/.

financial position, whilst Wildman and Jones (2002) argue it reflects the control they perceive to possess.

Comparing the results from the fixed effects models and the random effects models indicates some major differences in the determinants of both overall life satisfaction and psychological well-being. This is in line with Ferrer-i-Carbonell and Frijters (2004), who find that accounting for individual heterogeneity has a dramatic impact on the estimated coefficients in the context of overall life satisfaction.

In the random effects specifications, in line with the existing literature, age displays a "U-shaped" pattern in overall life satisfaction. This contradicts the fixed effects analysis which finds age not to be a significant determinant of overall life satisfaction. Similarly, in the random effects analysis, for Australia and Britain, being not in the labour force and retired are statistically significant determinants of overall life satisfaction. In addition, the education variables are statistically significant determinants in the random effects specifications; however, they are statistically insignificant determinants in the fixed effects specifications.

Considering the variables relating to the household's finances indicates that in both the random effects and fixed effects specifications, the subjective financial measures have a positive association with well-being. Looking at the financial measures reveals that, across all three countries, they have a statistically significant impact on both the head of household's overall life satisfaction and psychological well-being in a random effects specification. This shows the importance of accounting for the influence of individual heterogeneity when analysing measures of overall life satisfaction and psychological well-being.

3.6 Conclusion

The aim of this chapter was to explore the relationship between the head of household's overall life satisfaction, psychological well-being and household finances. The analysis was implemented across three countries to discover if the associations between psychological well-being, overall life satisfaction and household finances were consistent across different economies. In accordance with Ferrer-i-Carbonell and Frijters (2004), where possible, the analysis controls for individual heterogeneity as this has been previously found to dramatically influence the determinants of individual well-being.

The concept of well-being has become an increasingly explored topic in recent decades, and one area that potentially has a large impact on an individual's well-being is their finances. In addition, there has been a dramatic increase in the level of household debt since the early 1990s, which could potentially have a large detrimental impact on well-being.

This chapter draws on data from Australia, Britain and Germany, and analyses both overall life satisfaction and psychological well-being. The chapter explores the impact of both monetary financial measures and subjective financial measures on the head of household's well-being and overall life satisfaction. The analysis presented in this chapter indicates that across all three countries, once individual fixed effects are accounted for, it is the subjective, rather than the monetary, financial measures that have statistically significant impacts on the head of household's well-being. The subjective financial measures exert strong positive influences on the head of household's overall life satisfaction and psychological well-being.

In both Australia and Britain, the monetary financial measures, namely, total assets, total debt, unsecured and secured debt and household net worth are all found to be statistically insignificant determinants of overall life satisfaction and psychological well-being. In contrast, in Germany, the household's monetary financial measures exert the expected impact on the head of household's level of well-being, with total assets having a positive effect and debt having a negative effect. Also, as found in Brown *et al.* (2005), the separation of total debt into secured and unsecured debt reveals that it is unsecured, opposed to secured, debt that has a detrimental effect on well-being in Germany. Net worth is also found to be positively related to the well-being of the head of household in Germany.

Therefore, the analysis indicates that how the head of household perceives their household's current financial situation is an important determinant of their well-being, not necessarily the household's current financial situation. This result is analogous to the relationship commonly found between health status and well-being, in which self-assessed, subjective measures of health are determinants of well-being, rather than objective health measures. Consequently, the analysis suggests that the increased levels of household debt in recent decades do not necessarily imply a detrimental impact on the head of household's well-being; rather it is how the head of household formulates their subjective financial position which is important. Therefore, it could be possible to

significantly increase an individual's level of well-being by improving their subjective financial position. Further exploration of the determinants of the household's subjective financial position is required however to fully understand how it can be utilised to improve an individual's level of well-being.

It is important to acknowledge the potential short comings of the empirical analysis presented in Chapter 3. It is hard to make direct comparisons between the countries analysed due to key variables being measured on different scales. Therefore, despite it being possible to talk about statistically significant relationships, it is not possible to attach a magnitude to these effects and compare them across countries. In addition, the analysis presented in this chapter, despite finding that subjective financial position is a statistically significant determinant of well-being; does not shed any light on the determinants of subjective financial position. In addition, the estimates of the subjective financial position in the well-being measures are potentially biased due to endogeneity. As both the dependent variables analysed and the measures of subjective financial position are self-reported, there may exist unobserved characteristics which influence both the dependent variable and endogenous independent variable. The analysis presented in the next empirical chapter attempts to overcome the last two problems by exploring the determinants of subjective financial position and accounting for the potential endogeneity of subjective financial position in the well-being equations.

3.7 Appendix to Chapter 3

3.7.1 Random Effects Analysis

The analysis presented in the main body of the chapter is replicated here; however, a random effects specification is implemented. This will enable comparisons between the two different estimation techniques, and to discover if accounting for individual heterogeneity has a significant impact on the estimated coefficients. The difference between random and fixed effects specifications concerns the treatment of the unobserved individual effect. In a fixed effects specification, it is assumed that the unobserved time invariant component is correlated with the observed characteristics. As a result, it is desirable to remove this unobserved individual heterogeneity, as this could consequently lead to biased results. A random effects specification treats the individual heterogeneity as being uncorrelated with the observable variables, and consequently includes the unobserved component as part of the error term. The results indicate, in line with Ferrer-i-Carbonell and Frijters (2004), significant differences arise upon the comparison of the random and fixed effects specifications.

Initially, this section outlines the random effects ordered probit model which is used to analyse the dependent variables *A1* for Australia, *B1* and *B2* for Britain and *G1* for Germany. The section then outlines the random effects linear regression model, which will subsequently be used to analyse the dependent variables *A2*.

3.7.1.1 Random Effects Ordered Probit Model

This section draws heavily on Frechette (2001) and Greene (2012). The random effects ordered probit model allows for the discrete ordinal nature of the dependent variable. The random effects ordered probit model has the advantage over the standard ordered probit, as it allows for a cross-section correlation term. Let $y^{*}_{i,t}$ be defined as an unobserved latent variable that is linked to the observed ordinal response categories of $y_{i,t}$. Let a vector of individual and household characteristics be denoted by $\mathbf{x}_{i,t}$ and an error term represented by $\varepsilon_{i,t}$. Let the unobserved latent variable be defined as follows;

$$y^{*}_{i,t} = \beta' \mathbf{x}_{i,t} + \varepsilon_{i,t} \qquad i = 1,..., N \text{ and } t = 1,..., T \tag{3.10}$$

Let the error term be made up of an individual time invariant effect, α_i, and an unobserved error term, $u_{i,t.}$ The error term and its corresponding variance are defined as;

$$\varepsilon_{i,t} = \alpha_i + u_{i,t} \tag{3.11}$$

$$\text{Var}(\varepsilon_{i,t}) = \sigma_\alpha^2 + \sigma_u^2 \tag{3.12}$$

This gives the correlation across time of the error terms as follows;

$$\text{Corr}(\varepsilon_{i,t}, \varepsilon_{i,s}) = \rho = \frac{\sigma_u^2}{\sigma_\alpha^2 + \sigma_u^2} \tag{3.13}$$

The dependent variable $y_{i,t}^*$ is unobserved in practice; however, it is possible to observe:

$$\begin{aligned} y_{i,t} &= 1 \text{ if } y_{i,t}^* \le \mu_1 \\ y_{i,t} &= 2 \text{ if } \mu_1 < y_{i,t}^* \le \mu_2 \\ y_{i,t} &= 3 \text{ if } \mu_2 < y_{i,t}^* \le \mu_3 \\ &\vdots \\ y_{i,t} &= J \text{ if } \mu_{J-1} < y_{i,t}^* \le \mu_J \end{aligned} \tag{3.14}$$

The parameters of μ_j are unknown and estimated via maximum likelihood estimators, along with the parameter estimates. It is assumed that $\mu_0 = -\infty$ and $\mu_J = +\infty$. The log-likelihood function is given as;

$$L = \sum_{i=1}^{N} \ln(P(y_{i,1}, y_{i,2}, y_{i,3}, ..., y_{i,T})) \tag{3.15}$$

where;

$$P(y_{i,1}, y_{i,2}, y_{i,3}, ..., y_{i,T}) = \int_{-\infty}^{\infty} \prod_{t=1}^{T} (F(\mu_j - \beta' \mathbf{x}_{i,t} \mid \alpha_i) - F(\mu_{j-1} - \beta' \mathbf{x}_{i,t} \mid \alpha_i)) d\alpha_i \tag{3.16}$$

where F(.) is the cumulative density function of the normal distribution.

3.7.1.2 Linear Model with Random Effects

As previously specified in Equation 3.7, let the unobserved effects model be defined as;

$$y_{i,t} = \beta' \mathbf{x}_{i,t} + a_i + u_{i,t} \tag{3.17}$$

where i = 1,..., N and t = 1, ..., T and the other terms are as previously defined. Under a fixed effects specification, the aim is to eradicate a_i as it is assumed to be correlated with one or more of the explanatory variables, $\mathbf{x}_{i,t}$. However, if the error term, a_i, is uncorrelated with the explanatory variables, eliminating a_i results in an inefficient estimator. Formally, the random effects assumption is, $Cov(x_{i,t}, a_i) = 0$, t = 1, ..., N; j = 1, ..., k. Let the composite error term be defined as $v_{i,t} = a_i + u_{i,t}$, where the model is defined as;

$$y_{i,t} = \beta' \mathbf{x}_{i,t} + v_{i,t} \tag{3.18}$$

Since a_i is consistent across time periods, the composite error term is, therefore, serially correlated over time. That is, under the random effects assumption, $\text{Corr}(\varepsilon_{i,t}, \varepsilon_{i,s}) = \rho = \frac{\sigma_u^2}{\sigma_a^2 + \sigma_u^2}$ where $t \neq s$. The serial correlation across the error terms implies that a pooled OLS estimator is inefficient; consequently, a generalised least squares (GLS) estimator transforms the data such that the serial correlation is removed. A full explanation of the random effects linear specification can be found in Greene (2012). The random effects estimator is potentially advantageous to the fixed effects estimator as it is possible to ascertain the impact of time invariant explanatory variables.

3.7.2 Results

This section reports the results for the random effects analysis of the dependent variables *A1*, *A2*, *B1*, *B2* and *G1*.

3.7.2.1 Australia

Overall Life Satisfaction (A1)

Table A3.14 presents the results from the random effects ordered probit analysis relating to the dependent variable *A1*. Specification 1 indicates that there is no significant difference in overall life satisfaction between female or male heads of household. Overall life satisfaction displays a "U-shape" pattern in age, consistent with Theodossiou (1998), Winkelmann and Winkelmann (1998), Frey and Stutzer (2002), Clark (2003), Oswald (1997), Blanchflower and Oswald (2008), Blanchflower and Clark (2006) and Powdthavee (2005). This contrasts with the results of the fixed effects specification presented in Section 3.4.1, where the age of the head of household does not exert a statistically significant impact on overall life satisfaction, suggesting that the

treatment of individual fixed effects has a significant impact on the estimated coefficients.

The household's level of disposable income is positively associated with the head of household's overall life satisfaction, which is consistent with Ferrer-i-Carbonell (2005). Looking at the head of household's level of education indicates that having degree level education has a detrimental effect on overall life satisfaction, compared to having below high school education. The other education controls do not have a statistically significant impact on overall life satisfaction. This result is in line with Clark (2003), who finds that education is negatively associated with well-being.

The relationship status of the head of household has the expected impact on overall life satisfaction. Never married, divorced and widowed are all negatively associated with overall life satisfaction, compared to being married. These results accord with the existing literature where marriage is found to exert a positive impact on overall life satisfaction. Interestingly, overall life satisfaction appears to be unrelated to unemployment; however, compared to being employed, retirement is positively related to overall life satisfaction. As stated above, this anomaly could be the result of the definition of the head of household.

As expected, and consistent with the fixed effects specification and existing literature, self-reported health status has a significant positive association with overall life satisfaction. Similarly, the head of household's subjective financial position is an important determinant of the head of household's overall life satisfaction.

Considering the financial measures, the level of total assets has a positive relationship with overall life satisfaction, as presented in Specifications 3 and 5. The relationship, however, disappears once the head of household's subjective financial situation is controlled for in the analysis. In contrast with other studies and the other countries considered here, neither total debt, unsecured nor secured debt display a relationship with overall life satisfaction. Similarly, net worth is not found to be a significant determinant.

Psychological Well-Being (A2)

Table A3.15 presents the results for the random effects linear model relating to the dependent variable *A2*. As in previous sections, the base line model will initially be considered, with the results of subsequent specifications outlined.

Considering Specification 1 reveals that, in line with the existing literature, mental health displays a "U-Shaped" pattern in age. This contrasts with the fixed effects analysis presented in Section 3.4, where age was not a significant determinant of mental well-being. This supports the findings of Ferrer-i-Carbonell and Frijters (2004), who report significant differences between the estimated coefficients once individual fixed effects are accounted for. The level of disposable income remains a statistically insignificant determinant of mental health, as in the case of the fixed effects specification.

As in the fixed effects specification and the existing literature, neither household size nor the level of education are significant determinants of psychological well-being. Looking at the marital status of the head of household reveals that the variables have the expected impact on mental well-being. Compared to being married, being divorced or widowed has a detrimental effect on mental well-being. Similarly, heads of households who have never married report lower levels of mental well-being. As expected, being unemployed has a large negative association with mental well-being. This result is consistent with the existing literature and the fixed effects analysis.

Once the subjective financial measures are introduced in Specification 2, several of the baseline variables become statistically insignificant. Focusing on the statistically significant coefficients indicates that compared to being married, being never married or divorced or separated has a detrimental impact on the head of household's mental well-being. Unemployment continues to exert a large negative impact on mental well-being. Compared to being employed, unemployment is associated with a 5.34 lower score, *ceteris paribus*. The subjective financial measures exert a massive impact on the level of mental well-being. Households who report their financial situation as being prosperous, on average, report a mental health score 16.07 points higher than those who report their current financial situation as poor, ceteris paribus.

Specification 3 of Table A3.15 indicates that the financial variables have the expected impact on mental well-being. Total assets exert a statistically significant positive impact on mental well-being, however, whilst total debt exerts a negative influence, however, the result is not statistically significant at the 10% level. Once the subjective financial measures are included, the household's level of total assets fails to be a significant determinant of mental well-being. The subjective financial measures retain a large positive impact on overall life satisfaction. As mentioned previously, this could

be the result of the head of household's subjective financial position being formed based upon information corresponding to the value of the household's assets, rather than the level of debt the household holds. This could be due to a lack of financial education in Australia, compared to Britain and Germany, relating to the potential consequences of holding large consequences of household debt.

Specifications 5 and 6 indicate that, once the level of total debt is separated into secured and unsecured debt, neither exert a statistically significant relationship with mental well-being, while the level of total assets has a positive effect. This result is consistent with the fixed effects specification where, in Australia, the debt levels of the household do not determine the head of household's level of overall life satisfaction. Similarly, the household's net wealth does not have a statistically significant relationship with mental well-being, whilst the subjective financial measures exert a large impact on overall life satisfaction.

3.7.2.2 Britain

Overall Life Satisfaction (B1)

The results of the random effects ordered probit specification relating to the head of household's overall life satisfaction in Britain are presented in Table A3.16. The analysis indicates that female household heads report a lower level of overall life satisfaction compared to their male counterparts, as predicted from the descriptive statistics. In line with the existing literature, well-being displays a convex age pattern. Income has a positive and statistically significant impact on overall life satisfaction. However, this relationship disappears once the head of household's subjective financial situation is included in the analysis.

Interestingly, the highest level of educational attainment is negatively related to overall life satisfaction. This result accords with those presented in Clark (2003). Household size does not have a significant relationship with the head of household's well-being. Unemployment is not a significant determinant of overall life satisfaction, which is consistent with the results from the fixed effects ordered logit specification. However, in contrast to the fixed effects specification, retirement is positively related to the head of household's overall life satisfaction. Compared to being employed, not being in the labour force is negatively related to overall life satisfaction; however, this relationship disappears once the subjective financial measures are included in the analysis.

As predicted by the existing literature, being divorced or separated and being never married are all negatively associated with the head of household's overall life satisfaction. Self-reported health status, in line with the existing literature and the fixed effects specification, exerts a large positive impact on overall life satisfaction.

The random effects analysis reveals that the head of household's subjective current financial situation is positively associated with overall life satisfaction. Also, expecting the household's financial situation to improve in the future exerts a positive impact on overall life satisfaction. Compared to being worse off financially compared to a year ago, being better off is positively related to overall life satisfaction.

Total debt and total assets of the household are negatively and positively associated to the head of household's overall life satisfaction, respectively, contradicting the results from the fixed effects analysis, where the financial measures do not exert statistically significant impacts on overall life satisfaction. The statistical strength of these relationships is, however, reduced once the subjective financial measures are included in the analysis. Separating total debt into secured and secured debt indicates that both are negatively related to overall life satisfaction, and, once again, these relationships disappear once the subjective measures are included.

In line with the other financial measures, net wealth exerts a positive and statistically significant impact on overall life satisfaction, which is consistent with Headey *el al.* (2008) and Headey and Wooden (2004); however, this relationship is not robust to including controls for the head of household's subjective financial situation.

Psychological Well-Being (B2)

Table A3.17 presents the results for the random effects ordered probit analysis of the dependent variable *B2*. The analysis reveals that female household heads report lower GHQ12 scores than their male counterparts, which is consistent with the existing literature and the descriptive statistics presented in Table A3.1. The GHQ12 score displays a concave pattern in age, which contrasts with the existing literature.

Income, as in the random effects analysis for overall life satisfaction, displays a positive relationship with psychological well-being; however, this relationship becomes statistically insignificant upon the inclusion of the subjective financial measures. Interestingly, amongst the variables that capture the head of household's highest

education level, only possessing a degree level qualification exerts a negative and statistically significant impact on psychological well-being.

Household size is not a significant determinant of psychological well-being at the 5% level. Both being not in the labour force and unemployed are negatively associated with psychological well-being, which is consistent with the existing literature. Retirement does not exert a statistically significant impact on psychological well-being. Divorce is negatively associated with psychological well-being, however, this association is not robust to the inclusion of the subjective financial measures. Never married and being widowed exert negative impacts on psychological well-being. This result is consistent across all the specifications considered.

As previously found in the fixed effects specifications, the household's subjective financial position is positively related to psychological well-being. Considering the financial measures of the household's financial situation indicates that, unlike the fixed effects specification, they are statistically significant determinants of psychological well-being. The level of total debt is negatively associated with psychological well-being, whereas total assets display a positive association with psychological well-being. Specification 4 indicates that the relationship between total assets and psychological well-being disappears once the subjective financial measures are included in the analysis. Similarly, psychological well-being is positively associated with the household's level of net wealth, however, as presented in Specification 8 this relationship disappears upon the inclusion of the subjective financial measures.

3.7.2.3 Germany

Overall Life Satisfaction (G1)

Table A3.18 presents the results from the random effects ordered probit analysis of overall life satisfaction in Germany. The analysis indicates that being female does not exert a statistically significant impact on overall life satisfaction. Consistent with the existing literature, however, and in contrast with the fixed effects analysis, overall life satisfaction displays a "U-shaped" pattern in age. Household size is found to adversely affect the head of household's overall life satisfaction, whilst household income is positively related to the head of household's overall life satisfaction. Higher levels of education are associated with higher levels of overall life satisfaction. The relationship status of the head of household has the expected impact on overall life satisfaction.

Being divorced or separated is negatively related to overall life satisfaction, as is never married.

Compared to being employed, being unemployed has a detrimental impact on overall life satisfaction. Neither not being in the labour force nor being retired display a statistically significant relationship with overall life satisfaction at the five percent level.

In line with the existing literature, self-reported health status has a strong positive impact on overall life satisfaction. Specification 2 includes the subjective household financial measures. The subjective measures are strongly related to the household's level of overall life satisfaction, which is consistent with the fixed effects analysis.

The financial measures display the expected relationships with overall life satisfaction. Total assets are positively and statistically significantly related to the head of household's overall life satisfaction. This result is robust to the inclusion of the head of household's subjective financial status; however, the coefficient is reduced in size. The level of debt is negatively related to well-being. The relationship, however, becomes statistically insignificant once the subjective financial situation is controlled for. Focusing on the separation of total debt into secured and unsecured debt indicates that, in line with Brown *et al.* (2005), the level of unsecured debt is negatively associated with overall life satisfaction. The results presented in Specification 6 of Table A3.18, suggests that overall life satisfaction is not influenced by the household's level secured debt.

The level of net wealth is positively related to overall life satisfaction. This result remains statistically significant once the household's subjective financial situation is included. This result is in line with the existing literature and the fixed effects analysis of German household heads' overall life satisfaction.

3.7.3 Figures and Tables

Figure A3.1: Distribution of Dependent Variable *A1*

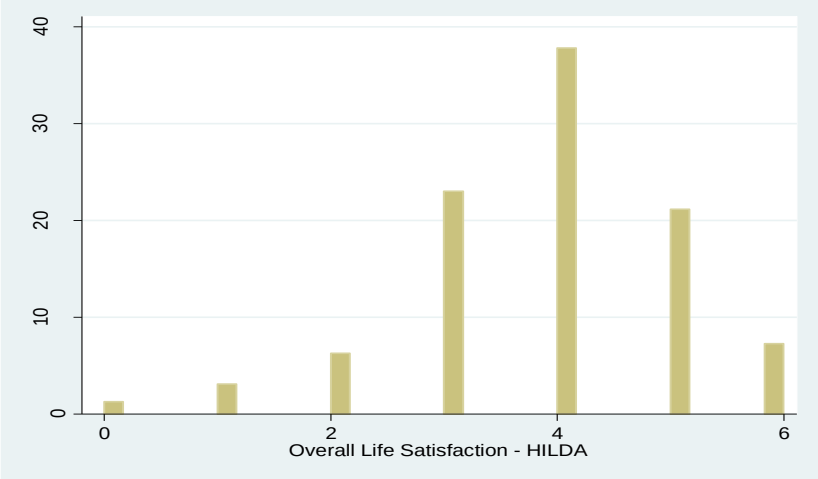


Figure A3.2: Distribution of Dependent Variable *A2*

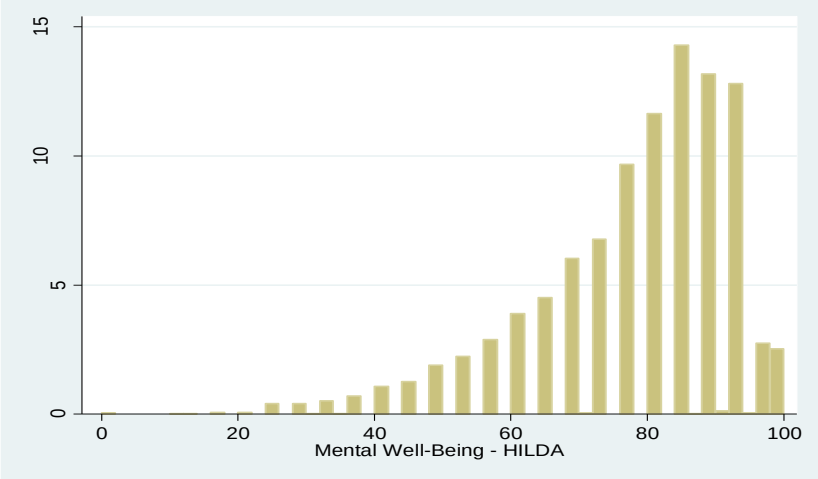


Figure A3.3: Distribution of Dependent Variable *B1*

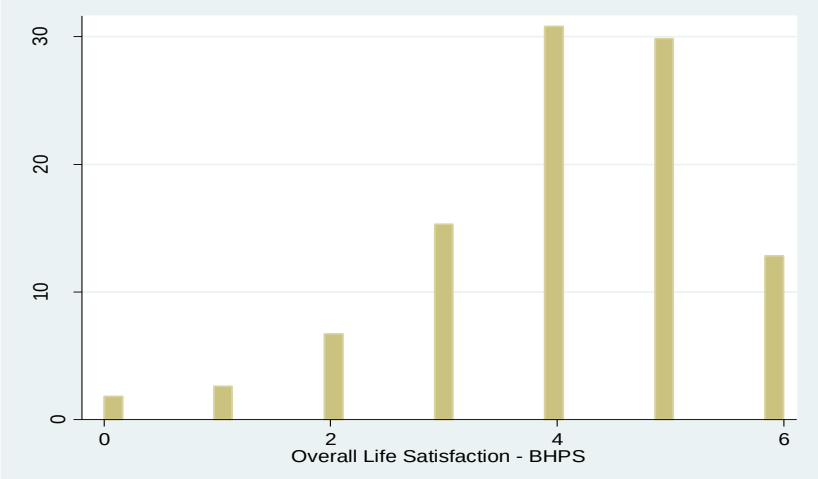


Figure A3.4: Distribution of Dependent Variable *B2*

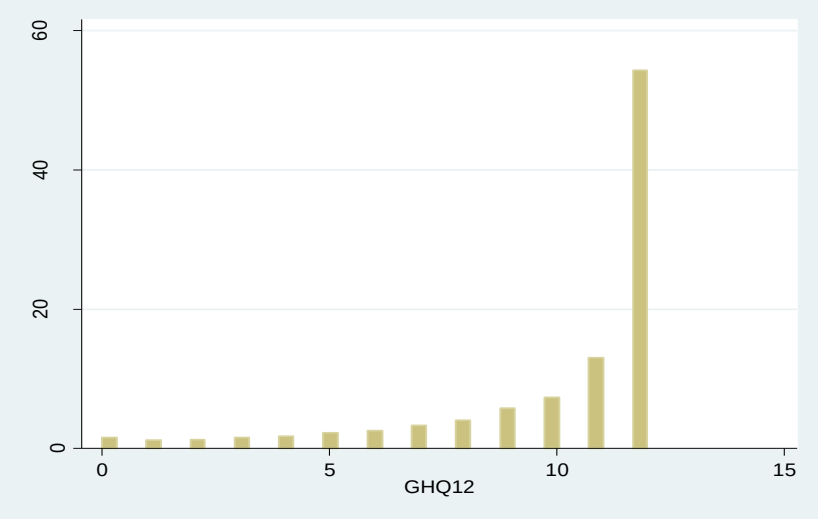


Figure A3.5: Distribution of Dependent Variable *G1*

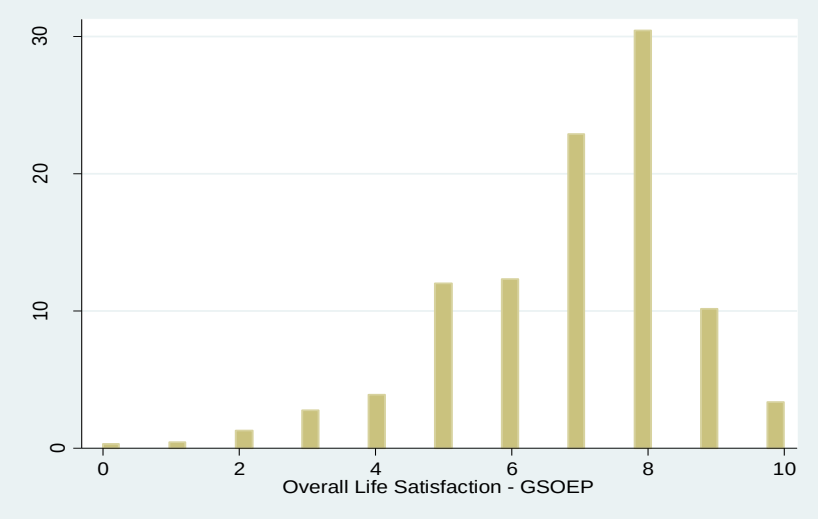


Figure A3.6: Distribution of Dependent Variable *G2*

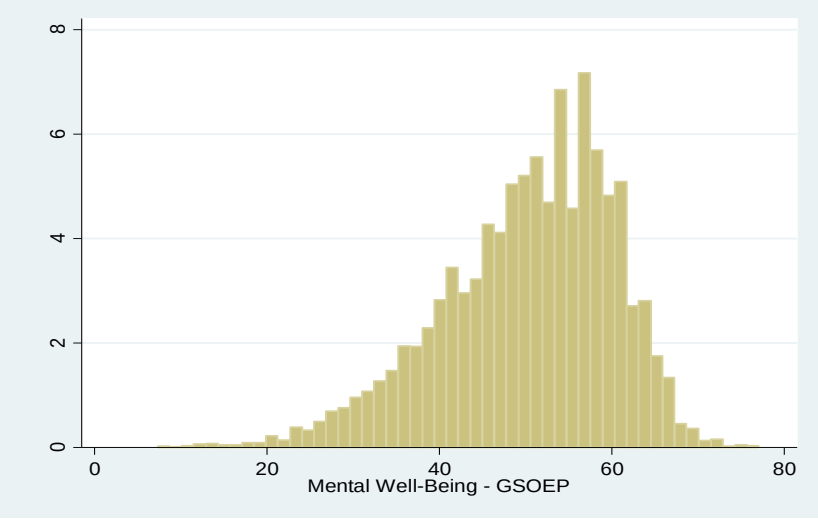


Figure A3.7: Distributions of the Monetary Financial Measures - HILDA

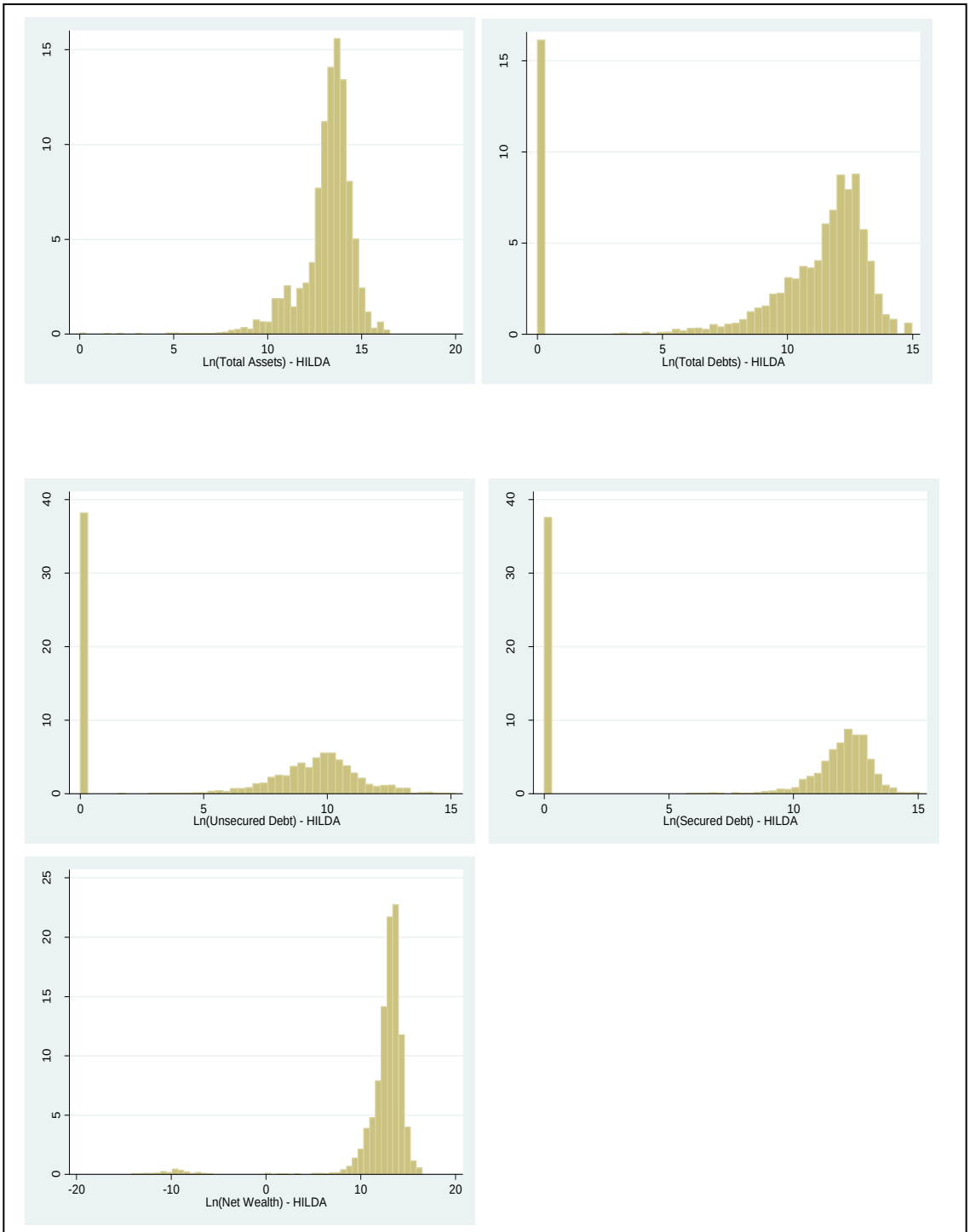


Figure A3.8: Distributions of the Monetary Financial Measures - BHPS

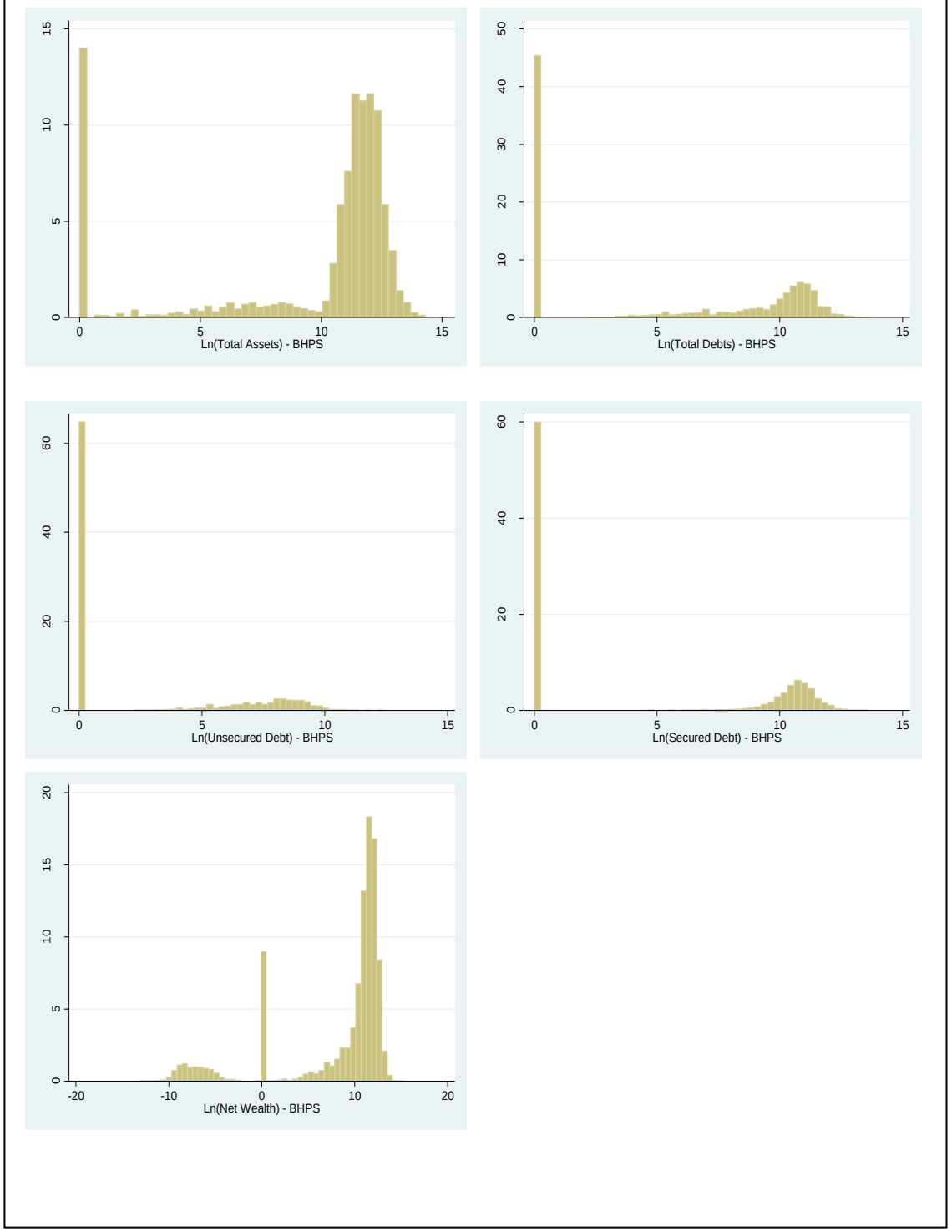


Figure A3.9: Distributions of the Monetary Financial Measures - GSOEP

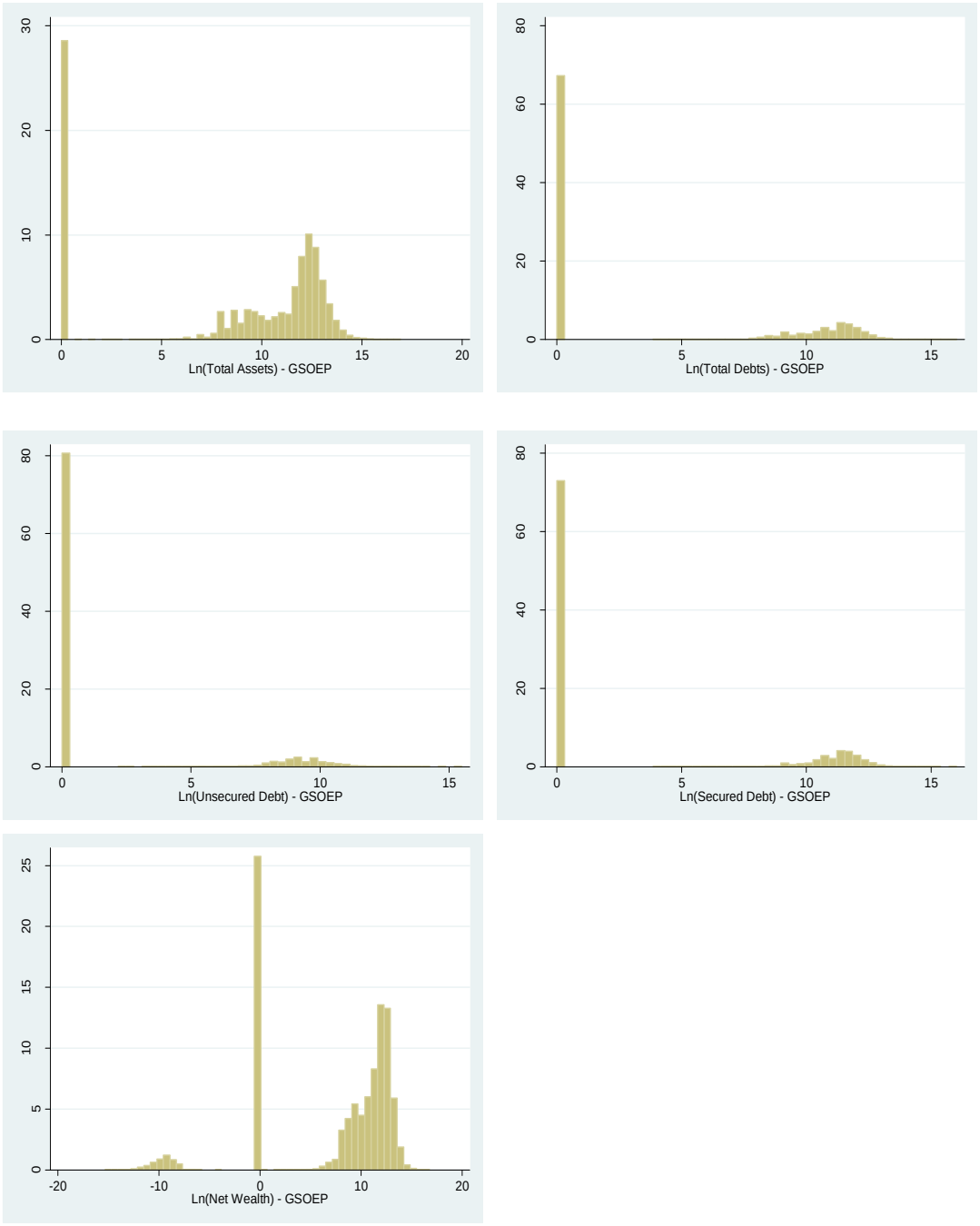


Table A3.1: Dependent Variables: Descriptive Statistics

	Australia				Britain				Germany			
	Overall Life Satisfaction		Psychological Well-Being		Overall Life Satisfaction		Psychological Well-Being		Overall Life Satisfaction		Psychological Well-Being	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Overall	3.8536	1.2042	76.9565	15.0980	4.1163	1.3225	10.1846	2.9144	6.9023	1.7475	50.3093	10.0019
Males	3.8618	1.1945	77.3695	14.9977	4.2141	1.2159	10.5187	2.6027	6.9700	1.7253	51.4546	9.4881
Females	3.8293	1.2329	75.7342	15.3332	3.9186	1.4963	9.5092	9.5092	6.7875	1.7789	48.3567	10.5403
Changes Over Time												
Year 0	3.7739	1.3111	76.3999	15.6019	4.1469	1.3204	10.1389	2.9590	7.0118	1.7047	50.3093	10.0019
Year 1	3.8811	1.1591	77.2243	14.8331	4.0858	1.3242	10.2304	2.8689	6.7927	1.7827	N/A	N/A
Year 2	3.8900	1.1562	77.1325	14.9503	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Debt												
Total Debt > 0	3.8206	1.1826	76.6066	15.1292	4.0035	1.2072	10.0910	3.0140	7.1118	1.6589	50.0521	9.8399
Total Debt = 0	4.0257	1.2985	78.7769	14.8131	4.2522	1.4378	10.2974	2.7862	6.8005	1.7802	50.4666	10.0975
Unsecured Debt												
Unsecured Debt > 0	3.8050	1.2091	76.4827	15.1636	3.9176	1.2574	9.9289	3.1301	6.6235	1.8345	48.5084	10.2611
Unsecured Debt = 0	3.9324	1.1925	77.7241	14.9641	4.2244	1.3445	10.3238	2.7806	6.9691	1.7194	50.6745	9.9095
Secured Debt												
Secured Debt > 0	3.8549	1.1339	77.1436	14.8214	4.0920	1.0960	10.3082	2.8348	7.2246	1.5886	51.0237	9.2981
Secured Debt = 0	3.8516	1.3132	76.6457	15.5464	4.1326	1.4541	10.1022	2.9639	6.7830	1.7882	50.0517	10.2325
Net Wealth												
Net Wealth ≤ 0	3.5484	1.3635	73.3333	15.8836	3.6556	1.5572	9.3930	3.4510	6.3784	1.9061	48.2643	10.7896
Net Worth >0	3.8607	1.1996	77.0405	15.0710	4.2198	1.2407	10.3625	2.7488	7.1356	1.6184	51.2938	9.4442

Notes: For Australia Year 0, Year 1 and Year 2 correspond to the 2002, 2006 and 2010 waves of the HILDA, respectively. For Britain Year 0 and Year 1 correspond to the 2000 and 2005 waves of the BHPS respectively, whilst, for Germany, Year 0 and Year 1 indicate the 2002 and 2007 waves for the GSOEP survey.

Table A3.2: Independent Variables: Definitions – HILDA

Independent Variables	Definition
Age	Age of the head of household.
Age Squared/100	Age square divided by 100.
Female	1 if head of household is female, 0 if male.
Ln(Household Size)	Natural logarithm of household size.
Marital Status - *(Married or in de facto relationship omitted category)*	
Divorced/Separated	1 if head of household is divorced or separated, 0 otherwise.
Widowed	1 if head of household is widowed, 0 otherwise.
Never Married	1 if head of household has never been married, 0 otherwise.
Labour Force Status - *(Employed is the omitted category)*	
Unemployed	1 if head of household is unemployed, 0 otherwise.
NLF	1 if head of household is not in the labour force, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Income	
Household Annual Disposable Income	Natural logarithm of household's disposable income if disposable income is greater than zero, defined to be zero if disposable income is zero.
Education - (*Below high school education omitted category)*	
Degree	1 if highest level of education is degree or higher, 0 otherwise
Vocational Degree	1 if highest level of education is a vocational degree, 0 otherwise
High School	1 if highest level of education is high school level, 0 otherwise
Self-Reported Health Status - *(Poor Health omitted category)*	
Excellent	1 if self-assessed health is excellent, 0 otherwise
Very Good	1 if self-assessed health is very good, 0 otherwise
Good	1 if self-assessed health is good, 0 otherwise
Fair	1 if self-assessed health is fair, 0 otherwise
Subjective Financial Position - *(Very poor and poor omitted category)*	
Prosperous	1 if responds "prosperous" to the question *"Given your current needs and financial responsibilities, would you say your family are...?"*, 0 otherwise.
Very Comfortable	1 if responds "very comfortable" to the question *"Given your current needs and financial responsibilities, would you say your family are...?"*, 0 otherwise.
Relatively Comfortable	1 if responds "relatively comfortable" to the question *"Given your current needs and financial responsibilities, would you say your family are...?"*, 0 otherwise.
Get Along	1 if respond "just get along" to the question *"Given your current needs and financial responsibilities, would you say your family are...?"*, 0 otherwise.
Monetary Financial Variables	
Ln(Total Assets) (Ln(Ta^A))	Natural logarithm of household total assets.
Ln(Total Debt) (Ln(Td^A))	Natural logarithm of household total debt.
Ln(Unsecured Debt) (Ln(Ud^A))	Natural logarithm of household unsecured debt.
Ln(Secured Debt) (Ln(Sd^A))	Natural logarithm of household secured debt.
Ln(Net Wealth) (Ln(nw^A))	Natural logarithm of household net wealth.

Table A3.3: Independent Variables: Summary Statistics - HILDA

Independent Variable	Mean	S.D.	Min	Max
Age	43.7333	11.5742	17	93
Age Squared/100	20.4653	10.7530	2.89	86.49
Female	0.2526	0.4345	0	1
Ln(Household Size)	0.8998	0.5565	0	2.3026
Marital Status - *(Married or in de facto relationship omitted category)*				
Divorced/Separated	0.1203	0.3254	0	1
Widowed	0.0170	0.1295	0	1
Never Married	0.1534	0.3604	0	1
Labour Force Status - *(Employed is the omitted category)*				
Unemployed	0.0110	0.1041	0	1
NLF	0.0132	0.1139	0	1
Retired	0.0244	0.1542	0	1
Income				
Household Disposable Income	11.3310	0.5821	4.5799	13.2340
Education - (*Below high school education omitted category)*				
Degree	0.4009	0.4901	0	1
Vocational Degree	0.3444	0.4752	0	1
High School	0.1040	0.3053	0	1
Self-Reported Health Status - *(Poor health omitted category)*				
Excellent	0.1374	0.3443	0	1
Very Good	0.4092	0.4917	0	1
Good	0.3570	0.4792	0	1
Fair	0.0889	0.2846	0	1
Subjective Financial Position - *(Very poor and poor omitted category)*				
Prosperous	0.0229	0.1496	0	1
Very Comfortable	0.1758	0.3807	0	1
Relatively Comfortable	0.5743	0.4945	0	1
Get Along	0.2090	0.4066	0	1
Monetary Financial Variables				
Total Assets ($A\$_{2010}$)	989,866	1,230,804	0	14,800,000
Total Assets ($£_{2005}$)	357,361	444,345	0	5,339,713
Ln (Ta^A)	13.1907	1.4020	0	16.5095
Total Debt ($A\$_{2010}$)	200,782	322,872	0	3,199,640
Total Debt ($£_{2005}$)	72,486	116,563	0	1,155,134
Ln(Td^A)	9.6236	4.5027	0	14.9786
Unsecured Debt ($A\$_{2010}$)	39,612	166,529	0	3,940,825
Unsecured Debt ($£_{2005}$)	14,301	60,120	0	1,422,717
Ln(Ud^A)	5.9513	4.8688	0	15.1869
Secured Debt ($A\$_{2010}$)	162,577	260,790	0	3,436,311
Secured Debt ($£_{2005}$)	58,694	94,150	0	1,240,577
Ln(Sd^A)	7.4993	5.8812	0	15.0499
Net Wealth ($A\$_{2010}$)	787,760	1,103,495	-1,451,536	14,200,000
Net Wealth ($£_{2005}$)	284,397	398,384	-524,034	5,134,977
Ln(nw^A)	12.4233	3.5850	-14.1881	16.4704

Monetary variables are in Australian Dollars (A$) and are inflated to 2010 prices. In addition, for means of comparisons of the descriptive statistics, the monetary values are presented in British Pounds (£) deflated to 2005 prices.

Table A3.4: Independent Variables: Definitions – BHPS

Independent Variables	Description
Age	Age of the head of household.
Age Squared/100	Age of head of household squared divided by 100.
Female	1 if head of household is female, 0 if male.
Ln(Household Size)	Natural logarithm of number of people present in the household.
Relationship Status - *(Married omitted category)*	
Divorced/Separated	1 if head of household is divorced or separated, 0 otherwise.
Never Married	1 if head of household has never married, 0 otherwise.
Widowed	1 if head of household is widowed, 0 otherwise.
Employment Status - *(Employed is omitted category)*	
Unemployed	1 if head of household is unemployed, 0 otherwise.
NLF	1 if head of household is not in the labour force, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Household Income	
Natural Logarithm of Monthly Income	Natural logarithm of household income from all sources the month prior to the interview.
Education - *(Below GCSE level is omitted category)*	
Degree	1 if head of household's highest level of education is degree or higher, 0 otherwise.
Vocational Degree	1 if head of household's highest level of education is a vocational degree, 0 otherwise.
A-level	1 if head of household's highest level of education is A-level, 0 otherwise.
GCSE	1 if head of household's highest level of education is GCSE, 0 otherwise.
Self-Rated Health Status - *(Very poor defined to be the omitted category)*	
Excellent	1 if head of household reports current health as excellent, 0 otherwise
Good	1 if head of household reports current health as very good, 0 otherwise
Fair	1 if head of household reports current health as fair, 0 otherwise
Poor	1 if head of household reports current health as poor, 0 otherwise
Subjective Financial Situation - *(Finding it very difficult is omitted category)*	
Comfortable	1 if head of household reports "living comfortably" in response to *"How well would you say you yourself are managing financially these days?"*, 0 otherwise.
Doing Alright	1 if head of household reports "doing alright" in response to *"How well would you say you yourself are managing financially these days?"*, 0 otherwise.
Getting By	1 if head of household reports "getting by" in response to *"How well would you say you yourself are managing financially these days?"*, 0 otherwise.
Quite Difficult	1 if head of household reports "finding it quite difficult" in response to *"How well would you say you yourself are managing financially these days?"*, 0 otherwise.
Expected Financial Situation - *(Expect financial situation to be worse off is omitted category)*	
Better Off - Future	1 if head of household responds "better off" to the question *"Looking ahead, how do you think you will be financially a year from now?"*, 0 otherwise.
Same – Future	1 if head of household responds "about the same" to the question *"Looking ahead, how do you think you will be financially a year from now?",* 0 otherwise.
Change in Financial Position - *(Being worse off is omitted category)*	
Better – Past	1 if head of household responds "better off" to the question "*Would you say that you yourself are better off or worse off financially than you were a year ago?"*, 0 otherwise.
Same - Past	1 if head of household responds "about the same" to the question "*Would you say that you yourself are better off or worse off financially than you were a year ago?"*, 0 otherwise.
Monetary Financial Variables	
Ln(Ta^B)	Natural logarithm of household total assets.
Ln(Td^B)	Natural logarithm of household total debt.
Ln(Ud^B)	Natural logarithm of household unsecured debt.
Ln(Sd^B)	Natural logarithm of household secured debt.
Ln(nw^B)	Natural logarithm of household net wealth.

Table A3.5: Independent Variables: Summary Statistics – BHPS

Independent Variable	Mean	S.D.	Minimum	Maximum
Age	53.21	16.92	17	99
Age Squared/100	31.17	18.58	2.89	98.01
Female	0.3309	0.4706	0	1
Ln(Household Size)	0.6690	0.5456	0	2.1972
Relationship Status - *(Married is omitted category)*				
Divorced/Separated	0.1877	0.3905	0	1
Never Married	0.1915	0.3935	0	1
Widowed	0.1503	0.3574	0	1
Employment Status - *(Employed is omitted category)*				
Unemployed	0.0222	0.1474	0	1
NLF	0.0932	0.2907	0	1
Retired	0.3220	0.4673	0	1
Household income				
Natural Logarithm of Monthly Income	7.4400	0.9085	0	10.65
Education - *(Below GCSE level is omitted category)*				
Degree	0.1446	0.3517	0	1
Vocational Degree	0.2983	0.4576	0	1
A-level	0.0954	0.2939	0	1
GCSE	0.1474	0.3546	0	1
Self-Rated Health Status - *(Very poor defined as omitted category)*				
Excellent	0.2078	0.4058	0	1
Good	0.4677	0.4990	0	1
Fair	0.2260	0.4183	0	1
Poor	0.0776	0.2676	0	1
Subjective Financial Situation - *(Finding it very difficult is omitted category)*				
Comfortable	0.3201	0.4666	0	1
Doing Alright	0.3647	0.4814	0	1
Getting By	0.2528	0.4346	0	1
Quite Difficult	0.0431	0.2030	0	1
Expected Financial Situation - *(Expect financial situation to be worse is omitted category)*				
Better Off - Future	0.2381	0.4260	0	1
Same – Future	0.6537	0.4758	0	1
Change in Financial Position - *(Being worse off is omitted category)*				
Better – Past	0.2484	0.4321	0	1
Same - Past	0.5235	0.4995	0	1
Monetary Financial Variables				
Total Assets (£$_{2005}$)	128,750	154,344	0	4,100,000
Ln(Ta^B)	9.5339	4.3007	0	15.2265
Total Debt (£$_{2005}$)	25,363	50,225	0	910,000
Ln(Td^B)	5.2917	5.0505	0	13.7212
Secured Debt (£$_{2005}$)	23,455	47,572	0	800,000
Ln(Sd^B)	4.2475	5.2339	0	13.5924
Unsecured Debt (£$_{2005}$)	1,907	6,823	0	240,000
Ln(Ud^B)	2.6785	3.7578	0	12.3884
Net Wealth (£$_{2005}$)	103,387	141,392	-481,578	4,100,000
Ln(nw^B)	8.2642	6.1521	-13.0848	15.2265

All financial variables are measured in British Pounds (£) and inflated to 2005 price levels.

Table A3.6: Independent Variables: Definitions – GSOEP

Independent Variables	Description
Age	Age of the head of household.
Age Squared/100	Age of head of household squared divided by 100.
Female	1 if head of household is female, 0 if male.
Ln(Household Size)	Natural logarithm of number of people present in the household.
Relationship Status - *(Married omitted category)*	
Divorced/Separated	1 if head of household is divorced or separated, 0 otherwise.
Never Married	1 if head of household has never married, 0 otherwise.
Widowed	1 if head of household is widowed, 0 otherwise.
Employment Status - *(Employed is omitted category)*	
Unemployed	1 if head of household is unemployed, 0 otherwise.
NLF	1 if head of household is not in the labour force, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Household Income	
Natural Logarithm Annual Household Income	Natural logarithm of post government annual household income.
Education - *(Below basic qualifications is omitted category)*	
Tertiary Degree	1 if head of household has tertiary education, 0 otherwise
Vocational Degree	1 if head of household has a vocational qualification, 0 otherwise
Intermediate Qualification	1 if head of household has a *Arbitur* qualification, 0 otherwise
Basic Qualification	1 if head of household has *Realschule*, 0 otherwise
Self-Reported Health Status - *(Very poor is defined to be the omitted category)*	
Very Good	1 if head of household rates their current health as very good, 0 otherwise
Good	1 if head of household rates their current health as good, 0 otherwise
Fair	1 if head of household rates their current health as fair, 0 otherwise
Poor	1 if head of household rates their current health as poor, 0 otherwise
Subjective Financial Situation – (V*ery concerned about household finances is omitted category)*	
Concerned	1 if head of household responds "concerned " to the question *"What is your attitude towards the following areas – are you concerned about them? Your own economic situation."* , 0 otherwise.
Not Concerned	1 if head of household responds "not concerned " to the question *"What is your attitude towards the following areas – are you concerned about them? Your own economic situation."*, 0 otherwise.
Monetary Financial Variables	
Ln(Ta^G)	Natural logarithm of household total assets.
Ln(Td^G)	Natural logarithm of household total debt.
Ln(Sd^G)	Natural logarithm of household unsecured debt.
Ln(Ud^G)	Natural logarithm of household secured debt.
Ln(nw^G)	Natural logarithm of household net wealth.

Table A3.7: Independent Variables: Summary Statistics – GSOEP

Independent Variable	Mean	Standard Deviation	Min	Max
Age	51.9500	15.2290	18	97
Age Squared/100	29.3071	16.5190	3.24	94.09
Female	0.3712	0.4831	0	1
Ln(Household Size)	0.7748	0.5168	0	2.5649
Relationship Status				
Divorced/Separated	0.1371	0.3439	0	1
Never Married	0.1555	0.3624	0	1
Widowed	0.0910	0.2876	0	1
Employment Status				
Unemployed	0.0508	0.2196	0	1
NLF	0.1388	0.3457	0	1
Retired	0.2022	0.4016	0	1
Household income				
Natural Logarithm Annual Household Income	10.3144	0.6566	4.6812	13.8327
Education				
Tertiary Degree	0.1690	0.3747	0	1
Vocational Qualification	0.1522	0.3591	0	1
Intermediate Qualification	0.0176	0.1316	0	1
Basic Qualification	0.0207	0.1424	0	1
Self-Reported Health Status				
Very Good	0.0699	0.2550	0	1
Good	0.3958	0.4890	0	1
Fair	0.3543	0.4783	0	1
Poor	0.1435	0.3506	0	1
Subjective Financial Situation				
Concerned	0.4878	0.4999	0	1
Not Concerned	0.3064	0.4610	0	1
Monetary Financial Variables				
Total Assets ($€_{2007}$)	179,647	439,087	0	22,500,000
Total Assets ($£_{2005}$)	115,866	283,196	0	14,500,000
Ln(Ta^G)	8.1483	5.3737	0	16.9275
Total Debt ($€_{2007}$)	36,102	136,894	0	9,171,500
Total Debt ($£_{2005}$)	23,284	88,292	0	5,915,293
Ln(Td^G)	3.5487	5.1531	0	16.0316
Secured Debt ($€_{2007}$)	33,178	123,106	0	9,171,500
Secured Debt ($£_{2005}$)	21,399	79,399	0	5,915,293
Ln(Sd^G)	3.0067	4.9851	0	16.0316
Unsecured Debt ($€_{2007}$)	5,606	56,809	0	5,395,000
Unsecured Debt ($£_{2005}$)	3,615	36,640	0	3,479,584
Ln(Ud^G)	1.7888	3.7032	0	15.5010
Net Wealth ($€_{2007}$)	143,545	379,071	-4,639,700	19,800,000
Net Wealth ($£_{2005}$)	92,581	244,488	-2,992,443	14,500,000
Ln(nw^G)	7.2810	6.4077	-15.3502	16.7987

All financial variables are measured in Euro's (€) and inflated to 2007 prices. In addition, for means of comparisons of the descriptive statistics, the monetary values are presented in British Pounds (£) deflated to 2005 prices.

Table A3.8: The Determinants of Overall Life Satisfaction *(A1)*: HILDA – Fixed Effects Ordered Logit Model

The dependent variable is overall life satisfaction as measured on a 6 point scale. A fixed effects ordered logit model, estimated by the "Blow up and Cluster" estimator, is used to analyse an unbalanced panel from 2002, 2006 and 2010 waves of the HILDA survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Prosperous		1.105**		1.040*		0.982*		1.090**
		(0.543)		(0.545)		(0.550)		(0.547)
Subjective Financial Position - Very Comfortable		1.510***		1.455***		1.418***		1.500***
		(0.372)		(0.373)		(0.374)		(0.374)
Subjective Financial Position - Relatively Comfortable		1.096***		1.062***		1.037***		1.085***
		(0.342)		(0.341)		(0.341)		(0.345)
Subjective Financial Position - Get Along		0.497		0.477		0.454		0.487
		(0.328)		(0.324)		(0.325)		(0.330)
Total Assets			0.134	0.0899	0.137	0.0974		
			(0.0983)	(0.0920)	(0.101)	(0.0957)		
Total Debt			-0.00512	-0.00171				
			(0.0146)	(0.0146)				
Unsecured Debt					-0.0172	-0.0123		
					(0.0125)	(0.0126)		
Secured Debt					-0.00359	-0.00488		
					(0.0125)	(0.0126)		
Net Wealth							0.00711	0.00417
							(0.0153)	(0.0153)
Age	-0.0139	-0.000624	-0.0514	-0.0267	-0.0557	-0.0290	-0.0165	-0.00215
	(0.0538)	(0.0560)	(0.0569)	(0.0585)	(0.0565)	(0.0583)	(0.0538)	(0.0559)
Age Squared/100	0.0838	0.0675	0.114*	0.0889	0.117**	0.0901	0.0860	0.0688
	(0.0583)	(0.0606)	(0.0598)	(0.0617)	(0.0596)	(0.0615)	(0.0583)	(0.0605)
Ln(Household Size)	-0.155	-0.177	-0.186	-0.197	-0.168	-0.184	-0.159	-0.177
	(0.183)	(0.191)	(0.185)	(0.192)	(0.186)	(0.193)	(0.184)	(0.191)
Divorced/Separated	-1.119***	-1.000***	-1.063***	-0.966***	-1.055***	-0.969***	-1.115***	-0.998***
	(0.299)	(0.306)	(0.301)	(0.307)	(0.304)	(0.309)	(0.300)	(0.306)
Never Married	-0.512*	-0.545*	-0.529*	-0.554*	-0.530*	-0.561*	-0.510*	-0.544*
	(0.283)	(0.292)	(0.286)	(0.294)	(0.289)	(0.296)	(0.282)	(0.292)
Widowed	-1.717	-1.738	-1.805	-1.796	-1.802	-1.789	-1.718	-1.742
	(1.453)	(1.231)	(1.416)	(1.222)	(1.390)	(1.202)	(1.451)	(1.231)
Unemployed	0.272	0.362	0.238	0.348	0.233	0.337	0.270	0.360
	(0.405)	(0.419)	(0.404)	(0.417)	(0.401)	(0.414)	(0.404)	(0.418)
NLF	0.527	0.667*	0.555	0.676*	0.550	0.670*	0.536	0.670*
	(0.412)	(0.391)	(0.419)	(0.393)	(0.417)	(0.392)	(0.412)	(0.391)
Retired	0.249	0.320	0.224	0.303	0.216	0.294	0.241	0.315
	(0.416)	(0.421)	(0.415)	(0.419)	(0.418)	(0.421)	(0.416)	(0.420)
Ln(Household Disposable Income)	0.199	0.0885	0.143	0.0541	0.166	0.0719	0.199	0.0880
	(0.133)	(0.139)	(0.135)	(0.141)	(0.138)	(0.143)	(0.133)	(0.139)
Degree	-0.715	-0.672	-0.702	-0.662	-0.655	-0.630	-0.713	-0.671
	(0.570)	(0.571)	(0.573)	(0.573)	(0.562)	(0.564)	(0.570)	(0.571)
Vocational Degree	0.00204	0.113	-0.00875	0.107	0.0170	0.119	-0.000162	0.112
	(0.450)	(0.439)	(0.457)	(0.447)	(0.448)	(0.438)	(0.450)	(0.440)
High School	0.583	0.693	0.570	0.684	0.595	0.696	0.577	0.689
	(0.814)	(0.819)	(0.809)	(0.814)	(0.799)	(0.803)	(0.813)	(0.819)
Excellent	3.457***	3.575***	3.497***	3.596***	3.531***	3.621***	3.462***	3.575***
	(0.691)	(0.671)	(0.684)	(0.668)	(0.681)	(0.664)	(0.690)	(0.670)
Very Good	2.950***	3.105***	3.005***	3.134***	3.020***	3.144***	2.957***	3.105***
	(0.667)	(0.648)	(0.661)	(0.646)	(0.658)	(0.643)	(0.666)	(0.647)
Good	2.351***	2.512***	2.417***	2.548***	2.426***	2.552***	2.356***	2.511***
	(0.653)	(0.631)	(0.645)	(0.629)	(0.643)	(0.626)	(0.652)	(0.631)
Fair	1.130*	1.349**	1.210**	1.392**	1.207**	1.391**	1.137*	1.350**
	(0.614)	(0.584)	(0.605)	(0.581)	(0.602)	(0.578)	(0.613)	(0.583)
Observations	3,777	3,777	3,777	3,777	3,777	3,777	3,777	3,777
Log Pseudo Likelihood	-1224.79	-1200.10	-1.221.45	-1198.63	-1219.88	-1197.73	-1224.59	-1200.04
Wald Chi^2 (p-value)	110.31	135.61	112.20	136.75	118.29	141.80	110.37	135.93
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R^2	0.086	0.105	0.087	0.106	0.090	0.106	0.086	0.105

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.9: The Determinants of Psychological Well-Being (*A2)*: HILDA – Fixed Effects Linear Regression Model

The dependent variable is the mental health component of the SF-36 questionnaire as measured on a 0 - 100 scale. A fixed effects linear regression model is used to analyse a sample from an unbalanced panel from 2002, 2006 and 2010 waves of the HILDA survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Prosperous		11.40*** (3.367)		11.46*** (3.388)		11.34*** (3.405)		11.42*** (3.397)
Subjective Financial Position - Very Comfortable		9.968*** (3.036)		9.964*** (3.052)		9.882*** (3.063)		9.988*** (3.055)
Subjective Financial Position - Relatively Comfortable		9.156*** (2.967)		9.169*** (2.980)		9.133*** (2.990)		9.176*** (2.984)
Subjective Financial Position - Get Along		6.745** (2.977)		6.762** (2.990)		6.756** (3.000)		6.764** (2.991)
Total Assets			0.461 (0.365)	0.273 (0.361)	0.427 (0.367)	0.241 (0.364)		
Total Debt			0.0503 (0.0716)	0.0786 (0.0715)				
Unsecured Debt					-0.0356 (0.0547)	-0.0183 (0.0546)		
Secured Debt					0.0419 (0.0569)	0.0578 (0.0566)		
Net Wealth							0.0242 (0.0984)	-0.00911 (0.0947)
Age	-0.402 (0.289)	-0.383 (0.285)	-0.545* (0.308)	-0.489 (0.303)	-0.557* (0.307)	-0.501* (0.303)	-0.412 (0.288)	-0.379 (0.284)
Age Squared /100	0.565* (0.302)	0.534* (0.299)	0.686** (0.317)	0.631** (0.313)	0.693** (0.316)	0.637** (0.312)	0.574* (0.301)	0.531* (0.297)
Ln(Household Size)	1.661* (0.987)	1.709* (0.981)	1.525 (0.992)	1.610 (0.987)	1.604 (0.999)	1.671* (0.994)	1.653* (0.988)	1.712* (0.981)
Divorced/Separated	-0.606 (1.635)	-0.215 (1.628)	-0.365 (1.643)	-0.0152 (1.633)	-0.293 (1.641)	0.0499 (1.630)	-0.604 (1.636)	-0.215 (1.628)
Widowed	-3.507 (5.065)	-1.569 (5.284)	-3.504 (5.052)	-1.522 (5.308)	-3.495 (4.994)	-1.514 (5.248)	-3.511 (5.061)	-1.562 (5.288)
Never Married	-1.785 (1.467)	-1.912 (1.457)	-1.811 (1.471)	-1.922 (1.458)	-1.726 (1.483)	-1.823 (1.470)	-1.778 (1.474)	-1.915 (1.461)
Unemployed	-5.482* (2.985)	-4.355 (3.050)	-5.456* (2.983)	-4.274 (3.056)	-5.539* (2.981)	-4.389 (3.061)	-5.482* (2.985)	-4.352 (3.050)
NLF	-0.338 (2.381)	0.428 (2.355)	-0.262 (2.408)	0.516 (2.386)	-0.355 (2.396)	0.400 (2.372)	-0.309 (2.373)	0.419 (2.349)
Retired	0.304 (1.977)	0.872 (1.935)	0.364 (1.988)	0.986 (1.950)	0.192 (1.985)	0.789 (1.944)	0.287 (1.979)	0.879 (1.936)
Ln(Household Disposable Income)	0.761 (0.659)	0.297 (0.667)	0.552 (0.668)	0.144 (0.668)	0.607 (0.664)	0.200 (0.663)	0.750 (0.663)	0.300 (0.669)
Degree	-6.825* (3.938)	-6.800* (3.970)	-6.674* (3.940)	-6.645* (3.980)	-6.617* (3.944)	-6.608* (3.983)	-6.825* (3.940)	-6.800* (3.970)
Vocational Degree	-2.816 (2.796)	-2.011 (2.866)	-2.716 (2.805)	-1.878 (2.879)	-2.720 (2.806)	-1.914 (2.882)	-2.815 (2.798)	-2.010 (2.866)
High School	-4.036 (4.250)	-3.032 (4.332)	-3.829 (4.266)	-2.832 (4.343)	-3.900 (4.280)	-2.937 (4.360)	-4.006 (4.261)	-3.041 (4.340)
Constant	77.43*** (8.952)	73.27*** (9.254)	77.00*** (9.008)	73.25*** (9.327)	77.50*** (9.107)	73.84*** (9.407)	77.52*** (8.947)	73.23*** (9.244)
Observations	4,106	4,106	4,106	4,106	4,106	4,106	4,106	4,106
Number of Groups	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182
R^2	0.012	0.038	0.014	0.039	0.014	0.040	0.012	0.039
F-Statistic (p-value)	2.26 (0.006)	2.65 (0.000)	2.11 (0.008)	2.49 (0.000)	2.05 (0.008)	2.36 (0.001)	2.12 (0.009)	2.52 (0.000)

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.10: The Determinants of Overall Life Satisfaction *(B1)*: BHPS – Fixed Effects Ordered Logit Model

The dependent variable analysed is overall life satisfaction measured on a 7 point scale. A fixed effects ordered logit model, estimated by the "Blow up and Cluster" estimator, is used to analyse a balanced panel from 2000 and 2005 waves of the BHPS.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Comfortable		1.095***		1.117***		1.137***		1.103***
		(0.356)		(0.352)		(0.353)		(0.357)
Subjective Financial Position - Alright		1.063***		1.077***		1.089***		1.062***
		(0.338)		(0.335)		(0.335)		(0.339)
Subjective Financial Position - Get By		0.720**		0.729**		0.737**		0.713**
		(0.324)		(0.320)		(0.320)		(0.325)
Subjective Financial Position - Quite Difficult		0.352		0.350		0.346		0.347
		(0.343)		(0.340)		(0.340)		(0.343)
Expected Financial Position - Better		0.293		0.292		0.283		0.296
		(0.187)		(0.188)		(0.188)		(0.188)
Expected Financial Position - Same		0.266		0.262		0.258		0.266
		(0.166)		(0.167)		(0.166)		(0.167)
Financial Position Compared to Previous Year - Better		0.0730		0.0704		0.0766		0.0645
		(0.145)		(0.146)		(0.146)		(0.146)
Financial Position Compared to Previous Year - Same		-0.0569		-0.0602		-0.0556		-0.0625
		(0.123)		(0.124)		(0.124)		(0.124)
Total Assets			-0.0253	-0.0325	-0.0312	-0.0387		
			(0.0228)	(0.0225)	(0.0238)	(0.0234)		
Total Debt			-0.00852	-0.00250				
			(0.0178)	(0.0181)				
Unsecured Debt					0.00264	0.0103		
					(0.0154)	(0.0157)		
Secured Debt					0.00648	0.00904		
					(0.0191)	(0.0193)		
Net Wealth							-0.0146	-0.0157
							(0.0120)	(0.0121)
Age	0.0414	0.0328	0.0515	0.0443	0.0511	0.0447	0.0517	0.0435
	(0.0405)	(0.0407)	(0.0417)	(0.0417)	(0.0418)	(0.0418)	(0.0417)	(0.0416)
Age Squared/100	-0.0695*	-0.0655*	-0.0766**	-0.0732*	-0.0751**	-0.0724*	-0.0762**	-0.0726*
	(0.0368)	(0.0373)	(0.0374)	(0.0378)	(0.0376)	(0.0379)	(0.0374)	(0.0376)
Ln(Household Size)	-0.0909	-0.129	-0.0697	-0.102	-0.0637	-0.0965	-0.0834	-0.122
	(0.196)	(0.188)	(0.200)	(0.193)	(0.200)	(0.193)	(0.198)	(0.190)
Divorced/Separated	-0.596**	-0.530*	-0.612**	-0.545**	-0.606**	-0.543**	-0.612**	-0.546**
	(0.278)	(0.274)	(0.281)	(0.277)	(0.282)	(0.277)	(0.282)	(0.276)
Widowed	-0.720*	-0.784**	-0.719*	-0.781*	-0.712*	-0.779*	-0.725*	-0.790**
	(0.399)	(0.399)	(0.406)	(0.404)	(0.404)	(0.403)	(0.403)	(0.402)
Never Married	-0.212	-0.263	-0.242	-0.295	-0.231	-0.284	-0.257	-0.315
	(0.361)	(0.372)	(0.363)	(0.373)	(0.363)	(0.376)	(0.369)	(0.381)
Unemployed	-0.0578	0.134	-0.0668	0.133	-0.0568	0.153	-0.0504	0.143
	(0.329)	(0.347)	(0.333)	(0.347)	(0.332)	(0.345)	(0.332)	(0.350)
NLF	-0.232	-0.111	-0.244	-0.116	-0.227	-0.0973	-0.236	-0.116
	(0.238)	(0.239)	(0.239)	(0.240)	(0.238)	(0.239)	(0.239)	(0.240)
Retired	0.228	0.280	0.213	0.271	0.233	0.292	0.220	0.270
	(0.257)	(0.261)	(0.258)	(0.262)	(0.258)	(0.263)	(0.257)	(0.261)
Ln(Household Monthly Income)	0.0945	0.0688	0.0963	0.0679	0.0920	0.0627	0.0949	0.0691
	(0.0737)	(0.0680)	(0.0745)	(0.0686)	(0.0741)	(0.0686)	(0.0746)	(0.0692)
Degree	0.964	0.926	0.863	0.817	0.883	0.836	0.933	0.888
	(0.745)	(0.739)	(0.763)	(0.757)	(0.754)	(0.745)	(0.754)	(0.745)
Vocational Degree	0.0333	0.0667	-0.0125	0.0160	-0.00461	0.0235	0.0109	0.0413
	(0.435)	(0.433)	(0.434)	(0.429)	(0.434)	(0.428)	(0.435)	(0.430)
A-Level	0.329	0.262	0.278	0.214	0.308	0.239	0.327	0.253
	(0.535)	(0.531)	(0.534)	(0.526)	(0.535)	(0.527)	(0.539)	(0.529)
GCSE	-0.459	-0.507	-0.474	-0.533	-0.489	-0.554	-0.484	-0.536
	(0.533)	(0.535)	(0.531)	(0.532)	(0.532)	(0.530)	(0.533)	(0.533)
Excellent	1.688***	1.569***	1.700***	1.576***	1.700***	1.572***	1.677***	1.556***
	(0.378)	(0.385)	(0.382)	(0.387)	(0.382)	(0.387)	(0.379)	(0.384)
Good	1.658***	1.507***	1.667***	1.510***	1.667***	1.506***	1.649***	1.495***
	(0.357)	(0.363)	(0.361)	(0.367)	(0.361)	(0.365)	(0.357)	(0.362)
Fair	1.054***	0.931**	1.060***	0.929**	1.057***	0.922**	1.043***	0.919**
	(0.355)	(0.364)	(0.359)	(0.367)	(0.360)	(0.366)	(0.356)	(0.363)
Poor	0.526	0.461	0.531	0.458	0.525	0.447	0.519	0.451
	(0.343)	(0.349)	(0.346)	(0.351)	(0.347)	(0.350)	(0.343)	(0.347)
Observations	4,610	4,610	4,610	4,610	4,610	4,610	4,610	4,610
Log Pseudo Likelihood	-1510.48	-1486.09	-1508.42	-1483.57	-1508.51	-1482.98	-1509.07	-1484.51
Wald Chi^2	72.62	85.38	73.09	87.70	74.19	89.83	74.08	87.05
(P-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R^2	0.055	0.070	0.056	0.071	0.056	0.072	0.056	0.071

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.11 The Determinants of Psychological Well-Being *(B2)*: BHPS – Fixed Effects Ordered Logit Model

The dependent variable analysed is psychological well-being measured by the GHQ12 on a 12 point scale. A fixed effects ordered logit model, estimated by the "Blow Up and Cluster" estimator, is used to analyse a balanced panel from 2000 and 2005 waves of the BHPS.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Comfortable		1.290*** (0.362)		1.368*** (0.359)		1.329*** (0.362)		1.309*** (0.365)
Subjective Financial Position -Alright		1.547*** (0.343)		1.613*** (0.338)		1.579*** (0.341)		1.552*** (0.345)
Subjective Financial Position -Get By		1.110*** (0.325)		1.200*** (0.320)		1.155*** (0.322)		1.116*** (0.326)
Subjective Financial Position -Quite Difficult		0.597 (0.368)		0.699* (0.361)		0.656* (0.364)		0.593 (0.371)
Expected Financial Position - Better		0.0560 (0.199)		0.0473 (0.196)		0.0570 (0.196)		0.0527 (0.199)
Expected Financial Position - Same		0.210 (0.181)		0.196 (0.178)		0.200 (0.179)		0.211 (0.182)
Financial Position Compared to Previous Year -Better		0.355** (0.161)		0.330** (0.161)		0.340** (0.160)		0.347** (0.161)
Financial Position Compared to Previous Year -Same		0.268** (0.136)		0.264* (0.136)		0.266** (0.136)		0.269** (0.136)
Total Assets			-0.0216 (0.0229)	-0.0259 (0.0219)	-0.0284 (0.0240)	-0.0337 (0.0231)		
Total Debt			-0.0505*** (0.0195)	-0.0455** (0.0204)				
Unsecured Debt					-0.0284 (0.0174)	-0.0185 (0.0178)		
Secured Debt					-0.0123 (0.0204)	-0.00700 (0.0207)		
Net wealth							-0.0125 (0.0131)	-0.0140 (0.0135)
Age	0.0495 (0.0448)	0.0426 (0.0446)	0.0545 (0.0454)	0.0501 (0.0451)	0.0551 (0.0455)	0.0517 (0.0451)	0.0608 (0.0461)	0.0548 (0.0456)
Age Squared	-0.0289 (0.0402)	-0.0312 (0.0405)	-0.0349 (0.0404)	-0.0386 (0.0408)	-0.0346 (0.0405)	-0.0386 (0.0408)	-0.0369 (0.0408)	-0.0399 (0.0411)
Ln(Household Size)	0.181 (0.223)	0.124 (0.224)	0.246 (0.218)	0.184 (0.224)	0.235 (0.218)	0.172 (0.224)	0.187 (0.220)	0.130 (0.223)
Divorced/Separated	0.0555 (0.321)	0.190 (0.300)	0.0554 (0.333)	0.184 (0.306)	0.0753 (0.329)	0.202 (0.305)	0.0572 (0.328)	0.191 (0.301)
Widowed	-0.856* (0.484)	-0.884* (0.491)	-0.776 (0.481)	-0.811* (0.487)	-0.793* (0.477)	-0.827* (0.483)	-0.842* (0.479)	-0.867* (0.486)
Never Married	0.548 (0.364)	0.567 (0.358)	0.543 (0.368)	0.567 (0.357)	0.551 (0.363)	0.571 (0.354)	0.533 (0.367)	0.549 (0.359)
Unemployed	-0.801** (0.317)	-0.484 (0.331)	-0.824*** (0.319)	-0.517 (0.332)	-0.825*** (0.318)	-0.509 (0.330)	-0.800** (0.317)	-0.484 (0.329)
NLF	-0.844*** (0.237)	-0.635** (0.250)	-0.850*** (0.238)	-0.656*** (0.252)	-0.854*** (0.238)	-0.653*** (0.253)	-0.843*** (0.239)	-0.636** (0.252)
Retired	-0.258 (0.293)	-0.183 (0.310)	-0.273 (0.299)	-0.206 (0.315)	-0.254 (0.294)	-0.186 (0.310)	-0.262 (0.291)	-0.186 (0.308)
Ln(Household Monthly Income)	0.0854 (0.0703)	0.0430 (0.0719)	0.0957 (0.0704)	0.0536 (0.0723)	0.0905 (0.0704)	0.0468 (0.0730)	0.0825 (0.0717)	0.0400 (0.0738)
Degree	1.514** (0.711)	1.361** (0.667)	1.485** (0.716)	1.311* (0.669)	1.520** (0.718)	1.322** (0.669)	1.467** (0.716)	1.298* (0.666)
Vocational Degree	0.701 (0.492)	0.664 (0.436)	0.664 (0.503)	0.611 (0.445)	0.680 (0.497)	0.624 (0.440)	0.657 (0.498)	0.603 (0.433)
A-Level	1.403** (0.616)	1.197** (0.590)	1.407** (0.621)	1.196** (0.591)	1.427** (0.618)	1.200** (0.589)	1.369** (0.622)	1.150* (0.589)
GCSE	0.545 (0.573)	0.214 (0.546)	0.536 (0.574)	0.186 (0.550)	0.537 (0.578)	0.187 (0.549)	0.496 (0.579)	0.151 (0.548)
Observations	10,126	10,126	10,126	10,126	10,126	10,126	10,126	10,126
Log Pseudo Likelihood	-3403.76	-3268.42	-3379.02	-3247.39	-3388.57	-3257.70	-3401.04	-3265.28
Wald Chi^2 (P-Value)	42.21 (0.000)	83.00 (0.000)	49.18 (0.000)	90.75 (0.000)	46.05 (0.000)	87.23 (0.000)	43.36 (0.000)	84.12 (0.000)
Pseudo R^2	0.030	0.069	0.037	0.075	0.034	0.072	0.031	0.070

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.12: The Determinants of Overall Life Satisfaction *(G1)*: GSOEP – Fixed Effects Ordered Logit Model

The dependent variable analysed is overall life satisfaction measured on an 11 point scale. A fixed effects ordered logit model, as estimated by the "Blow Up and Cluster" estimator, is used to analyse a balanced panel from 2002 and 2007 waves of the GSOEP Survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective financial Position – Concerned		0.815***		0.809***		0.810***		0.812***
		(0.0802)		(0.0802)		(0.0804)		(0.0806)
Subjective financial Position -Not Concerned		1.377***		1.370***		1.372***		1.373***
		(0.103)		(0.103)		(0.103)		(0.103)
Total Assets			0.0195**	0.0182**	0.0162**	0.0147*		
			(0.00771)	(0.00795)	(0.00778)	(0.00798)		
Total Debt			-0.0158**	-0.0110				
			(0.00722)	(0.00754)				
Unsecured Debt					-0.0268***	-0.0238***		
					(0.00819)	(0.00850)		
Secured Debt					-0.00150	0.00418		
					(0.00815)	(0.00849)		
Net Wealth							0.0179***	0.0165***
							(0.00561)	(0.00573)
Age	0.0154	0.0358	0.00390	0.0260	0.0179	0.0356	-0.000834	0.0209
	(0.0259)	(0.0267)	(0.0261)	(0.0270)	(0.0262)	(0.0270)	(0.0263)	(0.0271)
Age Squared/100	-0.0657***	-0.0763***	-0.0578**	-0.0690***	-0.0657***	-0.0741***	-0.0536**	-0.0649**
	(0.0241)	(0.0250)	(0.0243)	(0.0251)	(0.0244)	(0.0252)	(0.0244)	(0.0252)
Ln(Household Size)	0.0199	0.0397	0.0148	0.0344	-0.00588	0.0117	0.00320	0.0256
	(0.131)	(0.129)	(0.131)	(0.129)	(0.132)	(0.130)	(0.131)	(0.129)
Divorced/Separated	-0.394**	-0.362**	-0.394**	-0.357**	-0.398**	-0.360**	-0.376**	-0.345**
	(0.160)	(0.165)	(0.161)	(0.167)	(0.163)	(0.169)	(0.161)	(0.168)
Widower	0.104	0.0167	0.0802	-0.00449	0.0662	-0.0193	0.0872	0.000463
	(0.267)	(0.276)	(0.270)	(0.279)	(0.270)	(0.279)	(0.269)	(0.278)
Never Married	-0.275	-0.263	-0.289	-0.271	-0.286	-0.264	-0.273	-0.257
	(0.195)	(0.191)	(0.195)	(0.192)	(0.196)	(0.192)	(0.196)	(0.192)
Unemployed	-0.564***	-0.385***	-0.564***	-0.386***	-0.565***	-0.387***	-0.562***	-0.385***
	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)
NLF	0.117	0.151	0.119	0.152	0.118	0.151	0.125	0.158
	(0.101)	(0.103)	(0.102)	(0.103)	(0.102)	(0.103)	(0.102)	(0.103)
Retired	0.179	0.225	0.175	0.219	0.170	0.216	0.184	0.227
	(0.142)	(0.145)	(0.143)	(0.145)	(0.143)	(0.145)	(0.143)	(0.145)
Ln(Annual Household Income)	0.439***	0.349***	0.427***	0.337***	0.431***	0.341***	0.427***	0.338***
	(0.0968)	(0.0919)	(0.0970)	(0.0923)	(0.0972)	(0.0926)	(0.0962)	(0.0918)
Tertiary Qualification	0.0494	-0.0232	-0.00958	-0.0656	-0.0194	-0.0654	0.0194	-0.0462
	(0.588)	(0.690)	(0.599)	(0.698)	(0.621)	(0.718)	(0.590)	(0.694)
Vocational Qualification	0.482	0.347	0.456	0.331	0.424	0.305	0.464	0.336
	(0.449)	(0.511)	(0.451)	(0.512)	(0.467)	(0.527)	(0.448)	(0.512)
Intermediate Qualification	-0.0294	-0.198	-0.0499	-0.202	-0.0758	-0.231	-0.0498	-0.210
	(0.615)	(0.677)	(0.616)	(0.674)	(0.632)	(0.691)	(0.611)	(0.673)
Basic Qualification	-0.178	-0.363	-0.184	-0.361	-0.151	-0.332	-0.182	-0.364
	(0.643)	(0.567)	(0.640)	(0.570)	(0.633)	(0.555)	(0.633)	(0.560)
Poor	1.089***	1.087***	1.090***	1.086***	1.081***	1.079***	1.094***	1.091***
	(0.167)	(0.167)	(0.166)	(0.167)	(0.166)	(0.166)	(0.166)	(0.166)
Fair	1.812***	1.780***	1.814***	1.782***	1.806***	1.773***	1.817***	1.784***
	(0.176)	(0.176)	(0.175)	(0.176)	(0.175)	(0.175)	(0.175)	(0.175)
Good	2.588***	2.500***	2.588***	2.500***	2.580***	2.493***	2.587***	2.500***
	(0.184)	(0.184)	(0.183)	(0.184)	(0.183)	(0.183)	(0.183)	(0.183)
Very Good	3.084***	2.928***	3.086***	2.929***	3.082***	2.928***	3.088***	2.931***
	(0.214)	(0.215)	(0.214)	(0.215)	(0.213)	(0.215)	(0.214)	(0.215)
Observations	18,620	18,620	18,620	18,620	18,620	18,620	18,620	18,620
Log Pseudo Likelihood	-5643.52	-5412.13	-5632.65	-5404.78	-5625.16	5397.48	-5630.60	-5401.86
Wald Chi^2 (P-Value)	502.22	651.95	515.53	664.37	518.25	663.06	520.01	672.62
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R^2	0.126	0.161	0.127	0.163	0.128	0.164	0.128	0.163

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1

Table A3.13: The Determinants of Psychological Well-Being *(G2)*: GSOEP – Linear Regression Model

The dependent variable analysed is psychological well-being measured on a 0-100 scale. OLS is used to analyse the 2002 wave of the GSOEP Survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position -Concerned		4.068***		3.948***		3.921***		3.957***
		(0.350)		(0.350)		(0.350)		(0.350)
Subjective Financial Position -Not Concerned		7.472***		7.271***		7.229***		7.285***
		(0.374)		(0.377)		(0.377)		(0.377)
Total Assets			0.161***	0.0807***	0.138***	0.0642**		
			(0.0258)	(0.0253)	(0.0269)	(0.0264)		
Total Debt			-0.115***	-0.0833***				
			(0.0242)	(0.0235)				
Unsecured Debt					-0.170***	-0.119***		
					(0.0323)	(0.0313)		
Secured Debt					-0.0430*	-0.0301		
					(0.0260)	(0.0251)		
Net Wealth							0.115***	0.0546***
							(0.0181)	(0.0178)
Age	-0.198***	-0.102	-0.216***	-0.111*	-0.222***	-0.116*	-0.227***	-0.118*
	(0.0667)	(0.0639)	(0.0664)	(0.0640)	(0.0665)	(0.0641)	(0.0666)	(0.0641)
Age Squared / 100	0.284***	0.167**	0.284***	0.166**	0.290***	0.171**	0.298***	0.176***
	(0.0694)	(0.0665)	(0.0692)	(0.0665)	(0.0692)	(0.0666)	(0.0692)	(0.0666)
Female	-1.960***	-1.713***	-1.934***	-1.709***	-1.959***	-1.728***	-1.925***	-1.702***
	(0.265)	(0.257)	(0.264)	(0.257)	(0.264)	(0.257)	(0.264)	(0.257)
Ln(household Size)	-1.556***	-0.656*	-1.422***	-0.605*	-1.413***	-0.604*	-1.452***	-0.628*
	(0.347)	(0.338)	(0.346)	(0.338)	(0.346)	(0.338)	(0.347)	(0.339)
Divorced/Separated	-2.250***	-1.728***	-1.997***	-1.620***	-1.946***	-1.587***	-1.979***	-1.613***
	(0.420)	(0.407)	(0.419)	(0.408)	(0.419)	(0.408)	(0.420)	(0.408)
Widowed	-2.384***	-2.633***	-2.291***	-2.570***	-2.269***	-2.555***	-2.328***	-2.600***
	(0.554)	(0.536)	(0.553)	(0.536)	(0.553)	(0.536)	(0.554)	(0.537)
Never Married	-1.385***	-1.220***	-1.449***	-1.298***	-1.405***	-1.263***	-1.341***	-1.203***
	(0.448)	(0.437)	(0.449)	(0.439)	(0.450)	(0.440)	(0.448)	(0.438)
Unemployed	-0.983*	0.720	-0.870	0.698	-0.866	0.693	-0.839	0.744
	(0.587)	(0.595)	(0.584)	(0.593)	(0.583)	(0.593)	(0.584)	(0.593)
NLF	-0.735*	-0.741**	-0.818**	-0.803**	-0.796**	-0.786**	-0.767**	-0.757**
	(0.375)	(0.363)	(0.374)	(0.363)	(0.374)	(0.363)	(0.373)	(0.363)
Retired	-0.366	-0.357	-0.458	-0.433	-0.422	-0.404	-0.345	-0.348
	(0.584)	(0.559)	(0.583)	(0.560)	(0.583)	(0.560)	(0.583)	(0.559)
Ln(Household Income)	1.850***	0.686***	1.545***	0.618**	1.527***	0.606**	1.460***	0.530**
	(0.256)	(0.244)	(0.270)	(0.256)	(0.269)	(0.256)	(0.260)	(0.248)
Tertiary Qualification	-0.115	-0.654**	-0.143	-0.648**	-0.159	-0.657**	-0.177	-0.670**
	(0.323)	(0.315)	(0.323)	(0.315)	(0.323)	(0.315)	(0.323)	(0.315)
Vocational Qualification	-0.309	-0.757**	-0.346	-0.748**	-0.375	-0.767**	-0.402	-0.790**
	(0.319)	(0.308)	(0.317)	(0.308)	(0.318)	(0.308)	(0.318)	(0.308)
Intermediate Qualification	-0.527	-1.308*	-0.633	-1.351*	-0.708	-1.398*	-0.681	-1.362*
	(0.822)	(0.782)	(0.815)	(0.779)	(0.817)	(0.781)	(0.816)	(0.781)
Basic Qualification	0.153	0.264	0.193	0.292	0.178	0.279	0.139	0.255
	(0.749)	(0.722)	(0.745)	(0.720)	(0.746)	(0.721)	(0.747)	(0.722)
Constant	36.43***	41.57***	39.51***	42.52***	39.95***	42.84***	40.59***	43.42***
	(2.797)	(2.638)	(2.900)	(2.730)	(2.899)	(2.735)	(2.837)	(2.685)
Observations	7,598	7,598	7,598	7,598	7,598	7,598	7,598	7,598
R-squared	0.062	0.117	0.068	0.119	0.069	0.119	0.067	0.118

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.14: The Determinants of Overall Life Satisfaction (*A1)*: HILDA – Random Effects Ordered Probit Model

The dependent variable is overall life satisfaction as measured on a 6 point scale. A random effects ordered probit model is used to analyse an unbalanced panel from 2002, 2006 and 2010 waves of the HILDA survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position- Prosperous		1.284***		1.269***		1.265***		1.298***
		(0.235)		(0.238)		(0.238)		(0.236)
Subjective Financial Position- Very Comfortable		1.199***		1.187***		1.185***		1.210***
		(0.181)		(0.184)		(0.183)		(0.183)
Subjective Financial Position- Relatively Comfortable		0.889***		0.881***		0.879***		0.900***
		(0.171)		(0.173)		(0.173)		(0.173)
Subjective Financial Position- Get Along		0.409**		0.404**		0.403**		0.418**
		(0.170)		(0.170)		(0.170)		(0.171)
Total Assets			0.0710***	0.0120	0.0718***	0.0128		
			(0.0247)	(0.0252)	(0.0259)	(0.0264)		
Total Debt			-0.00714	0.000491				
			(0.00568)	(0.00571)				
Unsecured Debt					-0.00515	-0.000429		
					(0.00484)	(0.00484)		
Secured Debt					-0.00408	-0.000146		
					(0.00457)	(0.00457)		
Net Wealth							0.00439	-0.00307
							(0.00670)	(0.00675)
Female	0.0997	0.110	0.106	0.111	0.107	0.111	0.100	0.110
	(0.0718)	(0.0710)	(0.0720)	(0.0711)	(0.0720)	(0.0711)	(0.0718)	(0.0710)
Age	-0.0770***	-0.0661***	-0.0865***	-0.0683***	-0.0869***	-0.0683***	-0.0784***	-0.0651***
	(0.0148)	(0.0148)	(0.0154)	(0.0153)	(0.0154)	(0.0154)	(0.0150)	(0.0149)
Age Squared / 100	0.107***	0.0931***	0.114***	0.0949***	0.114***	0.0948***	0.109***	0.0922***
	(0.0165)	(0.0164)	(0.0169)	(0.0168)	(0.0169)	(0.0169)	(0.0166)	(0.0166)
Ln(Household Size)	-0.0860	-0.0120	-0.0923	-0.0146	-0.0887	-0.0140	-0.0867	-0.0113
	(0.0626)	(0.0627)	(0.0628)	(0.0629)	(0.0631)	(0.0632)	(0.0626)	(0.0627)
Divorced/Separated	-0.657***	-0.559***	-0.630***	-0.554***	-0.631***	-0.554***	-0.655***	-0.560***
	(0.0933)	(0.0931)	(0.0940)	(0.0937)	(0.0941)	(0.0938)	(0.0933)	(0.0931)
Widowed	-0.842***	-0.737***	-0.843***	-0.739***	-0.841***	-0.739***	-0.843***	-0.735***
	(0.240)	(0.238)	(0.240)	(0.238)	(0.240)	(0.238)	(0.240)	(0.238)
Never Married	-0.499***	-0.477***	-0.495***	-0.475***	-0.497***	-0.476***	-0.497***	-0.479***
	(0.0919)	(0.0914)	(0.0921)	(0.0916)	(0.0925)	(0.0919)	(0.0919)	(0.0915)
Unemployed	0.0761	0.233	0.105	0.239	0.110	0.238	0.0797	0.232
	(0.207)	(0.209)	(0.208)	(0.210)	(0.208)	(0.210)	(0.207)	(0.209)
NLF	0.289	0.407**	0.297	0.410**	0.300	0.409**	0.294	0.405**
	(0.183)	(0.184)	(0.184)	(0.184)	(0.184)	(0.184)	(0.183)	(0.184)
Retired	0.416**	0.443**	0.414**	0.445**	0.418**	0.443**	0.413**	0.445**
	(0.194)	(0.194)	(0.195)	(0.194)	(0.195)	(0.194)	(0.194)	(0.194)
Ln(Disposable Household Income)	0.150***	0.0104	0.102*	0.00188	0.104*	0.00270	0.145***	0.0129
	(0.0502)	(0.0517)	(0.0536)	(0.0543)	(0.0538)	(0.0545)	(0.0506)	(0.0520)
Degree	-0.220**	-0.333***	-0.260***	-0.339***	-0.260***	-0.339***	-0.222**	-0.331***
	(0.0921)	(0.0917)	(0.0934)	(0.0927)	(0.0934)	(0.0927)	(0.0922)	(0.0918)
Vocational Degree	-0.00247	-0.0449	-0.0326	-0.0495	-0.0315	-0.0498	-0.00481	-0.0435
	(0.0904)	(0.0895)	(0.0912)	(0.0901)	(0.0912)	(0.0901)	(0.0905)	(0.0895)
High School	-0.135	-0.177	-0.161	-0.181	-0.159	-0.181	-0.136	-0.176
	(0.117)	(0.116)	(0.118)	(0.116)	(0.118)	(0.116)	(0.117)	(0.116)
Excellent	2.137***	1.966***	2.118***	1.965***	2.117***	1.965***	2.136***	1.966***
	(0.259)	(0.259)	(0.259)	(0.259)	(0.259)	(0.259)	(0.259)	(0.259)
Very Good	1.664***	1.523***	1.646***	1.521***	1.645***	1.521***	1.664***	1.523***
	(0.252)	(0.252)	(0.253)	(0.252)	(0.253)	(0.252)	(0.252)	(0.252)
Good	1.163***	1.066***	1.151***	1.066***	1.150***	1.065***	1.163***	1.066***
	(0.251)	(0.251)	(0.252)	(0.251)	(0.252)	(0.251)	(0.251)	(0.251)
Fair	0.392	0.351	0.387	0.350	0.385	0.350	0.393	0.350
	(0.254)	(0.253)	(0.254)	(0.253)	(0.254)	(0.253)	(0.254)	(0.253)
Cut 1	-1.819***	-2.522***	-1.835***	-2.530***	-1.804***	-2.523***	-1.856***	-2.493***
	(0.642)	(0.662)	(0.644)	(0.664)	(0.648)	(0.668)	(0.644)	(0.665)
Cut 2	-1.041	-1.726***	-1.054	-1.733***	-1.022	-1.726***	-1.077*	-1.698**
	(0.641)	(0.661)	(0.643)	(0.663)	(0.647)	(0.668)	(0.643)	(0.664)
Cut 3	-0.337	-1.008	-0.348	-1.015	-0.315	-1.008	-0.373	-0.980
	(0.641)	(0.662)	(0.643)	(0.663)	(0.647)	(0.668)	(0.643)	(0.665)
Cut 4	0.961	0.304	0.953	0.299	0.985	0.306	0.925	0.333
	(0.642)	(0.663)	(0.643)	(0.664)	(0.648)	(0.669)	(0.644)	(0.666)
Cut 5	2.552***	1.909***	2.547***	1.904***	2.580***	1.911***	2.516***	1.938***
	(0.643)	(0.664)	(0.645)	(0.666)	(0.649)	(0.670)	(0.646)	(0.667)
Cut 6	3.976***	3.339***	3.973***	3.335***	4.005***	3.342***	3.940***	3.368***
	(0.645)	(0.666)	(0.647)	(0.668)	(0.651)	(0.672)	(0.648)	(0.669)
rho	0.515***	0.505***	0.516***	0.505***	0.516***	0.505***	0.515***	0.505***
	(0.0179)	(0.0182)	(0.0179)	(0.0183)	(0.0179)	(0.0183)	(0.0179)	(0.0182)
Observations	4,106	4,106	4,106	4,106	4,106	4,106	4,106	4,106
LR Chi^2	548.36	666.17	557.43	666.14	557.85	666.44	549.06	666.38
Log Likelihood	-5718.80	-5660.03	-5714.41	-5659.90	-5714.19	-5659.90	-5718.59	-5659.93

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.15: The Determinants of Psychological Well-Being (*A2)*: HILDA – Random Effects Linear Regression Model

The dependent variable is the mental health component of the SF-36 questionnaire as measured on a 0 - 100 scale. A random effects linear regression model is used to analyse a sample from an unbalanced panel from 2002, 2006 and 2010 waves of the HILDA survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Prosperous		16.07*** (2.635)		16.03*** (2.659)		16.07*** (2.668)		16.14*** (2.655)
Subjective Financial Position - Very Comfortable		14.77*** (2.343)		14.74*** (2.363)		14.73*** (2.367)		14.83*** (2.361)
Subjective Financial Position - Relatively Comfortable		12.82*** (2.293)		12.80*** (2.305)		12.80*** (2.308)		12.88*** (2.306)
Subjective Financial Position - Get Along		8.414*** (2.347)		8.396*** (2.352)		8.401*** (2.354)		8.459*** (2.357)
Total Assets			0.618** (0.261)	0.0436 (0.260)	0.574** (0.269)	-0.00339 (0.268)		
Total Debt			-0.0662 (0.0569)	0.00217 (0.0561)				
Unsecured Debt					-0.0613 (0.0454)	-0.0184 (0.0451)		
Secured Debt					-0.0137 (0.0463)	0.0221 (0.0456)		
Net Wealth							0.0752 (0.0761)	-0.0148 (0.0718)
Age	-0.467*** (0.178)	-0.348** (0.175)	-0.548*** (0.186)	-0.355* (0.183)	-0.558*** (0.187)	-0.362** (0.183)	-0.491*** (0.181)	-0.342* (0.176)
Age Squared / 100	0.644*** (0.202)	0.494** (0.198)	0.695*** (0.209)	0.501** (0.205)	0.708*** (0.210)	0.509** (0.206)	0.664*** (0.204)	0.490** (0.199)
Female	-0.536 (0.734)	-0.437 (0.723)	-0.479 (0.734)	-0.434 (0.723)	-0.468 (0.734)	-0.431 (0.723)	-0.523 (0.733)	-0.439 (0.723)
Ln(Household Size)	-0.331 (0.656)	0.253 (0.656)	-0.389 (0.657)	0.242 (0.657)	-0.328 (0.662)	0.273 (0.662)	-0.343 (0.658)	0.256 (0.656)
Divorced/Separated	-2.572** (1.047)	-1.628 (1.035)	-2.332** (1.057)	-1.610 (1.041)	-2.308** (1.055)	-1.582 (1.038)	-2.534** (1.050)	-1.634 (1.038)
Widowed	-5.410** (2.665)	-4.208 (2.652)	-5.405** (2.668)	-4.220 (2.659)	-5.402** (2.670)	-4.230 (2.664)	-5.426** (2.670)	-4.201 (2.653)
Never Married	-2.321** (0.949)	-2.087** (0.929)	-2.285** (0.959)	-2.080** (0.933)	-2.250** (0.966)	-2.035** (0.938)	-2.283** (0.954)	-2.094** (0.931)
Unemployed	-7.666*** (2.578)	-5.336** (2.629)	-7.457*** (2.551)	-5.316** (2.622)	-7.402*** (2.551)	-5.320** (2.628)	-7.609*** (2.575)	-5.339** (2.628)
NLF	-1.843 (1.959)	-0.310 (2.004)	-1.812 (1.975)	-0.302 (2.014)	-1.776 (1.975)	-0.313 (2.010)	-1.761 (1.950)	-0.320 (2.003)
Retired	-0.0921 (1.819)	0.367 (1.787)	-0.130 (1.823)	0.376 (1.790)	-0.133 (1.823)	0.322 (1.787)	-0.137 (1.821)	0.378 (1.788)
Ln(Household Disposable Income)	1.836*** (0.540)	0.596 (0.533)	1.436** (0.586)	0.565 (0.561)	1.469** (0.584)	0.587 (0.558)	1.762*** (0.546)	0.607 (0.537)
Degree	0.509 (0.962)	-0.598 (0.926)	0.139 (0.975)	-0.622 (0.938)	0.158 (0.976)	-0.611 (0.938)	0.458 (0.964)	-0.590 (0.928)
Vocational Degree	1.848** (0.938)	1.350 (0.907)	1.575* (0.946)	1.332 (0.917)	1.597* (0.947)	1.343 (0.917)	1.807* (0.939)	1.357 (0.909)
High School	0.803 (1.225)	0.324 (1.197)	0.566 (1.227)	0.307 (1.199)	0.596 (1.227)	0.321 (1.199)	0.779 (1.225)	0.327 (1.197)
Constant	63.72*** (6.634)	63.42*** (6.687)	63.50*** (6.675)	63.43*** (6.737)	63.63*** (6.790)	63.82*** (6.837)	64.30*** (6.667)	63.28*** (6.735)
Observations	4,106	4,106	4,106	4,106	4,106	4,106	4,106	4,106
Number of Groups	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828
Overall R^2	0.0422	0.0849	0.0445	0.0848	0.0439	0.0846	0.0427	0.0850
Wald Chi^2	88.44	187.63	96.98	187.75	96.17	188.23	90.22	187.77
Prob $Chi^2 > 0$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.16: The Determinants of Overall Life Satisfaction (*B1)*: BHPS – Random Effects Ordered Probit Model

The dependent variable analysed is overall life satisfaction measured on a 7 point scale. A random effects probit model is used to analyse a balanced panel from 2000 and 2005 waves of the BHPS.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Comfortable		1.222***		1.205***		1.208***		1.217***
		(0.145)		(0.146)		(0.146)		(0.146)
Subjective Financial Position - Alright		1.050***		1.038***		1.040***		1.046***
		(0.141)		(0.142)		(0.142)		(0.142)
Subjective Financial Position - Get By		0.718***		0.712***		0.712***		0.716***
		(0.138)		(0.139)		(0.139)		(0.139)
Subjective Financial Position - Quite Difficult		0.333**		0.330**		0.327**		0.332**
		(0.154)		(0.154)		(0.154)		(0.154)
Expected Financial Position - Better		0.209***		0.213***		0.213***		0.210***
		(0.0700)		(0.0701)		(0.0701)		(0.0700)
Expected Financial Position - Same		0.197***		0.198***		0.198***		0.197***
		(0.0616)		(0.0617)		(0.0617)		(0.0617)
Financial Position Compared to Previous Year -Better		0.113**		0.114**		0.114**		0.114**
		(0.0574)		(0.0576)		(0.0576)		(0.0576)
Financial Position Compared to Previous Year -Same		0.0596		0.0582		0.0597		0.0602
		(0.0492)		(0.0493)		(0.0493)		(0.0493)
Total Assets			0.0137**	0.00412	0.0139**	0.00501		
			(0.00600)	(0.00595)	(0.00637)	(0.00631)		
Total Debt			-0.0179***	-0.0100*				
			(0.00568)	(0.00561)				
Unsecured Debt					-0.00993*	-0.00120		
					(0.00572)	(0.00569)		
Secured Debt					-0.0114**	-0.00814		
					(0.00560)	(0.00549)		
Net Wealth							0.00723*	0.00140
							(0.00380)	(0.00377)
Age	-0.0201**	-0.0166*	-0.0247***	-0.0183**	-0.0250***	-0.0180**	-0.0236***	-0.0172*
	(0.00893)	(0.00872)	(0.00905)	(0.00885)	(0.00907)	(0.00887)	(0.00910)	(0.00889)
Age Squared/100	0.0250***	0.0191**	0.0266***	0.0194**	0.0272***	0.0195**	0.0274***	0.0196**
	(0.00841)	(0.00818)	(0.00845)	(0.00824)	(0.00845)	(0.00824)	(0.00849)	(0.00828)
Female	-0.120*	-0.104*	-0.118*	-0.107*	-0.118*	-0.107*	-0.113*	-0.103*
	(0.0621)	(0.0599)	(0.0622)	(0.0602)	(0.0622)	(0.0602)	(0.0621)	(0.0600)
Ln(Household Size)	-0.00433	0.0508	0.00638	0.0547	0.00606	0.0539	-0.00116	0.0511
	(0.0572)	(0.0561)	(0.0572)	(0.0561)	(0.0572)	(0.0561)	(0.0572)	(0.0561)
Unemployed	-0.204	-0.00920	-0.209	-0.0205	-0.208	-0.0162	-0.188	-0.00643
	(0.131)	(0.130)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)
NLF	-0.202***	-0.0910	-0.215***	-0.106	-0.214***	-0.105	-0.186**	-0.0879
	(0.0776)	(0.0768)	(0.0788)	(0.0781)	(0.0789)	(0.0782)	(0.0780)	(0.0772)

Table A3.17: The Determinants of Overall Life Satisfaction (*B1)*: BHPS – Random Effects Ordered Probit Model *(Continued)*

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Retired	0.351***	0.392***	0.314***	0.370***	0.322***	0.374***	0.354***	0.393***
	(0.0763)	(0.0748)	(0.0773)	(0.0759)	(0.0771)	(0.0758)	(0.0763)	(0.0748)
Divorced/Separated	-0.330***	-0.270***	-0.306***	-0.264***	-0.306***	-0.266***	-0.313***	-0.267***
	(0.0751)	(0.0734)	(0.0756)	(0.0739)	(0.0756)	(0.0739)	(0.0756)	(0.0738)
Widowed	-0.137	-0.159*	-0.135	-0.158*	-0.133	-0.159*	-0.135	-0.158*
	(0.0928)	(0.0902)	(0.0926)	(0.0902)	(0.0926)	(0.0902)	(0.0927)	(0.0902)
Never Married	-0.191**	-0.199**	-0.194**	-0.204***	-0.195**	-0.206***	-0.179**	-0.196**
	(0.0806)	(0.0785)	(0.0808)	(0.0788)	(0.0808)	(0.0789)	(0.0807)	(0.0787)
Ln(Household Monthly Income)	0.0538**	-0.00826	0.0554**	-0.00435	0.0544**	-0.00512	0.0495*	-0.00888
	(0.0271)	(0.0272)	(0.0273)	(0.0274)	(0.0273)	(0.0274)	(0.0272)	(0.0272)
Degree	-0.406***	-0.478***	-0.418***	-0.473***	-0.417***	-0.475***	-0.428***	-0.482***
	(0.0797)	(0.0777)	(0.0813)	(0.0792)	(0.0812)	(0.0792)	(0.0804)	(0.0784)
Vocational Degree	-0.202***	-0.229***	-0.215***	-0.229***	-0.215***	-0.231***	-0.217***	-0.232***
	(0.0616)	(0.0600)	(0.0626)	(0.0609)	(0.0626)	(0.0609)	(0.0621)	(0.0604)
A-Level	-0.218**	-0.264***	-0.233***	-0.264***	-0.233***	-0.267***	-0.235***	-0.267***
	(0.0850)	(0.0825)	(0.0857)	(0.0833)	(0.0857)	(0.0833)	(0.0853)	(0.0829)
GCSE	-0.211***	-0.246***	-0.227***	-0.248***	-0.227***	-0.250***	-0.223***	-0.248***
	(0.0731)	(0.0709)	(0.0736)	(0.0714)	(0.0735)	(0.0714)	(0.0733)	(0.0711)
Excellent	2.029***	1.828***	2.012***	1.827***	2.010***	1.828***	2.012***	1.826***
	(0.143)	(0.142)	(0.143)	(0.142)	(0.143)	(0.142)	(0.143)	(0.142)
Good	1.728***	1.537***	1.713***	1.536***	1.710***	1.536***	1.712***	1.534***
	(0.138)	(0.137)	(0.138)	(0.137)	(0.138)	(0.137)	(0.138)	(0.137)
Fair	1.198***	1.053***	1.191***	1.054***	1.189***	1.053***	1.188***	1.052***
	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)
Poor	0.622***	0.514***	0.621***	0.516***	0.622***	0.517***	0.615***	0.513***
	(0.141)	(0.141)	(0.141)	(0.141)	(0.141)	(0.141)	(0.141)	(0.141)
Cut 1	-1.733***	-1.124***	-1.903***	-1.206***	-1.886***	-1.170***	-1.827***	-1.142***
	(0.339)	(0.356)	(0.342)	(0.359)	(0.342)	(0.359)	(0.342)	(0.359)
Cut 2	-1.149***	-0.539	-1.320***	-0.620*	-1.303***	-0.585	-1.243***	-0.556
	(0.337)	(0.355)	(0.340)	(0.358)	(0.340)	(0.358)	(0.340)	(0.358)
Cut 3	-0.413	0.207	-0.583*	0.125	-0.567*	0.160	-0.506	0.190
	(0.336)	(0.355)	(0.339)	(0.358)	(0.339)	(0.358)	(0.339)	(0.358)
Cut 4	0.485	1.113***	0.314	1.032***	0.329	1.066***	0.391	1.096***
	(0.336)	(0.355)	(0.339)	(0.358)	(0.339)	(0.358)	(0.339)	(0.358)
Cut 5	1.694***	2.326***	1.523***	2.245***	1.538***	2.279***	1.599***	2.309***
	(0.336)	(0.356)	(0.339)	(0.359)	(0.340)	(0.359)	(0.340)	(0.359)
Cut 6	3.111***	3.734***	2.940***	3.654***	2.954***	3.686***	3.015***	3.716***
	(0.339)	(0.358)	(0.342)	(0.361)	(0.342)	(0.362)	(0.342)	(0.361)
Rho	0.450***	0.416***	0.448***	0.416***	0.447***	0.415***	0.448***	0.416***
	(0.0178)	(0.0186)	(0.0179)	(0.0186)	(0.0179)	(0.0186)	(0.0178)	(0.0186)
Observations	5,270	5,270	5,270	5,270	5,270	5,270	5,270	5,270
Log Likelihood	-7,782.12	-7,676.67	-7,773.19	-7,675.07	-7,777.22	-7,675.51	-7,780.32	-7,676.60
LR Chi^2 (P-Value)	717.74	928.63	729.60	931.84	727.55	930.96	721.35	928.77
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A3.18: The Determinants of Psychological Well-Being (*B2)*: BHPS – Random Effects Ordered Probit Model

The dependent variable analysed is psychological well-being measured by the GHQ12 on a 12 point scale. A random effects ordered probit model is used to analyse a balanced panel from 2000 and 2005 waves of the BHPS.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Comfortable		1.334*** (0.141)		1.304*** (0.143)		1.299*** (0.143)		1.327*** (0.143)
Subjective Financial Position - Alright		1.325*** (0.138)		1.304*** (0.139)		1.301*** (0.139)		1.320*** (0.138)
Subjective Financial Position - Get By		0.921*** (0.134)		0.910*** (0.134)		0.904*** (0.135)		0.917*** (0.134)
Subjective Financial Position - Quite Difficult		0.438*** (0.149)		0.432*** (0.149)		0.430*** (0.149)		0.436*** (0.149)
Expected Financial Position - Better		-0.00372 (0.0735)		0.00245 (0.0736)		0.00636 (0.0736)		-0.00242 (0.0735)
Expected Financial Position - Same		0.159** (0.0650)		0.159** (0.0651)		0.162** (0.0651)		0.159** (0.0650)
Financial Position Compared to Previous Year -Better		0.182*** (0.0616)		0.184*** (0.0618)		0.185*** (0.0618)		0.184*** (0.0618)
Financial Position Compared to Previous Year -Same		0.243*** (0.0524)		0.240*** (0.0524)		0.241*** (0.0524)		0.244*** (0.0524)
Total Assets			0.0182*** (0.00619)	0.00569 (0.00615)	0.0150** (0.00662)	0.00391 (0.00656)		
Total Debt			-0.0311*** (0.00618)	-0.0200*** (0.00609)				
Unsecured Debt					-0.0251*** (0.00619)	-0.0115* (0.00616)		
Secured Debt					-0.0123** (0.00608)	-0.00854 (0.00594)		
Net Wealth							0.00999** (0.00396)	0.00160 (0.00394)
Age	0.0238** (0.00926)	0.0262*** (0.00900)	0.0172* (0.00936)	0.0234** (0.00914)	0.0165* (0.00938)	0.0236*** (0.00916)	0.0192** (0.00940)	0.0255*** (0.00916)
Age Squared / 100	-0.0159* (0.00869)	-0.0229*** (0.00841)	-0.0140 (0.00871)	-0.0225*** (0.00847)	-0.0127 (0.00871)	-0.0220*** (0.00847)	-0.0128 (0.00874)	-0.0224*** (0.00850)
Female	-0.345*** (0.0644)	-0.335*** (0.0618)	-0.351*** (0.0645)	-0.346*** (0.0622)	-0.348*** (0.0645)	-0.344*** (0.0622)	-0.336*** (0.0642)	-0.334*** (0.0619)
Ln(Household Size)	0.0514 (0.0606)	0.0982* (0.0592)	0.0690 (0.0606)	0.106* (0.0593)	0.0666 (0.0605)	0.103* (0.0593)	0.0558 (0.0605)	0.0986* (0.0592)
Divorced/Separated	-0.183** (0.0792)	-0.104 (0.0772)	-0.147* (0.0798)	-0.0930 (0.0779)	-0.145* (0.0798)	-0.0953 (0.0779)	-0.157** (0.0797)	-0.0998 (0.0778)
Widowed	-0.190* (0.0972)	-0.200** (0.0940)	-0.184* (0.0970)	-0.198** (0.0941)	-0.179* (0.0969)	-0.197** (0.0941)	-0.185* (0.0969)	-0.200** (0.0940)
Never Married	0.177** (0.0863)	0.180** (0.0838)	0.170** (0.0864)	0.169** (0.0842)	0.172** (0.0865)	0.170** (0.0843)	0.194** (0.0864)	0.183** (0.0841)

Table A3.19: The Determinants of Psychological Well-Being (*B2)*: BHPS – Random Effects Ordered Probit Model *(Continued)*

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Unemployed	-0.593*** (0.134)	-0.299** (0.133)	-0.608*** (0.134)	-0.326** (0.134)	-0.609*** (0.134)	-0.323** (0.134)	-0.566*** (0.134)	-0.295** (0.134)
NLF	-0.691*** (0.0773)	-0.544*** (0.0763)	-0.719*** (0.0791)	-0.579*** (0.0782)	-0.708*** (0.0792)	-0.570*** (0.0783)	-0.662*** (0.0780)	-0.540*** (0.0770)
Retired	-0.00967 (0.0824)	0.0424 (0.0804)	-0.0739 (0.0836)	-0.00329 (0.0818)	-0.0495 (0.0834)	0.0152 (0.0816)	-0.00311 (0.0823)	0.0435 (0.0804)
Ln(Household Monthly Income)	0.0561* (0.0287)	-0.0107 (0.0290)	0.0616** (0.0289)	-0.00178 (0.0292)	0.0581** (0.0289)	-0.00442 (0.0292)	0.0505* (0.0288)	-0.0114 (0.0290)
Degree	-0.230*** (0.0825)	-0.287*** (0.0801)	-0.236*** (0.0843)	-0.269*** (0.0820)	-0.237*** (0.0843)	-0.272*** (0.0820)	-0.264*** (0.0833)	-0.291*** (0.0809)
Vocational Degree	0.0395 (0.0646)	0.0205 (0.0626)	0.0265 (0.0657)	0.0262 (0.0637)	0.0311 (0.0657)	0.0270 (0.0638)	0.0169 (0.0650)	0.0173 (0.0631)
A-Level	0.120 (0.0904)	0.0792 (0.0874)	0.105 (0.0912)	0.0866 (0.0885)	0.110 (0.0912)	0.0873 (0.0885)	0.0927 (0.0907)	0.0754 (0.0879)
GCSE	0.0799 (0.0766)	0.0287 (0.0739)	0.0579 (0.0771)	0.0274 (0.0746)	0.0594 (0.0771)	0.0280 (0.0746)	0.0604 (0.0768)	0.0261 (0.0742)
Cut 1	-1.974*** (0.328)	-1.105*** (0.351)	-2.239*** (0.332)	-1.266*** (0.355)	-2.231*** (0.332)	-1.227*** (0.355)	-2.074*** (0.330)	-1.121*** (0.354)
Cut 2	-1.658*** (0.327)	-0.781** (0.350)	-1.923*** (0.330)	-0.942*** (0.354)	-1.915*** (0.330)	-0.904** (0.354)	-1.758*** (0.328)	-0.798** (0.352)
Cut 3	-1.426*** (0.326)	-0.543 (0.350)	-1.691*** (0.329)	-0.703** (0.353)	-1.683*** (0.329)	-0.665* (0.353)	-1.527*** (0.327)	-0.559 (0.352)
Cut 4	-1.206*** (0.325)	-0.317 (0.349)	-1.470*** (0.328)	-0.476 (0.353)	-1.463*** (0.328)	-0.439 (0.353)	-1.307*** (0.327)	-0.333 (0.352)
Cut 5	-1.013*** (0.325)	-0.119 (0.349)	-1.277*** (0.328)	-0.279 (0.353)	-1.270*** (0.328)	-0.241 (0.353)	-1.114*** (0.326)	-0.136 (0.352)
Cut 6	-0.809** (0.324)	0.0881 (0.349)	-1.073*** (0.328)	-0.0706 (0.353)	-1.066*** (0.328)	-0.0335 (0.353)	-0.911*** (0.326)	0.0716 (0.352)
Cut 7	-0.614* (0.324)	0.287 (0.349)	-0.877*** (0.327)	0.129 (0.353)	-0.871*** (0.327)	0.165 (0.353)	-0.716** (0.326)	0.270 (0.351)
Cut 8	-0.402 (0.324)	0.502 (0.349)	-0.665** (0.327)	0.344 (0.353)	-0.659** (0.327)	0.381 (0.353)	-0.504 (0.326)	0.486 (0.351)
Cut 9	-0.181 (0.324)	0.727** (0.349)	-0.443 (0.327)	0.570 (0.353)	-0.437 (0.327)	0.606* (0.353)	-0.283 (0.326)	0.711** (0.352)
Cut 10	0.0877 (0.324)	1.000*** (0.349)	-0.174 (0.327)	0.843** (0.353)	-0.169 (0.327)	0.879** (0.353)	-0.0148 (0.326)	0.984*** (0.352)
Cut 11	0.384 (0.324)	1.300*** (0.350)	0.123 (0.327)	1.144*** (0.353)	0.128 (0.327)	1.180*** (0.353)	0.281 (0.326)	1.284*** (0.352)
Cut 12	0.855*** (0.325)	1.775*** (0.351)	0.594* (0.327)	1.620*** (0.354)	0.599* (0.328)	1.655*** (0.354)	0.752** (0.326)	1.758*** (0.353)
Rho	0.429*** (0.0208)	0.387*** (0.0219)	0.426*** (0.0210)	0.387*** (0.0219)	0.425*** (0.0210)	0.387*** (0.0219)	0.426*** (0.0209)	0.387*** (0.0219)
Observations	5,270	5,270	5,270	5,270	5,270	5,270	5,270	5,270
Log Likelihood	-8,529.49	-8,383.47	-8,515.64	-8,378.03	-8,517.17	-8,380.44	-8,526.32	-8,380.40
LR Chi^2 (P-Value)	277.80 (0.0000)	569.83 (0.0000)	305.51 (0.0000)	580.72 (0.0000)	302.44 (0.0000)	575.91 (0.0000)	284.14 (0.0000)	569.99 (0.0000)

Robust standard errors in parentheses, *** - p<0.01, ** - p<0.05, * - p<0.1.

Table A3.20: The Determinants of Overall Life Satisfaction *(G1)*: GSOEP – Random Effects Ordered Probit Model

The dependent variable analysed is overall life satisfaction measured on an 11 point scale. A random effects ordered probit model is used to analyse a balanced panel from 2002 and 2007 waves of the GSOEP Survey.

	Specification							
Independent Variables	1	2	3	4	5	6	7	8
Subjective Financial Position - Concerned		0.627*** (0.0284)		0.615*** (0.0285)		0.607*** (0.0286)		0.614*** (0.0285)
Subjective Financial Position - Not Concerned		1.229*** (0.0344)		1.206*** (0.0346)		1.195*** (0.0347)		1.205*** (0.0346)
Total Assets			0.0254*** (0.00251)	0.0154*** (0.00247)	0.0233*** (0.00257)	0.0134*** (0.00253)		
Total Debt			-0.00630** (0.00245)	-0.00223 (0.00240)				
Unsecured Debt					-0.0229*** (0.00291)	-0.0150*** (0.00286)		
Secured Debt					-0.00205 (0.00266)	0.00212 (0.00260)		
Net Wealth							0.0197*** (0.00188)	0.0126*** (0.00185)
Age	-0.0322*** (0.00613)	-0.0231*** (0.00591)	-0.0382*** (0.00614)	-0.0269*** (0.00594)	-0.0373*** (0.00614)	-0.0268*** (0.00595)	-0.0397*** (0.00615)	-0.0279*** (0.00595)
Age Squared / 100	0.0393*** (0.00597)	0.0269*** (0.00577)	0.0433*** (0.00597)	0.0296*** (0.00579)	0.0421*** (0.00598)	0.0293*** (0.00580)	0.0445*** (0.00597)	0.0303*** (0.00580)
Female	0.0193 (0.0287)	0.0568** (0.0274)	0.0273 (0.0286)	0.0612** (0.0274)	0.0274 (0.0286)	0.0605** (0.0274)	0.0247 (0.0285)	0.0594** (0.0274)
Ln(Household Size)	-0.201*** (0.0350)	-0.0694** (0.0340)	-0.187*** (0.0349)	-0.0632* (0.0341)	-0.181*** (0.0349)	-0.0616* (0.0341)	-0.189*** (0.0349)	-0.0641* (0.0340)
Divorced/Separated	-0.305*** (0.0411)	-0.222*** (0.0398)	-0.267*** (0.0412)	-0.200*** (0.0399)	-0.260*** (0.0412)	-0.196*** (0.0400)	-0.267*** (0.0411)	-0.200*** (0.0399)
Widowed	-0.0670 (0.0537)	-0.103** (0.0516)	-0.0550 (0.0536)	-0.0951* (0.0516)	-0.0534 (0.0536)	-0.0937* (0.0517)	-0.0562 (0.0535)	-0.0949* (0.0516)
Never Married	-0.171*** (0.0463)	-0.157*** (0.0448)	-0.163*** (0.0463)	-0.151*** (0.0449)	-0.165*** (0.0463)	-0.151*** (0.0449)	-0.165*** (0.0462)	-0.154*** (0.0448)
Unemployed	-0.512*** (0.0494)	-0.319*** (0.0489)	-0.495*** (0.0494)	-0.310*** (0.0490)	-0.506*** (0.0494)	-0.319*** (0.0491)	-0.500*** (0.0493)	-0.314*** (0.0490)
NLF	0.0637* (0.0345)	0.0339 (0.0337)	0.0568* (0.0345)	0.0307 (0.0337)	0.0469 (0.0345)	0.0255 (0.0338)	0.0606* (0.0344)	0.0321 (0.0337)
Retired	0.0737 (0.0501)	0.0387 (0.0490)	0.0595 (0.0501)	0.0321 (0.0491)	0.0510 (0.0502)	0.0284 (0.0491)	0.0677 (0.0500)	0.0353 (0.0490)
Ln(Household Annual Income)	0.464*** (0.0247)	0.286*** (0.0244)	0.399*** (0.0259)	0.247*** (0.0255)	0.403*** (0.0258)	0.250*** (0.0255)	0.408*** (0.0252)	0.254*** (0.0249)
Basic Qualification	0.103 (0.0871)	0.128 (0.0833)	0.0964 (0.0868)	0.123 (0.0833)	0.0974 (0.0868)	0.122 (0.0834)	0.0952 (0.0867)	0.122 (0.0833)
Intermediate Qualification	0.168* (0.0905)	0.0784 (0.0873)	0.157* (0.0902)	0.0737 (0.0874)	0.146 (0.0902)	0.0663 (0.0874)	0.147 (0.0902)	0.0669 (0.0873)
Vocational Qualification	0.0977*** (0.0366)	0.0336 (0.0350)	0.0798** (0.0365)	0.0237 (0.0350)	0.0803** (0.0365)	0.0237 (0.0351)	0.0793** (0.0365)	0.0238 (0.0350)
Tertiary Qualification	0.0897** (0.0366)	0.0144 (0.0350)	0.0767** (0.0364)	0.00822 (0.0350)	0.0733** (0.0364)	0.00598 (0.0350)	0.0768** (0.0364)	0.00840 (0.0350)
Poor	0.888*** (0.0600)	0.826*** (0.0589)	0.873*** (0.0599)	0.819*** (0.0589)	0.870*** (0.0599)	0.818*** (0.0589)	0.879*** (0.0599)	0.822*** (0.0589)
Fair	1.507*** (0.0592)	1.375*** (0.0581)	1.487*** (0.0592)	1.367*** (0.0581)	1.482*** (0.0592)	1.366*** (0.0581)	1.493*** (0.0591)	1.370*** (0.0581)
Good	2.171*** (0.0613)	1.976*** (0.0603)	2.144*** (0.0613)	1.964*** (0.0603)	2.134*** (0.0613)	1.960*** (0.0603)	2.150*** (0.0612)	1.967*** (0.0603)
Very Good	2.831*** (0.0728)	2.579*** (0.0716)	2.801*** (0.0727)	2.567*** (0.0717)	2.791*** (0.0728)	2.562*** (0.0717)	2.807*** (0.0727)	2.570*** (0.0716)
Cut 1	1.619*** (0.286)	0.459* (0.279)	0.920*** (0.295)	0.0257 (0.288)	0.916*** (0.296)	0.00971 (0.289)	0.937*** (0.292)	0.0409 (0.285)
Cut 2	2.062*** (0.282)	0.904*** (0.275)	1.364*** (0.292)	0.471* (0.285)	1.361*** (0.292)	0.455 (0.286)	1.381*** (0.289)	0.486* (0.282)
Cut 3	2.639*** (0.281)	1.486*** (0.274)	1.942*** (0.290)	1.053*** (0.284)	1.940*** (0.291)	1.039*** (0.284)	1.958*** (0.287)	1.069*** (0.281)
Cut 4	3.225*** (0.281)	2.081*** (0.274)	2.529*** (0.290)	1.650*** (0.283)	2.529*** (0.291)	1.636*** (0.284)	2.544*** (0.287)	1.665*** (0.280)
Cut 5	3.696*** (0.281)	2.564*** (0.274)	3.002*** (0.290)	2.134*** (0.283)	3.003*** (0.291)	2.121*** (0.284)	3.017*** (0.287)	2.149*** (0.280)
Cut 6	4.545*** (0.281)	3.435*** (0.274)	3.853*** (0.291)	3.007*** (0.284)	3.856*** (0.291)	2.995*** (0.285)	3.868*** (0.288)	3.022*** (0.281)
Cut 7	5.136*** (0.282)	4.042*** (0.275)	4.446*** (0.291)	3.615*** (0.284)	4.450*** (0.292)	3.604*** (0.285)	4.461*** (0.288)	3.631*** (0.282)
Cut 8	6.042*** (0.283)	4.970*** (0.276)	5.354*** (0.292)	4.545*** (0.286)	5.361*** (0.293)	4.536*** (0.286)	5.369*** (0.289)	4.561*** (0.283)
Cut 9	7.465*** (0.285)	6.411*** (0.278)	6.778*** (0.294)	5.988*** (0.288)	6.786*** (0.295)	5.980*** (0.288)	6.792*** (0.291)	6.003*** (0.285)
Cut 10	8.525*** (0.288)	7.472*** (0.281)	7.837*** (0.296)	7.050*** (0.290)	7.846*** (0.297)	7.042*** (0.290)	7.851*** (0.293)	7.066*** (0.287)
Rho	0.405*** (0.0104)	0.360*** (0.0109)	0.401*** (0.0104)	0.361*** (0.0109)	0.401*** (0.0104)	0.361*** (0.0108)	0.401*** (0.0104)	0.361*** (0.0109)
Observations	15,592	15,592	15,592	15,592	15,592	15,592	15,592	15,592
Log Likelihood	-26,358	-25,710	-26,307	-25,690	-26,279	-25,677	-26,303	-25,687
LR Chi^2 (P-Value)	3,594 (0.0000)	4,890 (0.0000)	3,696 (0.0000)	4,930 (0.0000)	3,753 (0.0000)	4,957 (0.0000)	3,703 (0.0000)	4,936 (0.0000)

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4 Subjective Financial Situation and Overall Life Satisfaction: A Joint Modelling Approach

4.1 Introduction

Over the past three decades overall life satisfaction has received an increased level of interest from a variety of academic disciplines, whilst also capturing the attention of a wider public audience including politicians. Arguably, at the forefront of this research area are the disciplines of psychology and economics, with each considering the concepts of happiness and utility, respectively. Well-being is increasingly being proposed as a method of measuring a country's development. In Britain, this culminated in 2010 with the UK Prime Minister David Cameron commissioning the Office of National Statistics (ONS) to collect data relating to national well-being in Britain, with a view to using it to assess government policies. Consequently, ascertaining and fully understanding the determinants of overall life satisfaction are of increased importance in order to inform and evaluate public policy.

In the well-being literature, it is believed that an individual's overall life satisfaction comprises of a variety of domain specific satisfactions, such as job, health, housing and leisure satisfaction. In addition, an individual's satisfaction with their financial position constitutes one of these domains. Following Van Praag *et al.* (2003), it is believed that domain specific characteristics and behaviours contribute to specific domain satisfactions and, in turn, these domain satisfactions influence overall life satisfaction. In the existing literature, several studies support this theory and have presented evidence that financial satisfaction is an important determinant of overall life satisfaction, for example, Easterlin (2006), Layard (2005) and Van Praag and Ferrer-i-Carbonell (2007). In addition, the analysis presented in the previous chapter suggests that it is the subjective financial position, not the household's monetary financial position, which influences overall life satisfaction. Despite these findings, research on the determinants of financial satisfaction and subjective financial position is relatively sparse, and in particular, in the context of the impact of the household's level of assets and debt.

The majority of existing research relating to financial satisfaction focuses on the impact of income, see for example, Hsieh (2001), Hsieh (2004), Vera-Toscano *et al.* (2006), Xiao *et al.* (2009), Rao and Barber (2005) and Danigelis and McIntosh (2001). Income is consistently reported to have a positive, but moderate, impact on financial satisfaction. However, income is arguably not the most appropriate measure of the

household's financial resources. In addition to income, the head of household's financial satisfaction is potentially determined by the household's level of assets and debt. Assets are expected to be positively related to financial satisfaction, whereas debts are likely to have a detrimental impact on financial satisfaction.

A small number of studies consider the relationship between household assets, debt and net wealth and financial satisfaction, however, the research remains relatively limited. For example, Headey and Wooden (2004) explore the relationship between household net worth and financial satisfaction in Australia and find that net worth is as important as income as a determinant of financial satisfaction. Similarly, Headey *et al.* (2008) find that net wealth and income have similar impacts on the levels of financial satisfaction across the Netherlands, Germany, Hungary and Britain. Both Hansen *et al.* (2008) and Plagnol (2011) separate the household's net wealth into its constituent parts of assets and debt, and explore if a differential relationship with financial satisfaction is observed. Both Hansen *et al.* (2008) and Plagnol (2011) find that financial satisfaction is positively related to the level of household assets whilst inversely related to total debt. Of these studies, the analysis of Hansen *et al.* (2008) and Headey and Wooden (2004) are arguably limited being based on cross sectional data, which could potentially yield biased results as a consequence of individual heterogeneity. Both Headey *et al.* (2008) and Plagnol (2011) overcome this problem by employing linear fixed effects models. However, there are still several potential limitations with the analysis presented in the existing literature.

The empirical analysis presented in this chapter contributes to the existing literature in several distinct ways. Initially, the chapter analyses nationally representative household panel surveys for Australia and Germany, these are the HILDA and GSOEP surveys, respectively, allowing cross country comparisons. Consequently, an ordered probit model with Mundlak fixed effects is exploited, in order to account for individual heterogeneity, to ascertain the determinants of the head of household's subjective financial position. In addition, the chapter will focus on the role of household net wealth, assets and debt, as well as income, as they could potentially have a large impact on the subjective financial position. The analysis presented in this chapter contributes to the existing literature, as only two studies, Headey *et al.* (2008) and Plagnol (2011), account for individual heterogeneity whilst exploring the relationship between household assets, debt and financial satisfaction. Similarly, no studies which analyse

Australian data use longitudinal analysis to explore the determinants of subjective financial position or separate net wealth into its constituent parts of assets and debts.

In addition, the analysis presented explores the relationship between the head of household's risk attitudes and the subjective financial position. An individual's attitudes towards risk are consistently found to be an important determinant of an individual's decision making across a variety of aspects of life. For example, the existing literature presents evidence that risk attitudes influence an individual's decision to invest in human capital, to hold risky assets and influence the level of debt held amongst many other areas. Risk attitudes are also potentially related to the head of household's level of financial satisfaction. The analysis presented in this chapter develops the analysis presented in Joo and Grable (2004), which, to my knowledge, is the only study to control for risk attitudes in the analysis of financial satisfaction in the U.S. Consequently, risk attitudes are included in the analysis of financial satisfaction to ascertain if a relationship is present in Australia and Germany.

Finally, the chapter will bring together the empirical analysis presented in the current and the previous chapter of the thesis by jointly modelling the subjective financial position and overall life satisfaction in a bivariate recursive system. The results obtained in the previous chapter, which indicate that the subjective financial position is a significant determinant of overall life satisfaction, are potentially biased due to the potential endogeneity of subjective financial satisfaction. The joint modelling technique will account for this potential endogeneity and will also allow the exploration of the impact of the unobserved characteristics on both overall life satisfaction and subjective financial position. In addition, the joint modelling technique will allow an exploration of whether the effects of the household's monetary financial position on overall life satisfaction are mediated by the subjective financial situation, allowing the investigation of the theory of domain satisfaction. The theory of domain satisfaction indicates that overall life satisfaction is influenced by a series of specific domains, with these domains being influenced by domain specific characteristics and behaviours. Consequently, it is expected that the household's monetary financial position will affect the head of household subjective financial position, and this in turn will influence the head of household's overall life satisfaction.

In line with prior expectations, the results of the ordered probit model with Mundlak fixed effects indicate that, for Australia, the level of assets held by the household is

positively related to the subjective financial position whilst the level of total debt is inversely related to the subjective financial position. The decomposition of total debt into secured and unsecured debt indicates that both types of debt have a negative impact on the subjective financial position. As expected and in accordance with the previous literature, net wealth is positively associated with subjective financial position. In line with Joo and Grable (2004), the head of household's risk attitudes are an important determinant of financial satisfaction; with more risk tolerant individuals reporting higher levels of financial satisfaction.

Due to data limitations, the analysis for Germany considers the determinants of concerns relating to, opposed to satisfaction with, the household's financial situation. The findings indicate that the head of household's financial concern is increasing in the level of total debt. Similarly, the separation of total debt into unsecured and secured debt indicates that both types of debt are positively related to concerns with current financial situation. This is in line with the previous literature and the analysis for Australia. Interestingly, the empirical analysis indicates that, once individual heterogeneity is accounted for, the level of total assets is not a statistically significant determinant of concerns relating to financial position. This relationship is potentially the result of the different wording of the dependent variable where the focus of the question relates to "worry" and "concerns", opposed to "satisfaction". Alternatively, this lack of relationship between the household's level of assets and financial well-being in Germany potentially reflects that changes in financial position are unimportant given the level of assets held by the household. As the analysis presented in this chapter employs a fixed effects estimator, it considers changes in the household's monetary financial position, rather than the absolute level of assets held. Consequently, for a given level of assets, it could be the absolute level of assets rather than the changes in the assets level which has an influence on financial satisfaction. In line with the analysis presented for Australia and Joo and Grable (2004), risk attitudes are an important determinant of financial satisfaction, with risk tolerant individuals reporting, on average, lower levels of financial concern.

For both Australia and Germany, a joint modelling approach is statistically preferred to the univariate specifications. The results for Australia indicate a positive relationship between the unobserved characteristics between subjective financial satisfaction and overall life satisfaction. This finding demonstrates that some unobserved characteristics cause individuals to report higher levels of subjective financial satisfaction and overall

life satisfaction. The analysis reveals that, once jointly modelled, subjective financial satisfaction does not have an impact on overall life satisfaction in Australia. This suggests that the relationship between overall life satisfaction and subjective financial position observed in the previous chapter can be attributed to the endogeneity of subjective financial position. The household's monetary financial measures maintain the expected relationship with financial satisfaction and are as reported in the univariate specifications. That is, the level of assets and net worth are positively related to subjective financial position whilst household debt levels display an inverse relationship.

In accordance with the analysis presented for Australia, the analysis for Germany supports the joint modelling approach in favour of the univariate specifications. A positive correlation is observed between the unobserved characteristics between overall life satisfaction and financial concerns. This implies that unobserved characteristics which cause individuals to report higher levels of overall life satisfaction also increase the level of financial concerns. For Germany, the household's monetary financial position appears to mediate its effect on overall life satisfaction through the head of household's concerns relating to their household's finances.

The recursive bivariate analysis for Germany supports the theory of domain satisfaction. The analysis indicates that the household's monetary financial variables seem to influence the head of household's levels of subjective financial position, rather than having a direct influence on the level of overall life satisfaction. For example, the level of household income, the level of debt and net wealth are all statistically significant determinants of subjective financial position, but are not directly related to the level of overall life satisfaction.

The chapter is structured as follows: Section 4.2 provides a critical review of the existing literature while Section 4.3 explores the data and methodology employed in this chapter. Section 4.4 presents the results with Section 4.5 providing a discussion of the key findings. Finally, Section 4.6 will conclude.

4.2 Literature Review

This section will provide a critical review of the existing literature relating to financial satisfaction and subjective financial position. This will serve to inform the empirical analysis presented in this chapter and it will make the original contribution of this

chapter apparent. Initially, the literature relating to financial satisfaction and subjective financial position are reviewed, where the definitions, measurements, econometric techniques employed and results are discussed. The section goes on to explore the definition of risk attitudes used in the existing literature, in addition to the relationship between risk attitudes and a variety of household and individual decisions. The section then goes on to briefly outline the determinants of overall life satisfaction as a full review can be found in Section 3.2 of this thesis. The section then discusses the existing studies which employ a joint modelling technique to explore financial satisfaction and well-being. Finally, the section outlines the contribution the empirical analysis presented in this chapter makes to the literature.

4.2.1 Financial Satisfaction

In the existing literature, the determinants of financial satisfaction have received a limited amount of attention compared to overall life satisfaction. Consequently, empirical studies which seek to ascertain the sources of financial satisfaction are relatively limited. Of those studies which explore the determinants of financial satisfaction, the majority of studies focus on the impact of income on financial satisfaction. Following the analysis presented in Heady and Wooden (2004), Headey *et al.* (2008), Hansen *et al.* (2008) and Plagnol (2011), this chapter aims to contribute to the existing literature as it aims to ascertain the relationship between the subjective financial situation and the household's levels of assets, total debt, secured debt, unsecured debt and net wealth. This section initially explores the definitions of financial satisfaction employed in the existing literature and the various measurement techniques employed. A review of the existing empirical literature is then outlined where the focus is placed on studies which consider the role of the household's assets and debts.

Financial satisfaction has been previously defined as an individual's satisfaction with their current financial situation (Joo and Grable, 2004). In addition, Xiao *et al.* (2009) define financial satisfaction to be the degree to which individuals have financial adequacy and security, whilst Zurlo (2009) defines it to be a subjective measure of financial well-being. In the literature, no definitive definition of financial satisfaction is proposed.

Financial satisfaction is a subjective measure of an individual's financial well-being and captures the impact of various aspects of their financial situation. Analogous to

measures of subjective well-being, no consensus exists regarding the most effective method to measure financial satisfaction. Consequently, various approaches have been employed in order to capture one's level of financial satisfaction. For example, Draughn *et al.* (1994) and Hayhoe and Wilhelm (1998) use multiple item measures to capture an individual's level of financial satisfaction. These multiple item measures include information relating to a variety of financial well-being measures such as income, being able to handle financial emergencies and the level of savings amongst other areas. In contrast, Davis and Schumm (1987), Porter and Garman (1993), Headey and Wooden (2004), Van Praag *et al.* (2010), Hansen *et al.* (2008) and Plagnol (2011) all exploit single item measures of financial satisfaction. The responses to these questions are consequently measured on discrete ordinal scales. In this chapter, single item measures will be used for the analysis of both Australia and Germany. These measures are outlined in further detail in Section 4.3.2.

The relationship between income and financial satisfaction has received a large amount of attention in the existing empirical literature. For example, Hsieh (2004), Vera-Toscano *et al.* (2006), Xiao *et al.* (2009), Johnson and Krueger (2006) and Rao and Barber (2005) all generally find a positive, though relatively small, relationship between income and financial satisfaction. Following the theory of relative standards, developed by Campbell *et al.* (1976), the modest magnitude is often attributed to an individual's perceptions of financial satisfaction being more closely related to relative levels of income, either compared to previous levels of earnings or to a control group, as opposed to absolute levels of income.

The levels of household assets and debt are potentially important influences on financial satisfaction as they are directly related to the level of disposable income available to the household. In addition, when individuals report their level of financial satisfaction, it can be argued that they account for their current levels of assets and debt. Consequently, the level of a household's financial assets may enhance the level of financial satisfaction and the level of debt may be detrimentally related to financial satisfaction. Drentea (2000) argues that the lack of assets or higher debts could potentially cause economic worries in the future, and therefore compromise present levels of financial satisfaction. Plagnol (2011) suggests that an individual's level of debt reflects the difference between their perceived financial needs and aspirations and their current financial situation. Furthermore, Plagnol (2011) argues that the level of debt captures the level of aspirations of the individual. The formations of these

aspirations are closely related to the individual's adaption to their previous financial position and, in addition, to social comparisons. Consequently, the level of debt held by the household is therefore argued to indirectly capture the effects of social comparisons and adaption to changes in their financial situation.

Empirical Studies

The existing studies, which consider the determinants of financial satisfaction, are discussed next. Initially, studies that fail to account for either the household's level of assets or debts are considered, as this will serve to identify what other factors are determinants of financial satisfaction. The section then goes on to consider the empirical studies which control for the household's level of assets, debt and net wealth. Studies which aim to ascertain the determinants of financial satisfaction in the U.S. are initially explored, with other countries subsequently discussed.

Hsieh (2000) considers the trends in financial satisfaction in the U.S. across the period 1972 and 1996. Analysing the U.S. General Social Surveys (GSS), the study attempts to decompose the trends in financial satisfaction into inter-cohort and intra-cohort patterns of adults aged 45 and above. The study exploits a single item measure of financial satisfaction, that is, *"So far as you and your family are concerned, would you say that you are pretty well satisfied with your present financial situation, more or less satisfied, or not at all?"* This is measured on a three point scale. Hsieh (2000) employs a linear decomposition procedure, as outlined in Firebaugh (1989), in order to assess the trends in financial satisfaction. This strategy initially pools the cross-sectional data, yielding 15,982 observations, and then regresses financial satisfaction on both the time of the survey and the cohort birth year. From these coefficients, it is possible to recover the inter-cohort and intra-cohort trends in financial satisfaction. In addition to controlling for the trends in financial satisfaction, the study also controls for the income per capita, education level, perceived health, income comparison and finance comparison. The income comparison question is obtained from the question, "*compared to American families in general, would you say your family income is...?"* This is then measured on a five point scale where one indicates "*far below average"* and five represents "*far above average".* Similarly, an individual's financial comparison relates to whether their financial situation has changed over the past few years. This is measured on a three point scale where the response "*getting better"* is assigned the value three, while reporting "*getting worse"* is indicated by the value one.

The results indicate that the major trends in financial satisfaction are a consequence of inter-cohort replacement effects. That is, the change in financial satisfaction over the period considered is explained by cohort replacements as opposed to changing attitudes of existing cohorts. Younger cohorts report lower levels of financial satisfaction compared to older cohorts, but there is also an increasing level of financial satisfaction over time. In addition, the regression analysis indicates that income, perceived health and both comparative income and financial position all have positive impacts on the level of financial satisfaction.

Developing the analysis presented in Hsieh (2000), Hsieh (2001) further explores the correlates of financial satisfaction of American adults aged 45 and above. Again analysing the 1976 to 1996 waves of the U.S. GSS, and using the same measure of financial satisfaction, the study concludes that many of the major correlates of global subjective well-being have similar impacts on financial satisfaction. The study analyses these responses via OLS and ordered logit specifications in order to compare the results and demonstrate the importance of the assumption of ordinality. In the regression analysis, a variety of independent variables are controlled for including income, age, gender, race, self-assessed health, employment status and marital status. The study also includes controls for the size of residence, social interactions of the individual, social comparisons and relative deprivation and poverty status. Social interactions are measured by the number of voluntary civic organisations the respondent belongs to and the frequency the individual attends religious services. The measures of social comparison and relative deprivation relate to the income and financial comparisons outlined in Hsieh (2000). The study also includes a dummy variable to indicate if the individual's family experiences poverty. The variable takes the value 1 if the household's income falls under the U.S. Census Bureau poverty threshold levels, which are dependent on the size of the household. Households which are found to have a household income below this threshold are defined in the study to be *"poor"*.

Hsieh (2001) initially explores the influences of age and income on financial satisfaction, and subsequently includes other controls. In the ordered logit specification, age displays a positive relationship with financial satisfaction; however, this relationship disappears once the quadratic in age is included. Income exerts a large positive effect on financial satisfaction.

In the full specification, older individuals and those with higher income report higher levels of financial satisfaction. Both race and gender are statistically insignificant correlates of financial satisfaction, whilst, marital status and education appear to only have a limited impact on overall life satisfaction. Being married and possessing a bachelor's degree are positively related to financial satisfaction, whereas other education levels and marital statuses are not significant determinants. As predicted, work status has a positive impact on financial satisfaction. Perceived health and social interactions are positively related with financial satisfaction. Similarly, both income and financial comparisons, as defined in Hsieh (2000), are associated with higher levels of financial satisfaction. Poor individuals are found to be more likely to report that they are more satisfied with their financial position than their non-poor counterparts.

Hsieh (2003) focuses on the influence of age and income on financial satisfaction. The study once again analyses the U.S. GSS and the dependent variable is a single item measure of financial satisfaction, which is measured on a three point scale. The aim of the paper is to ascertain the influences of age and income on financial satisfaction. The analysis also accounts for a variety of other control variables including gender, race, marital status, education and employment status. In addition, following Hsieh (2001), a measure of relative deprivation, self-assessed health status and two social interaction variables are controlled for. To further investigate the impacts of age and income on financial satisfaction, Hsieh (2003) includes an interaction term between income and age, which allows the impact of income to change conditional on the age of the individual.

The ordered logit analysis indicates that the interaction term between age and income was not significant in any of the age ranges analysed. This implies that the effect of income on life satisfaction does not differ with the age of the individual. Income, however, is positively related to financial satisfaction across all age ranges. The inclusion of a variety of controls reduces the impact of income; however, the result remains positive and statistically significant. The study reports that the measures of relative deprivation are positively related to an individual's financial satisfaction across all age ranges. The relationship between household income and financial satisfaction disappears once these relative measures of income are included. Hsieh (2003) raises two points: firstly, the choice of income measure matters in the determinants of financial satisfaction, be it household or personal income. Secondly, it appears that it is

important to distinguish between the ages of individuals as the determinants of financial satisfaction vary depending on age.

All of the studies by Hsieh (2000, 2001, and 2003), despite exploring the relationship between various individual and household characteristics and financial satisfaction, fail to take into account the household's level of net wealth, assets and debt. The analysis presented in this chapter will contribute to the literature by developing the link between financial satisfaction and the household's monetary financial position. The analysis presented in the studies by Hsieh is also arguably limited as it fails to account for individual heterogeneity, which could have a significant impact on the estimated coefficients.

Joo and Grable (2004) develop a framework to analyse the potential determinants of financial satisfaction. The study initially outlines potential factors which influence financial satisfaction and then tests the direct and indirect effects of these factors. The existing empirical literature indicates that several demographic and socio-economic characteristics influence financial satisfaction, these factors include, gender, marital status, education, ethnicity, age, income and home ownership. In addition, Joo and Grable (2004) suggest that variables which capture financial stressors and stress, financial behaviours, financial solvency, financial attitudes, including risk attitudes, and financial knowledge are all potential determinants of financial satisfaction.

After presenting a theoretical model of the potential determinants of financial satisfaction, the study then empirically tests the model by analysing a relatively small sample of 220 white collar clerical workers from a community in West Texas. The dependent variable of financial satisfaction is measured by a 10 point single item scale based on the response to a question relating to how satisfied individuals are with their present financial situation. In order to assess the direct and indirect impacts of the independent variables presented in their theoretical model, Joo and Grable (2004) employ path analysis. Path analysis is a method used to estimate the magnitude of both direct and indirect linkages between variables. The authors acknowledge that path analysis does not ascertain causal impacts, but it is, however, a statistical approach which helps find logical and theoretical relationships between variables. Path analysis is based on a series of linear regressions, five regression equations in this study, where the direct effects are simply the standardised regression coefficients, and the indirect

effects are given by multiplying the direct effects of each factor to each dependent variable. The total effects are defined to be the sum of the indirect and direct effects.

The analysis presented in Joo and Grable (2004) indicates that education, financial knowledge, risk tolerance, financial behaviours and stress levels have direct impacts on financial satisfaction. In particular, higher levels of financial knowledge, solvency, and displaying better financial behaviours, such as saving and paying off all bills on time, are positively related to financial satisfaction whereas education, financial stress levels and levels of risk tolerance are inversely related to financial satisfaction. In addition to the direct effects, several indirect effects are found. Specifically, education, homeownership, income, the number of financial dependents, financial stressors, knowledge, solvency, risk tolerance, and financial behaviours all exert indirect effects on financial satisfaction. The results indicate that, for the total effects, age, gender, ethnicity and marital status are not significant determinants of financial satisfaction. Education, income, homeownership, income, financial behaviours, risk tolerance, solvency and financial knowledge all exert a positive total effect on financial satisfaction, whereas, the number of dependents, financial stressors and financial stress measures are inversely related to financial satisfaction.

The analysis presented in Joo and Grable (2004) is potentially limited due to the small sample analysed. The fact that the sample is taken from a small area in the U.S. makes it hard to generalise the results to the whole population. In order to overcome such a problem, large nationally representative surveys will be analysed in this chapter. As previously mentioned, the study does not include the household's level of assets and debts which are potentially key determinants of financial satisfaction. In addition, as the study uses cross-sectional data, it is not possible to account for individual heterogeneity which could have an important impact on the results. Consequently, the analysis presented in this chapter will exploit longitudinal surveys.

The next two studies consider the financial satisfaction levels of U.S. college students. Xiao *et al.* (2009) analyse data on undergraduate students at major state universities and explore the determinants of financial satisfaction. The survey, competed in 2006, consists of around 1,000 respondents from large South Western state universities. The paper aims to explore several hypotheses using structural equation modelling and path analysis. These hypotheses explore seven distinct theories and explore a range of

relationships including the effects of positive financial behaviours, debt levels, education levels, academic satisfaction and financial satisfaction.

The results indicate that financial satisfaction is positively related to a variety of financial behaviours. Saving is positively related to financial satisfaction, as is balance control. Balance control refers to financial behaviours which include: maintaining sufficient balances in your bank account, paying bills on time each month and paying off credit cards in full each month. Each of these variables is measured on a five point scale. Interestingly, debt levels are not significantly related to financial satisfaction for college students. Financial satisfaction is positively related to life satisfaction; similarly, academic satisfaction is positively related to overall life satisfaction. These results support the theory of domain satisfaction.

The empirical analysis presented in Xiao *et al.* (2009) is potentially limited as the study fails to account for individual heterogeneity, which could potentially have a dramatic impact on the results. Also, as the sample analysed relates to college students, it would again be hard to generalise the results to a national level.

Gutter and Copur (2011) analyse data on a sample of college students aged 18 and over, from 15 campuses across the U.S. The survey, conducted in 2008, includes a variety of demographic and socioeconomic characteristics, as well as measures of financial satisfaction. The dependent variable is a multiple item measure of financial satisfaction, which is constructed from eight questions, with each measured on a ten point scale. The dependent variable is constructed by adding the responses to these questions and consequently, the measure of financial satisfaction is measured on the interval of 8 to 80. Initially, the study considers bivariate correlations between financial behaviours and financial satisfaction, and then moves on to OLS multivariate regression analysis. The bivariate correlations indicate that the student's demographic characteristics are associated with differing levels of financial well-being. Male, white and single students report, on average, higher levels of financial well-being. Students with no financial aid or scholarships had higher levels of financial well-being, as did students who report having no debts. Similarly, better financial behaviours such as budgeting, saving and paying credit cards in full are positively related to financial satisfaction.

In the regression analysis, an individual's financial behaviours and financial variables all have significant impacts on financial satisfaction. Saving and budgeting both exert positive impacts on financial satisfaction. In contrast, not paying off credit card bills or

making late payments on credit cards have detrimental effects on financial satisfaction. With respect to the demographic variables, white students, on average, report higher levels of financial satisfaction, as do male students. Interestingly, being single has a positive impact on financial satisfaction. As expected, the financial measures have a statistically significant impact on financial satisfaction. The levels of debt and loans have detrimental impacts on financial satisfaction whilst the monthly income of the student has a positive impact on financial satisfaction. Generally, positive financial behaviours such as saving and budgeting are positively related to financial satisfaction. These effects are found to be robust to the inclusion of a variety of other control variables.

Potential limitations of Gutter and Copur (2011) arguably relate to the sample analysed. As study focuses on students, it is not possible to explore the relationship between financial satisfaction and subjective financial position later in life. This relationship could be significantly different for individuals at different life stages. Once again, the analysis presented fails to account for individual heterogeneity, which could have an influence on the estimated results.

Studies, which consider financial satisfaction in countries other than the U.S., are now discussed. Vera-Toscano *et al.* (2006) explore the relationship between income and financial satisfaction in Spain. The empirical analysis aims to ascertain the relationship between both absolute and relative income and financial satisfaction. The study analyses the "Survey on Living Conditions and Poverty in Andalucía", which is a household survey based on a representative sample of 6,000 households which translates to around 21,000 individuals. From this survey, a sample of 5,235 individuals completed the relevant information and consequently forms the basis of the empirical analysis. The dependent variable, which captures the individual's level of financial satisfaction, is based on a question which asks individuals how they feel about their current financial situation. This is measured on a 7 point ordered scale which ranges from "*very unhappy*" to "*very happy*". The study includes the respondent's absolute level of income as well as information relating to how adequate they perceive their current income is to meet their current needs and also how consistent and steady their income stream is. The analysis also includes information on the respondent's health status and social participation as these were previously found to influence financial satisfaction. The analysis also includes information on the mean and mode of the income levels of a predefined reference group as people are likely to make social

comparisons when assessing their own levels of financial satisfactions. The study also controls for a variety of demographic variables as specified from the previous literature, namely, age, family size, gender, family responsibilities, education and occupation.

The study employs an ordered probit model to analyse financial satisfaction and implements several independent variable specifications. The study reveals a convex age pattern in financial satisfaction. Gender is not a significant determinant of financial satisfaction, as is if the individual lives alone. Family size and being a lone parent are inversely related to financial satisfaction and education does not exert a statistically significant impact on financial satisfaction. In line with prior expectations, unemployment is negatively related to financial satisfaction, whilst the absolute level of income is positively related to financial satisfaction, supporting the existing literature which finds that individuals with higher incomes are happier, *ceteris paribus*, than their poorer counterparts.

The analysis relating to the additional income and financial variables reveals that, when assessing their own levels of financial satisfaction, individuals account for how adequate their current income is given their current needs and how stable their income is, in addition to their absolute level of financial satisfaction. The study finds that financial satisfaction is increasing with an individual's subjective social position. Also, higher reference group income is inversely associated with an individual's financial satisfaction. The analysis indicates that health status and social interactions are key correlates of financial satisfaction. The study defines a respondent's reference group in two ways; one measure is based on age and highest education level whilst the other is defined from an individual's socio-geographical position and province. The analysis suggests that both measures of relative income are important determinants of financial satisfaction. Similarly, the subjective social groups of an individual are significant covariates of financial satisfaction.

Despite Vera-Toscano *et al.* (2006) comprehensively accounting for the role of income on financial satisfaction, the study is arguably limited as it fails to control for the level of assets and debt held by the household, which could potentially have a significant influence on the level of financial satisfaction. Also, the study fails to account for individual heterogeneity, which has been shown to have a dramatic impact on the estimation results relating to subjective measures, see for example, Ferrer-i-Carbonell and Frijters (2004).

Van Praag *et al.* (2010) explore the impact of religion, ethnicity and war on both overall life satisfaction and financial satisfaction in Israel. Analysing the 2006 Israeli Social Survey, the paper aims to assess the impact of various religions including Judaism, Islam and Christianity on both financial and overall life satisfaction. The study finds that religion has a significant impact on overall life satisfaction. The study employs a "probit adapted OLS" (POLS) technique in order to ascertain its determinants. The POLS approach maps the ordered categories of the dependent variable to a normal distribution. This mapping is based on the share of the sample in each category and maps rare extreme outcomes into the tails of the normal distribution. This transformed data is then estimated using standard OLS, which makes interpretation of the coefficients relatively simple compared to the coefficients estimated in an ordered choice model.

The results indicate that, in the Jewish subsample, income exerts a positive impact on both overall life satisfaction and financial satisfaction. Similarly, consistent with the literature, a "U-shaped" age pattern is found, whilst, health status displays a positive association with both overall life satisfaction and financial satisfaction. The results show that marriage is positively associated with life and financial satisfaction, whilst, unemployment exerts a large negative impact on both dependent variables. With regard to religiosity, children are found to be negative factors of life and financial satisfaction for non-religious people, whilst children have a positive impact for religious individuals. The study finds that, generally, immigrant status and war effects are insignificant determinants of life and financial satisfaction.

The analysis of the Arab subsample reveals that the role of children has a similar impact to that reported in the Jewish subsample. Marriage is not a significant determinant of overall life satisfaction, whilst, being widowed is positively associated with financial satisfaction. Unemployment is not a significant determinant of life satisfaction. As with the Jewish sample, income exerts a positive impact on both dependent variables and a "U-shaped" pattern is present. In both subsamples, there is little effect of the Lebanon war. The study is arguably limited as the authors do not account for the household's assets or debt when exploring financial satisfaction.

Relatively few studies in the existing literature explore the relationship between financial satisfaction and the household's level of assets and debt. To my knowledge, the only two studies which consider the impact of the household's assets and debt on

financial satisfaction are Hansen *et al.* (2008) and Plagnol (2011), with the first analysing cross-sectional data and the latter panel data. In addition to these two studies, Headey and Wooden (2004) analyse cross-sectional data from Australia to establish the impact of net wealth on financial satisfaction. Also, Headey *et al.* (2008) explore the effects of net wealth on an individual's satisfaction with their standard of living. Similarly, Van Praag and Ferrer-i-Carbonell (2007) assess the role of savings on financial satisfaction, however, they do not account for the level of debt held by the household.

One potential explanation for the relatively few studies which consider the influence of assets and debts on financial satisfaction is due to insufficient data being available. Self-reported measures of assets, debt and net wealth inherently suffer from high rates of non-response and under reporting, see for example, Headey and Wooden (2004), Headey *et al.* (2008) and Juster *et al.* (1999). As a result, relatively few data sets have sufficiently detailed data relating to assets and debt to implement statistical analysis.

Headey and Wooden (2004), using data from the 2002 wave of the HILDA survey explore the impact household net worth has on both subjective well-being and ill-being. The authors argue that well-being and ill-being are two distinct concepts rather than being opposite ends of the same spectrum. The variables, which capture well-being, are overall life satisfaction and financial satisfaction. Focusing on the determinants of financial satisfaction, the results reveal that both income and net worth are positively associated with financial satisfaction. The authors assert that net worth plays as an important role as income, that is, both are statistically significant and of similar magnitude. The analysis reveals no gender effects and a "U-shaped" age pattern is present in financial satisfaction. Financial satisfaction is positively related to being partnered, education and being employed, whilst being unemployed and disabled are inversely related to financial satisfaction.

The analysis of Headey and Wooden (2004) is potentially limited due to the sample analysed. As the study considers cross-sectional data, it is not possible to account for individual heterogeneity, which, following Ferrer-i-Carbonell and Frijters (2004), could have a dramatic impact on the estimated coefficients. The analysis presented in this chapter analyses longitudinal data and accounts for individual heterogeneity by exploiting a Mundlak fixed effects technique. Also, Headey and Wooden (2004) fail to separate net wealth into its constituent parts, which is potentially important as

households who have the same net wealth, may have significantly different levels of assets and debt. Therefore, separation of net wealth will allow the exploration of the impacts of assets and debts separately.

The analysis presented in Headey *et al.* (2008) aims to ascertain the effects of household wealth, income and consumption on both overall life satisfaction and satisfaction with their standard of living. This review will focus on the results relating to the household's standard of living. The analysis is implemented across five countries: Australia, Germany, the Netherlands, Hungry and Britain. The analysis for Australia draws upon data from the HILDA survey where satisfaction with the present standard of living is measured by a ten point scale relating to "*your financial satisfaction*". The analysis for Britain and Germany uses data from the BHPS and GSOEP survey respectively, where an individual's satisfaction with their standard of living is measured by the respondent's satisfaction with household income. The Tarki survey is analysed for Hungary, and the respondent's satisfaction with their standard of living is measured on a ten point scale. The analysis for the Netherlands uses the Dutch Socio-Economic Panel (SEP) survey and satisfaction with their standard of living is captured by the question, "*How well are you getting along with you household income?"*

Initially, the study uses cross-sectional data and employs OLS regression. The results show that equivalised income, net wealth and, where included, consumption, are positively associated with satisfaction with an individual's standard of living. Considering the other control variables, generally, females report being more satisfied with their standard of living. A "U-shaped" age pattern is present across all the countries, whilst being partnered is positively related to satisfaction with their standard of living. Satisfaction with standard of living is increasing with education levels, and also being employed. As expected, bad health and unemployment are inversely related to satisfaction with their standard of living.

The study then implements, where the data allows, longitudinal analysis of the determinants of satisfaction with their standard of living. Due to data limitations, Australia is omitted from the analysis. Across the remaining four countries, income displays a positive association with satisfaction with standard of living. A measure of net wealth is not available for Germany and Britain; however, the results for the Netherlands and Hungary indicate that higher levels of net wealth are associated with higher levels of satisfaction with their standard of living. Consumption is found to be

positively related to satisfaction with standard of living in Britain; however, there is an inverse relationship in the Hungary analysis.

The analysis presented in this chapter develops that presented in Headey *et al.* (2008) in several ways. Firstly, it presents longitudinal analysis for Germany and Australia, where the household's net wealth is also controlled for. Also, for the analysis for Germany, instead of using satisfaction with household income, the head of household's worries relating to their financial situation is used. This will allow comparison of the determinants of two different measures of financial satisfaction. In addition, the household's net wealth is deconstructed into its constituent parts, to explore the separate influences of household assets and debt.

Van Praag and Ferrer-i-Carbonell (2007), analysing the GSOEP and BHPS, explore the relationship between financial satisfaction, savings and income. Using a probit adapted OLS estimation technique, the study reports that household savings and income have positive impacts on the level of financial satisfaction in both counties. One potential short coming of the analysis presented in Van Praag and Ferrer-i-Carbonell (2007) is that it does not consider the impact of household debt on financial satisfaction.

Hansen *et al.* (2008) explore financial satisfaction in old age. It is frequently observed that financial satisfaction increases in old age despite relatively low incomes. One possible explanation for this observation is that older individuals become accustomed to lower levels of financial resources, that is, individuals revise their expectations and so report higher levels of satisfaction, despite their economic situations not changing. Hansen *et al.* (2008) propose a different explanation, that is, the increases in financial satisfaction can be explained by age differences in wealth and liabilities. Analysing the first wave of the Norwegian Life Course, Aging, and Generation Study (NorLAG), the study aims to assess whether assets and liabilities can explain increasing financial satisfaction in old age. The NorLAG survey comprises of a representative sample of adults aged 40-80. In the analysis, financial satisfaction is measured on a five point scale. The findings suggest that financial satisfaction is influenced by a wide range of financial measures beyond simply income. Furthermore, the study reports that a large proportion of the increase in the level of financial satisfaction in old age can be explained by an increased level of assets and decreased levels of debt held in later life. However, it is still found that, at low levels of income and wealth, older individuals tend to be more financially satisfied than their equally poor younger counter parts.

One of the potential limitations of Hansen *et al.* (2008) is the data analysed in the study. As a consequence of the data being cross-sectional, it is not possible to control for individual heterogeneity which, following Ferrer-i-Carbonell and Frijters (2004), could have a dramatic impact on the estimated coefficients. The empirical analysis presented in this chapter develops the results of Hansen *et al*. (2008) by accounting for individual fixed effects. Also, due to Hansen *et al.* (2008) focusing on the role of financial satisfaction in old age, the data analysed only contains individuals between the ages of 40 and 80. The data analysed in this chapter will allow the exploration of the determinants of financial satisfaction across the whole age range.

Plagnol (2011) considers the impact of assets and debts on financial satisfaction across the life course, using data from the second and third waves of the "National Survey of Families and Households" (NSFH) as these waves include information regarding the respondent's financial satisfaction. Financial satisfaction is measured on a seven point scale where one indicates very dissatisfied and seven indicates very satisfied. Income measures are defined at the household level as are the explanatory variables relating to assets and liabilities. Both absolute measures of debt and monthly debt payments are included in the empirical specifications. In addition, assets as defined into three categories, financial assets, tangible assets and homeownership are considered.

Initially, the study estimates non-parametrically the life course profiles of a variety of independent variables that could potentially be determinants of financial satisfaction. Plagnol (2011) then goes on to estimate parametrically via regression methods, including cross sectional and fixed effects methods, the relationship between a set of independent variables and financial satisfaction. The analysis reveals that financial satisfaction is steadily increasing between the ages of 30 and 78. The findings from the nonparametric estimation indicate that income follows a concave pattern over the life course, suggesting that financial satisfaction is influenced by other factors besides income.

As predicted and in line with the existing literature, the regression analysis reveals that financial satisfaction is increasing in income. The analysis also indicates that the increase in financial satisfaction in later life can be explained by an increase in the level of assets and a decrease in the debt level of the household. The study concludes that measures of wealth should be included in the analysis of financial satisfaction.

The analysis presented in this chapter develops the work of Plagnol (2011), by analysing the determinants of financial satisfaction across both Australia and Germany. Like Plagnol (2011), the analysis controls for unobserved heterogeneity by using an ordered probit model with Mundlak fixed effects due to the ordinal nature of the dependent variables, as opposed to a fixed effects linear regression model. Finally, the links between overall life satisfaction and subjective financial position will be explored by jointly modelling both in a recursive system.

4.2.2 Risk Tolerance

This section outlines the definitions of risk tolerance used in the existing literature in addition to exploring the impact of the individual's risk attitudes on a variety of behaviours and aspects of an individual's life. Xiao *et al*. (2001) assert that risk tolerance is a key component in determining a wide range of personal and household financial decisions, including investment in risky assets. In addition, attitudes towards risk have been shown to be a significant determinant of an individual's decision to invest in human capital (Shaw, 1996), portfolio allocation decisions (Arrow, 1978), the level of debt that individuals hold (Brown *et al.*, 2013), migration (Jaeger *et al.*, 2010), earnings (Dohmen *et al.*, 2005), self-employment (Brown *et al.*, 2011) and risky life style choices such as drinking and smoking (Dohmen *et al.*, 2012). Also, as suggested by Joo and Grable (2004), subjective financial satisfaction could potentially be influenced by an individual's risk attitudes.

In the existing literature, a variety of definitions of risk tolerance and risk attitudes have been used. For example, Kogan and Wallach (1964) define risk tolerance as the willingness of an individual to participate in behaviour, in which there is a goal, but where the goal is uncertain. Similarly, Irwin (1993) defines risk tolerance as the willingness to engage in behaviours where the possible outcomes remain uncertain. Financial risk tolerance is often defined as the maximum amount of volatility or uncertainty that an individual is willing to accept when making financial decisions (Elton *et al.*, 2009). Becker (1975) asserts that an individual's response to uncertainty is determined by the nature and quantity of risk and by tastes or risk attitudes, where risk aversion is part of the individual's risk attitudes. Highhouse and Yuce (1996), on the other hand, define a risk averse individual as someone who prefers a certain outcome to an alternative uncertain outcome. Two common measures of risk aversion are Arrow's Absolute Risk Aversion (ARA) (Arrow, 1965) and Pratt's Relative Risk Aversion (RRA) (Pratt, 1964). ARA is an individual's reaction to uncertainty relating to absolute

monetary gains, whereas RRA relates to uncertainty about a percentage of one's wealth. These measures are often used in the context of portfolio investment decisions, in particular investment in risky assets.

There exists a growing literature on the measurement and determinants of individual risk attitudes. In these studies, a variety of both objective and subjective measures are used to capture an individual's level of risk aversion/tolerance. Analogous to subjective well-being measures, economists are often sceptical about self-reported measures, instead preferring observed behaviours. However, like measures of subjective well-being, which, are increasingly used as a proxy for individual utility, the literature surrounding risk aversion is increasingly using self-reported measures of risk attitudes. For example, Dohmen *et al.* (2005), Dohmen *et al.* (2010), Dohmen *et al.* (2012) and Cardak and Wilkins (2009) all exploit single item measures of self-reported risk attitudes.

One possible way to measure risk aversion is through experimental studies with real cash incentives, however, these studies are often expensive to implement and also difficult to perform with large nationally representative samples. Consequently, it is often preferred to use survey questions. A small number of surveys contain hypothetical decisions relating to a financial lottery or outcome, for example, the Panel Survey of Income Dynamics (PSID) and the GSOEP survey. Dohmen *et al.* (2005) aimed to ascertain the behavioural validity of the survey risk attitudes instrument. The self-assessed risk attitude measures were compared to a traditional hypothetical lottery decision and also to responses to behaviour displayed in a paid real stakes lottery. The study analyses the 2004 wave of the GSOEP survey in conjunction with a field experiment of another representative sample of an additional 450 individuals selected in the same manner as the GSOEP[32]. The field experiment contains the same subjective measures of risk attitudes as the GSOEP survey, but also contains responses to a real stake lottery. Dohmen *et al.* (2005) assert that the responses to the general risk attitudes question contained in the GSOEP survey are reliable predictors of observed risky behaviour. The findings indicate that qualitative survey measures of risk attitudes can generate meaningful measures of risk attitudes.

[32]The subjects are a random sample drawn via a "random walk" method. That is, for each of the 179 voting districts used, one trained interviewer was randomly allocated to a starting house. The interviewer then contacted every third house.

Dohmen *et al.* (2005) then aim to ascertain the determinants of risk aversion using the responses to a general risk attitudes question. It is reported that gender, age, height and parental background are all statistically significant determinants of an individual's risk attitudes. These results were found to be robust over five additional measures of risk aversion, which capture the individual's willingness to participate in risk in different scenarios.

There has long been interest in the role an individual's risk aversion has on the behaviours and investment decisions of an economic agent including finance in addition to wider behaviours. In conjunction with the increase in the exploration of the determinants of an individual's level of risk aversion, the effects of risk attitudes have been increasingly explored. In particular, there has been an increase in the number of studies which explore the impact of risk attitudes on a variety of outcomes. Measures of subjective risk aversion are now widely used in the existing literature as independent variables. For example, Brown *et al.* (2013), Ferrer-i-Carbonell and Ramos (2010), Cardak and Wilkins (2009), Jaeger *et al.* (2010), Worthington (2009) and Barasinska *et al.* (2008) all exploit subjective risk measures as independent variables.

In an early contribution, Shaw (1996) examined the link between risk aversion, financial wealth and human capital investment using the U.S. Survey of Consumer Finances. The study jointly modelled investment in financial wealth and human capital. The study found that human capital was inversely related to the degree of relative risk aversion, whereas, wage growth was positively related to the willingness to undertake risk.

Ferrer-i-Carbonell and Ramos (2010) use the measure of general risk attitudes contained in the GSOEP survey to investigate the relationship between inequality aversion and risk attitudes, and the role that both play in an individual's utility as measured by overall life satisfaction. The study initially includes a measure of income inequality, as measured via a gini coefficient, and finds that inequality is inversely related to overall life satisfaction. The study then includes an interaction term between risk aversion and income inequality in an attempt to capture whether the impact of inequality on life satisfaction was dependent on the individual's level of risk aversion. Risk averse individuals were also more inequality averse, that is, for risk averse individuals; inequality has a greater impact on overall life satisfaction, compared to less risk averse individuals.

Brown *et al.* (2013), analysing the 1984 to 2007 waves of the U.S. PSID, exploited the responses to a hypothetical gamble, contained in the 1996 wave, to construct a measure of risk aversion in order to explore the relationship between household debt and risk attitudes. The study initially presents a theoretical model which predicts the relationship between risk aversion and debt. The study assumes that risk attitudes are constant over time, and consequently, analysed the 1984 to 2007 waves of the PSID. Using a tobit model with Mundlak fixed effects, the study finds that risk aversion is inversely related to the amount of unsecured debt; however, it is not consistently related to asset accumulation.

This chapter makes use of the general measure of risk attitudes included in the GSOEP following Dohmen *et al.* (2005) and Dohmen *et al*. (2012). For Australia, in accordance with Cardak and Wilkins (2009) and Worthington (2009), willingness to participate in financial risks will be used to capture the individual's risk attitudes. The analysis presented in this chapter, in line with Brown *et al.* (2013) and Ferrer-i-Carbonell and Ramos (2010), assumes that the risk attitude measures used for Germany are constant across the period analysed due to limitations of the data. This will be discussed further below.

4.2.3 Determinants of Overall Life Satisfaction

The determinants of overall life satisfaction have been extensively explored in the existing literature (see Section 3.2). It is consistently found that unemployment, being divorced and poor self-assessed health are inversely related to overall life satisfaction. Conversely, income, good health, being married, employment and wealth are positively related to overall life satisfaction. It is reported in the third chapter of this thesis that the subjective financial position of the household exerts a significant impact on overall life satisfaction in Australia and Germany. This supports the findings of Easterlin (2006), Layard (2005) and Van Praag and Ferrer-i-Carbonell (2007), who report a positive relationship between well-being and financial satisfaction.

4.2.4 Joint Modelling

In the existing literature a limited number of studies have employed a joint modelling technique in order to explore the relationship between household finances and well-being. For example, Bridges and Disney (2010) employ a joint modelling approach to explore the relationship between depression and debt in Britain. Analysing the Families and Children Survey (FACS), the study initially exploits a self-reported measure of

depression as a dependent variable and explores the influence of both subjective and objective debt measures. The FACS contains information on the debt levels of the household, in addition to information relating to the subjective debt burden, which is recorded as a binary variable. Using a Probit model to analyse the likelihood of reporting depression, Bridges and Disney (2010) find that it is the subjective, opposed to the objective, debt measures which have a statistically significant impact on the likelihood of being depressed.

The study argues that there is a potential bias in the estimates relating to the subjective debt measures in the likelihood of reporting being depressed as unobserved characteristics may influence both self-reported depression and self-reported subjective debt measures. For example, certain individuals may have a tendency to report lower scores for both measures, irrespective of other characteristics. In order to overcome this potential endogeneity, the study implements a bivariate recursive probit model to jointly model self-reported depression and the subjective debt measure.

The joint analysis reveals that the subjective debt burden is increasing in the objective measures of debt and, in turn, the subjective debt burden measure increases the likelihood of reporting being depressed. The analysis indicates a negative correlation between the unobserved components of the two equations. This negative correlation indicates that the unobserved characteristics that make an individual more prone to report depression more likely to report debt problems. The paper concludes that the 'objective' financial measures have a limited direct impact on the likelihood of being depressed. It is found, however, that they have large indirect effect on the likelihood of reporting being depressed, which is mediated through subjective debt measures.

Another study that exploits a joint modelling approach is Lenton and Mosley (2008). Analysing the 2003 to 2005 waves of the FACS, the study employs a variety of modelling approaches. Initially the study considers the impact of the debt on health, including the role of subjective debt worries and absolute measures of debt. The paper then considers the probability of being in debt and the determinants of worrying about debt. Finally, using a simultaneous equation generalised probit model, the probability of being in debt and the self-reported health status are jointly modelled.

The impact of debt on health from the probit specification reveals that worries about debt have a large negative impact on health status, while, access to low interest repayment structured loans has a positive impact on health. Also, supporting the

findings of the analysis presented in Chapter 3 and presented in Bridges and Disney (2010), it appears that it is the subjective financial position which has a significant relationship with health, rather than the total debt level.

In the simultaneous equation models, it is found that health and debt influence each other. That is, being in debt has a negative impact on reporting good health. Reporting being in good health reduces the probability of being in debt. The influence of reporting being worried about debt is positively associated with the amount of debt held.

Both Bridges and Disney (2010) and Lenton and Moseley (2010), despite using panel data, do not control for individual fixed effects, which are consistently found to be important in analysing such subjective measures. The analysis presented in this chapter attempts to control for the potential endogeneity between subjective life satisfaction and subjective financial position, in addition to individual heterogeneity. This will be done by including a Mundlak correction in the recursive bivariate specifications.

Summary

In summary, from reviewing the existing literature, it is apparent that the empirical analysis presented in this chapter contributes to the existing literature in several distinct ways. Firstly, it develops the analysis presented in Plagnol (2011), Headey *et al.* (2008), Headey and Wooden (2004) and Hansen *et al.* (2008) by employing panel data techniques to assess the relationship between subjective financial position and the level of household assets, debt and net wealth in Australia and Germany. In addition, in line with Brown *et al.* (2005), the analysis will also decompose household total debt into its constituent parts of secured and unsecured debt. Following Joo and Grable (2004), the head of household's risk attitudes are included in the analysis. The analysis presented in this chapter thus further explores the relationship between risk attitudes and financial satisfaction in Australia and Germany.

The chapter then goes on to further explore the relationship between overall life satisfaction and subjective financial position. This is conducted via a joint recursive modelling technique which allows exploration of whether the household's monetary financial position has an indirect impact on overall life satisfaction, and whether this effect is mediated through subjective financial position. It also controls for the potential endogeneity of financial satisfaction in the overall life satisfaction equation which could

result in biased estimates. Another advantage of the joint modelling technique is the ability to recover the correlation between the residuals of each equation. This correlation shows the impact that unobservable characteristics have on the level of the various dependent variables. The joint modelling techniques are described in further detail in the subsequent section.

4.3 Data and Methodology

4.3.1 Data

The analysis presented in this chapter builds on that presented in the previous chapter. In this chapter the Household, Income and Labour Dynamics in Australia (HILDA) survey and the German Socio-Economic Panel (GSOEP) survey are analysed for Australia and Germany[33], respectively, to ascertain the determinants of subjective financial position. In addition they will be analysed to further explore the relationship between overall life satisfaction and subjective financial position.

As in the previous chapter, the data for Australia draws upon the 2002, 2006 and 2010 waves of the HILDA survey. These waves are exploited as they contain a wealth module, which includes information on the monetary values of the household's assets, secured and unsecured debt and net wealth. As described previously, the HILDA survey includes information relating to the household's subjective financial position and their overall life satisfaction. In addition, each wave of the HILDA survey contains a question relating to the respondent's risk attitudes. This allows exploration of the relationships between risk attitudes, subjective financial position and overall life satisfaction. Once missing values are removed a sample of 1,615 household heads, which translates to an unbalanced panel of 3,616 individual/year observations, is obtained for the Australian analysis.

In line with the previous chapter, for Germany, the 2002 and 2007 waves of the GSOEP survey are considered as these waves contain a wealth module. Analogous to the wealth module contained in the HILDA survey, the survey contains detailed information on the household's assets and debts. The GSOEP survey contains information on concerns relating to the household's current economic situation, which will be used as the subjective financial position measure, and also the respondent's overall life satisfaction.

[33] It should be noted that Britain is not considered in the empirical analysis in this chapter due to the BHPS not containing a measure of risk aversion. One of the main contributions of this chapter to the existing literature is to explore the relationship between risk aversion and financial satisfaction.

Unfortunately, the questions relating to an individual's risk attitudes do not coincide with the information relating to the household's financial situation. Consequently, following Ferrer-i-Carbonell and Ramos (2010) and Brown *et al.* (2013), it is assumed that risk tolerance is time invariant[34]. As a result, the information relating to risk attitudes is taken from the 2004 wave of the GSOEP, which contains detailed information on the respondent's attitudes towards risk. This assumption allows the analysis of financial satisfaction to include measures of risk tolerance, which has not previously been implemented for Germany. The resultant sample analysed for Germany consists of 7,712 heads of households, which translates to 15,424 head of household/year observations.

In line with the previous chapter and the existing literature, see for example Bertaut and Haliassos (2002), Brown *et al.* (2005) and Nettleton and Burrows (2008), the analysis presented in this chapter focuses on the head of the household as it is likely that they will assume the role of "accountant" in the household structure. Bertaut and Haliassos (2002) define the "accountant" to be responsible for the financial decision making within the household, this is assumed to be the head of household, see for example, Brown *et al.* (2005). Consequently, the analysis is conducted at the head of household level as it is likely that they are the ones to bear the consequences of the household's financial position. The heads of household for Australia and Germany are as defined in Section 3.3. For Germany, the head of household is defined as the person who best knows how the household acts under general conditions. Following Marks *et al.* (2005) and Doiron and Guttmann (2009), the head of household in Australia is defined as the person in the household with the highest labour income, and if these are equal, it is the oldest individual.

4.3.2 Dependent Variables

This section outlines the dependent variables analysed in this chapter. In order to ascertain the determinants of subjective financial position, and further explore the relationship between subjective financial situation and overall life satisfaction, a variety of dependent variables will be analysed. Initially, the dependent variables relating to subjective financial position are discussed with the overall life satisfaction measures subsequently defined.

[34] The validity of this assumption is discussed in Section 4.3.4 below.

Subjective Financial Position

As outlined in Section 4.2.1, in the existing literature, a variety of measures have been exploited in an attempt to capture an individual's financial satisfaction. Analogous to overall life satisfaction, both single item measures and multiple item measures have previously been employed. Both the GSOEP and HILDA surveys contain single item measures of subjective financial position. This type of single item measure is being increasingly used in the literature, see for example, Headey and Wooden (2004), Plagnol (2011) and Van Praag and Ferrer-i-Carbonell (2007), amongst many others.

For the Australian analysis, in accordance with Qu and Weston (2003), Inder *et al.* (2012) and Siahpush *et al.* (2007) and the previous chapter, the head of household's subjective financial position is a single item measure constructed from the question *"Given your current needs and financial responsibilities, would you say that you and your family are... prosperous, very comfortable, reasonably comfortable, just getting along, poor or very poor?"* In line with the previous chapter, due to insufficient observations, the categories of very poor and poor are combined and consequently the dependent variable is measured on a five point scale, where zero indicates "*poor"* or "*very poor*" and four represents "*prosperous*". The summary statistics of financial satisfaction are presented in Table A4.1 and the distribution presented in Figure A4.1. It is clear from the distribution of financial satisfaction that it is measured on an ordinal discrete scale and, consequently, it will be analysed via ordered choice models including an ordered probit model with Mundlak fixed effects.

From Figure A4.1, the distribution appears to be relatively symmetric, as is indicated by the mean being 2.05 and a median of 2. The descriptive statistics indicate small differences between the levels of subjective financial position for males and females, with males, on average, report a level of financial satisfaction of 2.06 compared to 2.03 for females.

The analysis for Germany, in line with the previous chapter and the existing literature, for example, Goldstein and Kreyenfeld (2011), Fitzgerald (2012), Delken (2008) and Hoffmann and Hohmeyer (2013), is based on the measure of financial satisfaction generated from the question *"What is your attitude towards the following areas – are you concerned about them? Your own economic situation"*. The three possible responses to this question were *"not at all concerned", "concerned"* and *"very concerned"*. This variable is measured on an ordinal scale where zero indicates *"not at*

all concerned" and two represents *"very concerned"*. As a result of how the dependent variable is defined, positive coefficients indicate an increase in financial concerns and fall in financial satisfaction and, conversely, a negative coefficient is associated with an improvement in financial satisfaction. The distribution and summary statistics are presented in Figure A4.3 and Table A4.1, respectively.

From Table A4.1 and Figure 4.3, it is clear that the majority of heads of household, 48.8%, report *"concerned"* about their current finances. Of the sample analysed, 20.5% of household heads report being *"very concerned"* with their current financial situation whilst 30.7% report *"not at all concerned"* about their finances. The average score of the dependent variable is 0.90, whilst the median is 1. In order to ascertain the determinants of financial satisfaction in Germany, this chapter employs an ordered probit specification with Mundlak fixed effects.

Overall Life Satisfaction

Overall life satisfaction has received increased attention in recent years, both regarding its determinants and its measurement. For comprehensive reviews of overall life satisfaction literature, see Dolan *et al.* (2008) and MacKerron (2012). In this chapter, single item measures of overall life satisfaction are exploited in line with Ferrer-i-Carbonell and Frijters (2004), Winkelmann and Winkelmann (1998) and Clark and Oswald (1994), amongst many others.

As defined in Section 3.3.2, subjective well-being for Australia is captured by a single item measure relating to overall life satisfaction. Specifically, the question posed was, *"How satisfied are you with your life, all things considered?"* This is measured on an eleven point scale; however, the first five categories are combined due to lack of observations. This approach accords with the analysis presented in Boes and Winkelmann (2004) who combine the first five categories into two categories. The distributions and summary statistics are given in Figure A4.2 and Table A4.2, respectively.

It is clear from Figure A4.2, that the distribution is relatively symmetric, a finding which is at odds with the existing literature, see, for example, Dolan *et al.* (2008). This can be explained by the fact that the first five categories are combined. Otherwise this distribution would appear negatively skewed. The average score of overall life satisfaction is 3.90 for both males and females.

In accordance with the previous chapter, overall life satisfaction for Germany is constructed from the question "*How satisfied are you with your life, all things considered?"* As with the Australian measure of life satisfaction, this is measured on an eleven point scale, where zero indicates completely dissatisfied and ten indicates completely satisfied. As stated in the previous chapter, unlike Australia, there are a sufficient number of observations to maintain an eleven point scale[35]. The summary statistics and distribution are presented in Table A4.2 and Figure A4.4 respectively.

It is clear that the distribution analysed is discrete and ordered in nature, with a negatively skewed distribution, consistent with the existing literature and the previous chapter. The average overall life satisfaction score for the sample analysed is 6.90. On average, females report being less satisfied than males. Females report an average life satisfaction score of 6.78, compared to an average score for 6.97 of male household heads.

4.3.3 Methodology

Initially, this chapter employs an ordered probit model with Mundlak Fixed effects to assess the impact of a variety of independent variables on subjective financial position, with a particular focus on the level of a variety of household financial measures and risk attitudes. These measures will include risk tolerance, total assets, total debt, unsecured debt, secured debt and the net wealth of the household.

A bivariate ordered probit model will then be employed to account for the potential endogeneity of the individual's subjective financial position in the overall life satisfaction equation. The joint modelling approach will also allow the exploration of the potential mediating effect of subjective financial position between the household's monetary financial position and overall life satisfaction. This section firstly outlines the ordered probit model with Mundlak fixed effects. The section goes on to outline the bivariate ordered pobit model with Mundlak fixed effects.

4.3.3.1 Ordered Probit Model with Mundlak Fixed Effects

The ordered probit model was proposed by McElvey and Zavoina (1975) to analyse ordered or categorical outcomes. This type of model has since been employed to analyse a variety of outcomes, including self-assessed health status and satisfaction

[35] It should be noted that the results presented for Germany are robust to collapsing the first five categories into one, as in the analysis for Australia.

outcomes in a variety of different contexts and is commonly used in the existing economics literature. The model is applicable when the outcome is taken from a set of discrete ordered choices. This section draws heavily from Greene and Hensher (2010), who provide a comprehensive review of techniques employed to model ordered choices and provides a full explanation of the ordered probit model.

The ordered probit model is preferred to the fixed effects ordered logit model proposed by Baetschmann *et al.* (2011) and employed in the previous chapter, in order to maintain the same functional form throughout the analysis. Following Holm and Jaeger (2011), it is not possible to formulate a bivariate ordered logit model as here is no bivariate logit distribution, and as a result, it is not possible to recover the correlation between the unobserved characteristics in each equation. Similarly, Greene and Hensher (2010) state there is no convenient formulation of a bivariate logit model, therefore, a bivariate ordered probit model is employed in the analysis presented in this chapter, and for consistency, an ordered probit model is used throughout the analysis.

The ordered probit model is based upon a latent regression model, that is:

$$y^{*}_{i,t} = \boldsymbol{\beta}'\mathbf{x}_{i,t} + \alpha_i + u_{i,t},\ i = 1, \ldots, N,\ t = 1, \ldots, T. \tag{4.1}$$

The vector $\mathbf{x}_{i,t}$ is a set of K covariates; $\boldsymbol{\beta}$ is a vector of K parameters that are to be estimated. The error term is represented as an individual time invariant component, represented by α_i, and the unobserved time varying component $u_{i,t}$ which is assumed to be normally distributed across observations with mean zero and variance equal to one. The dependent variable $y^{*}_{i,t}$ is unobserved in practice; however, it is possible to observe:

$$\begin{aligned}
&y_{i,t} = 1 \quad \text{if } y^{*}_{i,t} \leq \mu_1 \\
&y_{i,t} = 2 \quad \text{if } \mu_1 < y^{*}_{i,t} \leq \mu_2 \\
&y_{i,t} = 3 \quad \text{if } \mu_2 < y^{*}_{i,t} \leq \mu_3 \\
&\qquad \vdots \\
&y_{i,t} = J \quad \text{if } \mu_{J-1} < y^{*}_{i,t} \leq \mu_J
\end{aligned} \tag{4.2}$$

where μ_j are the threshold parameters which are defined to be strictly increasing in j and are to be estimated with $\boldsymbol{\beta}$. The probabilities associated with each observed outcome are given by:

$$\begin{aligned}\Pr ob(y_{i,t} = j \mid x_{i,t}, \alpha_i) &= F(\mu_{i,j+1} - \mathbf{x}_{i,t}'\boldsymbol{\beta} - \alpha_i) - F(\mu_{i,j} - \mathbf{x}_{i,t}'\boldsymbol{\beta} - \alpha_i) \\ &= \phi(\mu_{i,j+1} - \mathbf{x}_{i,t}'\boldsymbol{\beta} - \alpha_i) - \phi(\mu_{i,j} - \mathbf{x}_{i,t}'\boldsymbol{\beta} - \alpha_i)\end{aligned} \quad (4.3)$$

where F(.) denotes the cumulative standard normal distribution function of the residual term, $u_{i,t}$, and it is assumed that the distribution of $u_{i,t}$ is conditional on $\mathbf{x}_{i,t}$. In order for these probabilities to be positive, we must have strictly increasing threshold parameters.

Following Ferrer-i-Carbonell and Frijters (2004), it is important to account for individual fixed effects. Consequently, following Mundlak (1978), a vector of means of the time varying variables are included in order to approximate a fixed effects estimator. The underlying model in this case becomes:

$$\mathbf{y}^*_{i,t} = \boldsymbol{\beta}'\mathbf{x}_{i,t} + \boldsymbol{\gamma}'\bar{\mathbf{x}}_i + \alpha_i + u_{i,t} = \boldsymbol{\pi}'\mathbf{z}_{i,t} + \alpha_i + u_{i,t},\ i = 1, \ldots, N,\ t = 1, \ldots, T. \quad (4.4)$$

where $\bar{\mathbf{x}}_i$ is the vector of the means across time variant variables and $\beta'\mathbf{x}_{i,t} + \gamma'\bar{\mathbf{x}}_i = \pi'\mathbf{z}_{i,t}$. This gives the approximation of a fixed effects estimator. This approach has been employed in Brown *et al.* (2011), Brown *et al.* (2013), Ferrer-i-Carbonell and Ramos (2010) and Ferrer-i-Carbonell (2005).

The log likelihood function is given by:

$$\ln L = \sum_{i=1}^{n}\sum_{j=0}^{J} \log\left[F(\mu_j - \boldsymbol{\pi}'\mathbf{z}_i) - F(\mu_{j-1} - \boldsymbol{\pi}'\mathbf{z}_i) \right] \quad (4.5)$$

Maximisation is performed subject to the constraint that the parameter μ_j lies on the real interval.

Marginal Effects

In the ordered probit model, there is no conditional mean function which provides the marginal effects. That is,

$$\frac{\partial \Pr ob(y = j \mid \mathbf{z})}{\partial z_k} = (f(\mu_{j-1} - \boldsymbol{\pi}'\mathbf{z}) - f(\mu_j - \boldsymbol{\pi}'\mathbf{z}))\pi_k \quad (4.6)$$

The magnitude is dependent upon the scale factor, the coefficients and the threshold parameters. The sign of this is dependent on the densities at two points of the distribution, and consequently, it is hard to determine what it means to be significant.

For this reason, we will focus on the probability on being in the upper most categories as the signs of changes in this category are definite.

4.3.3.2 The Bivariate Ordered Probit Model

The analysis presented in the previous chapter suggests that the head of household's subjective financial position is a significant determinant of overall life satisfaction. However, this relationship could potentially be biased if there are unobserved characteristics which influence both financial satisfaction and overall life satisfaction. These unobserved characteristics in the overall life satisfaction equation could be correlated with independent variables which capture the head of household's financial satisfaction. This could lead to the estimates capturing both the effect of the head of household's subjective financial satisfaction and, in addition, the impact of the unobserved characteristics on overall life satisfaction.

Generally, when an endogenous variable is encountered, an instrumental variable approach is often implemented in order to ascertain the causal unbiased relationship. Consequently, instrumental variable techniques have become a common approach in the applied micro-econometrics literature. However, problems arise when both the dependent and potentially endogenous variable are discrete and ordered in nature. In this situation, standard instrumental variable (IV) techniques, such as two stage least squares, frequently fail and consequently, a different econometric technique is required. Greene and Hensher (2010) assert that an IV approach is not applicable in a non-linear model, such as the ordered probit model, as a traditional IV approach is based upon the moments of the data. As the ordered probit specification uses maximum likelihood estimation approach, opposed to OLS, it is not obvious how an IV method would apply.

Following, Greene and Hensher (2010), when both the dependent variable and endogenous variable are ordered, the preferable estimation technique is a bivariate ordered probit model. Greene and Hensher (2010) present a selection of studies from a variety of disciplines which employ a bivariate estimation approach. The bivariate ordered probit model is becoming increasingly applied in the existing literature. For example, Magee *et al.* (2000), Bhat and Singh (2000), Dupor *et al*. (2004), Adams (2006), Scotti (2006) and Mitchell and Weale (2007) all employ a bivariate ordered probit specification to analyse a range of problems. These include correlation between husbands and wife's education, travel related activities, views on health care reforms

and accuracy of expectations relating to financial circumstances in Britain, amongst other things.

This chapter will employ a recursive bivariate ordered probit specification to jointly analyse the determinants of overall life satisfaction and subjective financial position. The joint modelling of overall life satisfaction and subjective financial position will account for unobserved characteristics which potentially influence both dependent variables.

Following Ferrer-i-Carbonell and Frijters (2004), it is also important to control for unobserved heterogeneity when exploring the determinants of subjective satisfaction measures. Consequently, in line with the univariate ordered probit analysis discussed above and as suggested in Greene and Hensher (2010), Mundlak fixed effects are implemented, that is the inclusion of the group means of the time varying variables. For the two dependent variables, $y^{*}_{i,1}$ and $y^{*}_{i,2}$ which indicate subjective financial position and overall life satisfaction, respectively, the bivariate ordered probit specification is defined as:

$$y^{*}_{i,1} = \boldsymbol{\beta}_1'\mathbf{x}_{i,1} + \boldsymbol{\delta}_1'\bar{\mathbf{x}}_{i,1} + \varepsilon_{i,1} = \boldsymbol{\pi}_1'\mathbf{z}_{i,1} + \varepsilon_{i,1}, \quad y_{i,1} = j \text{ if } \mu_{j-1} < y^{*}_{i,1} \leq \mu_j, \quad j = 0,...,J \qquad (4.7)$$

$$y^{*}_{i,2} = \gamma_1 y_{i,1} + \boldsymbol{\beta}_2'\mathbf{x}_{i,2} + \boldsymbol{\chi}_2'\bar{\mathbf{x}}_{i,2} + \varepsilon_{i,2} = \boldsymbol{\pi}_2'\mathbf{z}_{i,2} + \varepsilon_{i,2}, \; y_{i,2} = k \text{ if } \mu_{k-1} < y^{*}_{i,2} \leq \mu_k, k = 0,...,K \qquad (4.8)$$

where $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_2$ are vectors of parameters to be estimated, γ_1 is an unknown scalar, $\mathbf{x}_{i,1}$ and $\mathbf{x}_{i,2}$ are vectors of observable characteristics whilst $\bar{\mathbf{x}}_{i,1}$ and $\bar{\mathbf{x}}_{i,2}$ are the group means and provide the Mundlak correction. Also as in the univariate specification, the parameters are estimated as follows, $\boldsymbol{\pi}_1'\mathbf{z}_{i,1} = \boldsymbol{\beta}_1'\mathbf{x}_{i,1} + \boldsymbol{\delta}_1'\bar{\mathbf{x}}_{i,1}$ and $\boldsymbol{\pi}_2'\mathbf{z}_{i,2} = \gamma_1 y_{i,1} + \boldsymbol{\beta}_2'\mathbf{x}_{i,2} + \boldsymbol{\chi}_2'\bar{\mathbf{x}}_{i,2}$. μ_k and μ_j represent the threshold parameters which are to be estimated, whilst the error terms ($\varepsilon_{i,2}$, $\varepsilon_{i,2}$) are identically distributed, with a bivariate normal distribution, with a mean of zero and unit variance and correlation coefficient. That is, $\varepsilon_{i,1}$ and $\varepsilon_{i,2}$ are assumed to be white noise processes distributed, $\varepsilon_{i,1}, \varepsilon_{i,2} \sim N(0, 0, \sigma_1^2, \sigma_2^2, \rho)$. These error terms are correlated across the financial satisfaction and overall life satisfaction equations such that:

$$\begin{pmatrix} \varepsilon_{i,1} \\ \varepsilon_{i,2} \end{pmatrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right] \tag{4.9}$$

where all standard errors are clustered at the individual level to allow for repeated observations over time.

In a bivariate specification, failure to reject the null hypothesis $(\rho = 0)$ suggests that endogeneity is not a problem and therefore the coefficients estimated in a univariate specification do not suffer from bias. Should there be sufficient evidence to reject the null hypothesis; this suggests that subjective financial situation is not exogenous and consequently the results are biased. As a result, joint modelling estimation is preferred as it accounts for the endogeneity of subjective financial in the overall life satisfaction equation. In the instance where ρ is positive, it follows that unobserved characteristics increase both financial satisfaction and overall life satisfaction. If ρ is negative, then the opposite applies.

The joint probability of observing j in the financial well-being equation and k in the overall life satisfaction equation, which is $y_{i,1} = j$ and $y_{i,2} = k$, is given by:

$$\begin{aligned} &\text{prob}(y_{i,1} = j, y_{i,2} = k \mid x_{i,1}, x_{i,2}) = \\ &\quad \begin{bmatrix} \Phi_2\left[(\mu_j - \pi_1 '\mathbf{z}_{i,1}), (\mu_k - \pi_2 '\mathbf{z}_{i,2} - \gamma_1 y_{i,1}), \rho\right] \\ -\Phi_2\left[(\mu_{j-1} - \pi_1 '\mathbf{z}_{i,1}), (\mu_k - \pi_2 '\mathbf{z}_{i,2} - \gamma_1 y_{i,1}), \rho\right] \end{bmatrix} \\ &\qquad - \begin{bmatrix} \Phi_2\left[(\mu_j - \pi_1 '\mathbf{z}_{i,1}), (\mu_{k-1} - \pi_2 '\mathbf{z}_{i,2} - \gamma_1 y_{i,1}), \rho\right] \\ -\Phi_2\left[(\mu_{j-1} - \pi_1 '\mathbf{z}_{i,1}), (\mu_{k-1} - \pi_2 '\mathbf{z}_{i,2} - \gamma_1 y_{i,1}), \rho\right] \end{bmatrix} \end{aligned} \tag{4.10}$$

These probabilities enter the log likelihood function and are maximised to yield the parameter estimates.

The recursive framework allows the exploration of whether financial satisfaction acts as a mediator between the household's monetary financial situation and overall life satisfaction. That is, the household's monetary financial situation may influence the head of household's subjective financial position, and the subjective financial position then in turn may influence the head of household's overall life satisfaction.

The bivariate ordered probit model will be estimated using the "bioprobit" command in STATA, developed by Sajaia (2008).

Following Wilde (2000) it is possible to identify the system of equations presented in Equations 4.7 and 4.8 on the non-linearity of the system. However, in order to aid the identification of the model, a variable is included only in the financial satisfaction equation, which is not is assumed not to influence overall life satisfaction. In this context, the head of household's level of risk aversion is thought to influence an individual's level of financial satisfaction but not their level of life satisfaction.

Risk attitudes have long been associated with financial and investment decisions see for example, Arrow (1965). In addition, risk preferences have been found to be strongly correlated to an individual's level of financial knowledge, see for example, Joo and Grable (2004), Goldberg (1995) and Grable and Joo (1997). Therefore, risk attitudes will influence the investment decisions an individual makes and these, in turn, will influence an individual's level of financial satisfaction. As a result, the risk attitude of the individual is thought to influence the subjective financial position of the head of household and not directly the head of household's overall life satisfaction. In the existing literature, risk attitudes have been found to influence a variety of individual behaviours, as outlined in section 4.2.2. These behaviours and decisions in turn influence overall life satisfaction rather than risk tolerance having a direct impact on overall life satisfaction.

In addition, for the analysis of Australia, following the analysis of the previous chapter, the monetary financial values are not included in the overall life satisfaction equation, only the financial satisfaction equation[36].

Marginal Effects

As with the majority of multivariate models, the marginal or partial effects are often complicated functions of the parameter estimates. In the bivariate model, there exist several potential marginal effects, which can be computed, and consequently selection

[36] Despite the theoretical argument for including an individual's risk aversion in their financial satisfaction equation, it appears that, in practice, it is a poor instrument. For example, an individual's risk aversion is found to be a statistically significant determinant of overall life satisfaction. In addition, if the model is identified purely on the functional form of the model, with risk tolerance included in both or neither of equations 4.7 or 4.8, then the independent variables have similar impacts on each dependent variable, however, the rho parameter becomes statistically insignificant. Upon the inclusion of other identifying variables in the financial satisfaction equation, the results remain equivalent to those that just include the risk aversion measure in the financial satisfaction equation. These additional instrumental variables include binary variables indicating whether the individual holds life insurance and whether they hold financial assets. It is believe that these variables influence financial satisfaction however not overall life satisfaction.

of the most appropriate is relatively subjective. Greene and Hensher (2010) suggest computation of the derivatives of the conditional probability, that is:

$$\text{Prob}\left(y_{i,1} \mid y_{i,2} = k, \mathbf{z}_{i,1}, \mathbf{z}_{i,2}\right) = \text{Prob}\left(y_{i,1} = j, y_{i,2} = k \mid \mathbf{z}_{i,1}, \mathbf{z}_{i,2}\right) / \text{Prob}\left(y_{i,2} = k \mid \mathbf{z}_{i,2}\right) \quad (4.11)$$

Hence, the marginal effects reported in this chapter are at the margin of reporting the highest level of overall life satisfaction, given that the head of household reports being in the highest level of subjective financial position. Conversely, the marginal effect of each coefficient will be reported for the probability of being in the highest level of subjective financial position conditional on being in the highest state of overall life satisfaction[37].

4.3.4 Independent Variables

This section defines the independent variables controlled for in the empirical analysis presented in this chapter. Initially, the explanatory variables included in the financial satisfaction equation are defined. The section then subsequently goes on to briefly discuss the explanatory variables controlled for in the overall life satisfaction equation.

4.3.4.1 The Subjective Financial Position Model

Based on the existing literature outlined in Section 4.2, a variety of demographic and socio-economic characteristics are controlled for in the financial satisfaction model. These include: age; marital status; household size; education; employment status; self-assessed health and the head of household's risk attitudes. In addition, variables capturing the monetary position of the household will also be included; namely, household total assets, total debt, unsecured and secured debt and net wealth. The descriptions of the independent variables are presented in Tables A4.3 and A4.5 for Australia and Germany, respectively, with the corresponding summary statistics presented in Tables A4.4 and A4.6. This section initially outlines the variables representing the household's monetary financial position and then proceeds to outline the remaining independent variables.

Monetary Financial Measures

In the existing literature, a limited number of studies consider the influence of the household's level of assets and debt on financial satisfaction. For example, Heady and

[37] For some key selected variables, namely income, risk tolerance, total assets and total debts, a full matrix relating to the marginal effects of being in each category will be presented.

Wooden (2004) found that household net wealth is associated with higher levels of financial satisfaction in Australia. In addition, Headey *et al.* (2008) find that satisfaction with standard of living is increasing in household net wealth across a variety of countries. Similarly, Hansen *et al.* (2008) find, based upon cross-sectional analysis, that the levels of total assets and total debt are positively and negatively related to financial satisfaction, respectively. Plagnol (2011) employs panel data techniques and draws the same conclusions to Hansen *et al.* (2008). As in Hansen *et al.* (2008) and Plagnol (2011), the household's net wealth is split into assets and a variety of debt measures, in order to ascertain whether certain types of debt are related to financial satisfaction.

The household's monetary financial situation is measured by a variety of variables which capture the household's level of assets, total debt, secured and unsecured debt and net wealth. Full details of these variables are defined as in Section 3.3.4, with only a brief description provided here. The summary statistics for the samples analysed in this chapter are presented in Tables A4.4 and A4.6, whilst the distributions for Australia and Germany are given in Figures A4.5 and A4.6, respectively.

Total Assets

For the Australian analysis, in accordance with the previous chapter, the value of the household's total assets is given by summing the value of the household's financial and non-financial assets. This chapter uses the derived variables contained in the HILDA survey, and are as described Section 3.3.3 and further described in the HILDA user manual. The monetary values of total assets in 2002 and 2006 waves are inflated to the 2010 level. The household total assets for Australia are denoted by Ta^A.

In line with Brown and Taylor (2008), the value of the household's total assets for Germany is constructed by summing the value of the household's financial assets, tangible assets and the value of any property owned by the household[38]. These are then inflated to 2007 prices. The value of household total assets for Germany is represented by Ta^G.

[38] The GSOEP wealth module contains derived variables that use imputed variables to account for missing responses. Consequently, five versions of each derived variable are included and their value is dependent on the imputation method used. This chapter uses the method presented in Brown and Taylor (2008) and employed in the previous chapter and constructs its own measures of the household's financial variables. The analysis was replicated with the imputed variables and similar results were found.

The natural logarithm of total assets is defined in accordance with the previous chapter: the natural logarithm of household total assets is $\ln(Ta^i)$ if $Ta^i > 0$ and 0 if $Ta^i = 0$, where $i = A$ and G indicate Australia and Germany, respectively.

Secured Debt

Household secured debt refers to the household's mortgage debt and other property debt, which we denote by Sd^A. For Germany, the level of secured debt is generated by summing the total debt on any property owned by the household. Household secured debt for Germany is denoted by Sd^G. In line with household total assets, the natural logarithm is taken to account for the highly skewed nature of household secured debt.

In accordance with household total assets, the natural logarithm of household secured debt is taken, that is, $\ln(Sd^i)$ if $Sd^i > 0$ and 0 if $Sd^i = 0$, where $i = A$ and G indicate Australia and Germany, respectively.

Unsecured Debt

The unsecured debt of the household in the HILDA is given by summing the household's credit card debt, their Higher Education Contribution Scheme (HECS) debt, and other personal debt, and is denoted by Ud^A.

For Germany, the household's level of unsecured debt is constructed from responses to the question, *"Leaving aside any mortgages on house or property or house-building loan: Do you currently still own money on loans that you personally were granted by a bank, other organization, or private individual, and for which you personally are liable? How high are your outstanding debts?"* This question relates to the individual's unsecured debt. Those who respond "*no*" to the initial question are assigned the value of zero, while the household's level of unsecured debt is given by summing the levels of unsecured debt of each individual in the household.

The natural logarithm of household unsecured debt is taken using the same procedure as above: the natural logarithm of unsecured debt is defined as $\ln(Ud^i)$ if $Ud^i > 0$ and 0 if $Ud^i = 0$, where $i = A$ and G.

Total Debt

Household total debt is given by adding household unsecured and secured debt, that is $Ud^i + Sd^i = Td^i$, where $i = A$ and G indicate Australia and Germany, respectively. In line with the other monetary financial variables and the previous chapter the natural logarithm of total debt is included in the analysis.

Net wealth

Following Barwell *et al.* (2006), the net financial position of the household is explored. It is argued that the state of the household's balance sheet is given by the relative size of assets to debt, that is, net wealth. Household net worth is the value of total assets of the household minus the household's total debt, $nw^i = Ta^i - Td^i$, where $i = A$ and G indicates Australia and Germany, respectively.

In accordance with the previous chapter the natural logarithm of net wealth is employed. In the case where $nw^i > 0$, the natural logarithm is simply taken and if $nw^i = 0$, then the natural logarithm of net worth is defined to be zero, $\ln(nw^i) = 0$ if $nw^i = 0$. If household net worth is negative, that is $nw^i < 0$, then the natural logarithm is defined to be, $(-1)\ln(|nw^i|)$.

Demographic and Household Characteristics

The analysis presented in this chapter also controls for a variety of demographic, household and socio-economic characteristics, which are specified from the existing literature. The definitions and summary statistics for Australia are presented in Tables A4.3 and A4.4, respectively, while Tables A4.5 and A4.6 show the corresponding independent variable definitions and summary statistics for Germany.

Risk Attitudes

In the existing literature there is only one study that, when exploring the determinants of financial satisfaction, considers the impact of the individual's attitudes towards risk. Joo and Grable (2004) argue that risk attitudes can result in different financial decisions and outcomes and ultimately influence financial satisfaction. The level of risk tolerance has also been shown to be closely related to an individual's level of financial knowledge. Joo and Grable (2004) report that individuals who believe they are more knowledgeable about financial and investment decisions generally report being more

risk tolerant. Similarly, Goldberg (1995) and Grable and Joo (1997) both report that individuals who regard themselves as being more experienced investors or more knowledgeable about their personal finances also tend to be more risk tolerant. Consequently, the level of self-reported risk attitudes could potentially capture the level of financial knowledge, and, as a result, risk tolerance is anticipated to be positively related to the level of financial satisfaction.

For Australia, in line with Cardak and Wilkins (2009) and Worthington (2009), the head of household's risk attitudes is based on the question: *"Which of the following statements comes closest to describing the amount of financial risk that you are willing to take with any spare cash? That is cash used for savings or investments?"* The respondent is then given the choice of the following responses: *"I take substantial risks expecting to earn substantial returns"*, *"I take above average risks expecting to earn above average returns"*, "*I take average risks expecting to gain average returns"* and *"I am not willing to take any financial risks"*. Following Dohmen *et al.* (2005), the measure is collapsed into a binary variable to indicate whether the individual is risk tolerant or not. A head of household is said to be risk tolerant if they respond as either taking "*substantive risks*" or "*above average risks*". Of the sample analysed, 16.5% are defined as risk tolerant.

For Germany, the measure of risk attitudes is defined from the question *"Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?"* This is measured on an eleven point scale, where zero indicates "risk averse" and ten represents "fully prepared to take risks". This measure is included in the 2004 wave of the GSOEP survey and, following Brown *et al.* (2013), Ferrer-i-Carbonell and Ramos (2010) and Keese (2012), risk attitudes are assumed to be constant over time. Following Dohmen *et al.* (2005) and Jaeger *et al.* (2010), and in line with the Australian analysis, this measure is collapsed into a binary risk measure, where a value of one is assigned to individuals who report a score of six or above and a value of zero if the report five or below. These are referred to as risk tolerant and risk averse individuals, respectively. Dohmen *et al.* (2005) argue that, despite collapsing the risk attitudes into a binary measure loses some information contained in the ordered measures; a binary measure is preferred for ease of interpretation. In addition, Dohmen *et al.* (2005) report that imposing a cut off of six or above on an eleven point scale does not influence the behavioural validity of the risk attitude response. Of the German sample analysed 33.7% are defined as risk tolerant.

The assumption of time invariant individual risk attitudes has been shown not to be a strong assumption, see, for example Ferrer-i-Carbonell and Ramos (2010). Analysing the GSOEP survey, they report that there is little variation on individuals risk attitudes across the time period they consider. The paper reports that between 2004 and 2006, 55% of the sample variation in self-reported risk was one or less, with a further 20% of respondents reporting a two point change. The paper therefore concludes that risk attitudes are persistent across time. Following a similar approach to Ferrer-i-Carbonell and Ramos (2010), the stability of the risk attitudes measures in Australia is considered. This is done by exploring the first and second moments of risk attitude measures across the three waves of the HILDA survey analysed.

Across the three years considered, the binary risk tolerance measure varies by 0.029, with the average risk tolerance scores being 0.1809, 0.1652 and 0.1521 for the 2002, 2006 and 2010 waves, respectively. In the sample analysed, 82.3% of individuals have constant risk tolerance responses over time, as indicated by individuals reporting a variance of zero across the three waves. Similarly, there is a failure to reject the null hypothesis that the average scores in each year are equal. These findings support those presented in Ferrer-i-Carbonell and Ramos (2010) and as a result, risk attitudes are assumed to be time invariant.

Age

In the existing literature, there is some debate surrounding the impact of age on financial satisfaction. Using cross-sectional data, Hansen *et al.* (2008), Xiao *et al.* (2009), Vera-Toscano *et al.* (2006) and Hsieh (2001) find a positive relationship between age and financial satisfaction. Conversely, Van Praag *et al.* (2010) and Vera-Toscano *et al.* (2006) find a U-shaped age pattern in financial satisfaction. Conversely, Plagnol (2011), Parrotta and Johnson (1998) and Joo and Grable (2004) find that the age of the individual does not have a statistically significant impact on financial satisfaction.

Following the existing literature, the age of the head of household is controlled for in the analysis of financial satisfaction. In order to capture the potential non-linear relationship between age and financial satisfaction, both age and age squared divided by hundred are included in the analysis. The average age of the head of household analysed for Australia is 43.84 years old, compared to an average age of 51.99 years for the German sample.

Gender

In the existing literature, Hsieh (2001), Vera-Toscano *et al.* (2006) and Joo and Grable (2004) find that gender is not a significant determinant of financial satisfaction. In a cross-sectional specification, Plagnol (2011) finds that being male is associated with lower levels of financial satisfaction. Conversely, Bonke (2008) find a positive relationship between being male and financial satisfaction.

Consequently, a binary variable, which takes a value of one for females and zero for males, is included in order to capture the potential gender differences in financial satisfaction. In the Australian sample 23.8% of household heads are female, whilst 37.1% are females in the German sample.

Household Income

In the existing literature it is consistently found that income is positively related to financial satisfaction, see, for example, Hsieh (2000, 2001, 2003), Vera-Toscano *et al.* (2006), Plagnol (2011), Hansen *et al.* (2008), Headey *et al.* (2008) and Headey and Wooden (2004). Consequently, the natural logarithm of household income is included in the control variables. These variables are defined as in the previous chapter and the relevant descriptions are found in Tables A4.3 and A4.5 for Germany and Australia, respectively.

Household Size

The number of people present in the household has been previously found to have a detrimental impact on financial satisfaction. For example, Van Praag *et al.* (2010), Vera-Toscano *et al.* (2006) and Plagnol (2011) all report an inverse relationship between financial satisfaction and household size. In this chapter, the specification implemented in Van Praag *et al.* (2010) is used, where the natural logarithm of the number of people, both adults and children, in the household is included in the analysis for both Australia and Germany. In line with Van Praag *et al.* (2010), Luttmer (2005), Winkelmann (2005) and Boes and Winkelmann (2004) the natural logarithm is taken in order to account for the skewed nature of the household size.

The average household size in Australia is 2.89 people, with the median number of people present in the household given to be 3. For Germany, the mean and median are

2.46 and 2, respectively. Once the natural logarithms are taken, the average levels are 0.90 and 0.77 for Australia and Germany, respectively.

Employment Status

In the existing literature, the current employment status of the individual is found to be an important determinant of financial satisfaction. Plagnol (2011) finds that unemployment is inversely related to financial satisfaction. Similarly, Van Praag *et al*. (2010) and Headey and Wooden (2004) find that employment is positively related to financial satisfaction whereas unemployment is associated with lower levels of financial satisfaction. Similarly, Hsieh (2001) finds that employment is positively related to financial satisfaction. In addition, Plagnol (2011) and Hsieh (2001) report that being retired is positively related to financial satisfaction.

This chapter controls for the employment status of the head of household. For Australia and Germany, a series of binary variables are included to capture whether the head of household is currently not in the labour force, whether the head of household is currently unemployed and whether the head of household is retired. The summary statistics are presented in Tables A4.4 and A4.6 for Australia and Germany, respectively, and, as outlined in the previous chapter, a small percentage of the heads of household are currently unemployed in the Australian sample due to how the head of household is defined.

For Australia, 0.9% of the sample is defined as unemployed, while 1.1% of household heads are considered not to be in the labour force and 2.2% of the sample is classified as retired. In the German sample, 5.1% report being unemployed, 13.9% are defined not to be in the labour force and 20.3% report being retired.

Education

In the existing literature, there appears to be no consensus over the effect of education on financial satisfaction. For example, Lown and Ju (1992) and Joo and Grable (2004), report that higher levels of education are associated with higher levels of financial satisfaction. Conversely, Hira *et al.* (1992) found no statistically significant relationship between education and overall life satisfaction. For both Australia and Germany, the highest level of education is defined as in Section 3.4. A series of variables are included which capture education levels which are equivalent to having GCSEs, A-level, vocational degree and tertiary education in terms of English qualifications.

Marital Status

Marriage is traditionally seen as being a way of increasing the financial accumulation of individuals in society. As a result, it would be expected that financial satisfaction will be positively related to marriage and that it will have an inverse relationship with being single or divorced. This is supported by the empirical studies where marriage is positively related to financial satisfaction. For example, Hsieh (2001), Headey and Wooden (2004), Zurlo (2009), Stack and Eshleman (1998) and Van Praag *et al.* (2010) all report a positive effect of being married on financial satisfaction. Similarly, Plagnol (2011) finds that compared to being married, being separated, divorced or never being married are all inversely related to financial satisfaction. However, some studies fail to find a statistically significant relationship between financial satisfaction and marriage, see, for example, Lown and Ju (1992) and Joo and Grable (2004).

In line with Plagnol (2011) and Clark and Apouey (2013), this chapter specifies the omitted category to be whether the individual is married or cohabiting. A series of binary variables are included which capture whether the head of household is divorced or separated and whether they are a widowed. These variables are the same across the specifications for the German and Australian samples.

Self-Assessed Health Status

The analysis presented in this chapter follows the existing literature and uses self-assessed health status to capture the head of household's health status. For example, Plagnol (2011), Hsieh (2001), Hansen *et al.* (2008), Heady and Wooden (2004) and Van Praag *et al.* (2010) all exploit self-assessed health measures. It is consistently found, in both cross-sectional and longitudinal analysis, that better health is associated with higher levels of financial satisfaction.

In line with the previous chapter, and as outlined in Tables A4.3 and A4.5 for Australia and Germany, respectively, a series of binary variables are included in the analysis to capture the effects of self-assessed health status on the subjective financial position. For Australia, the omitted category is defined to be reporting *"poor"* or *"very poor"* health. These two categories are combined due to insufficient observations in the lowest category. Similarly, for Germany, the lowest category, *"very poor"*, is defined to be the omitted category.

4.3.4.2 The Overall Life Satisfaction Model

The set of independent variables included in the overall life satisfaction equation are based on the existing literature and the analysis of the previous chapter. The analysis includes a variety of individual and household demographic and socioeconomic variables. These include the head of household's gender, age, age squared/100, highest level of education, marital status, labour force status and self-assessed health status. Other control variables include the number of people, both adults and children, in the household, the household's level of disposable income, and also the head of household's subjective financial position. For Germany, the level of household assets, debt, both unsecured and secured, and net worth are also included in the overall life satisfaction equation. These financial variables are not included in the Australian analysis as these were found not to display a statistically significant relationship with overall life satisfaction in the previous chapter. These variables are as defined above.

4.4 Results

4.4.1 Descriptive Statistics

Prior to the regression analysis being discussed, a series of descriptive statistics and simple bivariate correlations are considered. Table A4.1 presents the summary statistics for Australia and Germany relating to subjective financial position. In addition, Tables A4.7 and A4.8 show the average characteristics associated with each category of subjective financial position for Australia and Germany, respectively.

Across both Australia and Germany, the head of household's risk attitudes appear to have an influence on their subjective financial position. In Australia, heads of households who report being risk tolerant are, on average, more satisfied with their current financial situation, compared to individuals who report being risk averse. Risk tolerant individuals report an average subjective financial position score of 2.24 compared to 2.02 for risk averse individuals, as presented in Table A4.1. This pattern is replicated across both males and females, with risk tolerance being associated with higher levels of financial satisfaction. Similarly, risk tolerant heads of households report lower levels of financial concerns. Risk tolerant household heads report, on average, a financial concern score of 0.84, compared to a score of 0.93 for heads of household who are defined to be risk averse.

In addition, the pair-wise correlations presented in Table A4.1 suggest that risk attitudes are significantly correlated with the head of household's subjective financial position. Overall, risk tolerance is positively related to financial satisfaction in Australia and is inversely related to financial concerns in Germany. This supports the findings of Joo and Grable (2004), who report a positive relationship between financial satisfaction and risk tolerance. This relationship will be further explored in the regression analysis.

In Australia, the level of total assets is positively related to subjective financial position. This relationship appears to be stronger for male household heads. The descriptive statistics presented in Table A4.7 show that the average level of total assets increases with higher levels of subjective financial situation, whilst higher levels of total debt are generally negatively related to financial satisfaction. Unsecured debt is inversely related to financial satisfaction; whereas the level of secured debt does not display a statistically significant relationship with financial satisfaction in simple pair wise correlations. On average, individuals who report being *"prosperous"* report lower levels of total debt compared to those who report their current financial position as *"poor"* or *"very poor*". This pattern is replicated for the level of unsecured debt. As expected, a positive correlation is present between financial satisfaction and the household's level of net wealth.

The pair-wise correlations presented in Table A4.1 for Germany demonstrate that the household's monetary financial measures display some interesting and potentially contradictory relationships with the head of household's financial concerns. For example, the level of total and secured debt is inversely related to the level of financial concerns. As expected, the level of total assets and net wealth are found to be negatively related to financial concerns. Table A4.8 also supports this relationship: individuals who report being *"very concerned"* with their financial situation, report, on average, lower levels of assets and net wealth compared to those who report *"not at all concerned"*.

In line with prior expectations, the level of unsecured debt is positively correlated with the head of household's financial concerns. Interestingly, increased levels of total debt are found to reduce the level of financial concern. One potential explanation for this is that the level of housing debt is included in the measure of total debt. Consequently, the reduction in financial concern could be potentially due to the head of household owning a house. This argument is supported by the fact that secured debt is inversely related to

the level of financial concern. The subsequent regression analysis explores the relationship between subjective financial position and the level of total debt once the household's level of total assets is also accounted for.

Tables A4.7 and A4.8 show the average characteristics associated with being in each dependent variable category for Australia and Germany, respectively. Focusing on the other covariates shows that for Australia, subjective financial position is increasing with age. Females are more prevalent in the lower levels of financial satisfaction, with a lower proportion of females reporting being *"prosperous"*. Generally, financial satisfaction is increasing with the number of people in the household; whilst never married, divorced and widowed appear to be inversely associated with subjective financial position. In line with prior expectations, higher levels of income are associated with higher levels of subjective financial position, while possessing a degree is more prevalent in the highest level of financial satisfaction compared to the lowest category. Similarly, better health is associated with higher levels of financial satisfaction and poor health is more prevalent in lower levels of financial satisfaction.

The descriptive statistics for Germany show similar trends to those presented for Australia. The average age is decreasing with the level of financial concerns. The average age of people reporting *"not concerned"* is 56.19 compared to 48.95 for individuals who report being *"very concerned"*. The proportion of females is increasing with the level of financial concern, while there appears to be no relationship with household size and financial concern. The average level of household income is higher for those who report "*not concerned"*, whilst never married is more prevalent in reporting being *"very concerned"*. Similarly, in line with the existing literature, the proportion of people unemployed is higher in the *"very concerned"* category as is being divorced. Table A4.8 indicates a higher proportion of people reporting being in very good health conditional on reporting *"not concerned"* with their current financial position.

These relationships will be explored further in the regression analysis, where it will be possible to control for multiple factors which potentially influence the head of household's subjective financial position.

4.4.2 Regression Analysis

4.4.2.1 Ordered Probit Model with Mundlak Fixed Effects

This section presents the results relating to the analysis of subjective financial well-being using the ordered probit model with Mundlak fixed effects with robust standard errors. This will allow the determinants of the head of household's subjective financial position in Australia and Germany to be explored. The appendix also presents the results from the pooled analysis with standard errors clustered at the individual level. This will allow comparisons between the two approaches and show the importance for accounting for individual heterogeneity. The section then goes on to present the results of the bivariate ordered probit model which will account for potential endogeneity of subjective financial position in the overall life satisfaction equation.

The results of the univariate models of subjective financial position are presented in Tables A4.9 and A4.11 with Tables A4.10 and A4.12 presenting the corresponding marginal effects for Australia and Germany, respectively. The marginal effects correspond to the probability of being in the upper most category of financial satisfaction. For Australia, this corresponds to reporting "*prosperous*" and for Germany it relates to being "*very concerned*".

Australia

Prior to including the household's monetary financial variables, the results of the baseline specification will be discussed; these are shown in specification 1 in Table A4.9 with the marginal effects presented in Table A4.10. This specification includes the head of household's demographic characteristics in addition to the head of household's risk attitudes. Table A4.9 also includes a variety of test and model statistics. Across the four specifications, the count R^2 statistic indicates that around 62% of individuals are predicted to be in the correct category of the dependent variable. The likelihood ratio test statistic indicates rejection that all the coefficients are jointly equal to zero.

Focusing on the baseline specifications and the marginal effects, gender does not have a statistically significant impact on the head of household's subjective financial position. This result supports Headey and Wooden (2004), who report using Australian data no gender effects for financial satisfaction. Similarly, Vera-Toscano *et al.* (2006), Lown

and Ju (1992), Joo and Grable (2004) and Xiao *et al.* (2009) find that gender does not display a statistically significant relationship with financial satisfaction.

Once individual fixed effects are accounted for, in accordance with Plagnol (2011), age does not display a statistically significant relationship with financial satisfaction. Similarly, Joo and Grable (2004) fail to find a statistically significant relationship between age and financial satisfaction.

In line with Hira *et al.* (1992) and Vera-Toscano *et al.* (2006), the highest education level of the head of household does not exert a statistically significant influence on financial satisfaction. It should be noted that, in the pooled analysis, possessing a degree level education is positively related to subjective financial position. Hence, the lack of a relationship present in the fixed effects analysis could be attributed to the lack of variation in the education variables across time.

In line with Plagnol (2011), the number of individuals in the household is not a statistically significant determinant of the head of household's financial satisfaction at the 5% level, once individual fixed effects are accounted for. However, in the pooled cross sectional analysis, an inverse relationship is present between the number of people in the household and financial satisfaction, a result which accords with the majority of the existing literature.

Compared to being married, financial satisfaction is inversely related to being divorced. Being divorced reduces the probability of reporting the highest level of financial satisfaction by 0.67%, *ceteris paribus*. This result accords with Plagnol (2011) and Headey and Wooden (2004) who find that divorce is associated with lower levels of financial satisfaction. Compared to being married, being widowed or having never been married does not exert a statistically significant influence on financial satisfaction.

In line with Vera-Toscano *et al.* (2006), being retired is negatively related to financial satisfaction, with retirees 0.66% less likely to report the highest level of financial satisfaction, *ceteris paribus*, whereas not being in the labour force and being unemployed are not statistically significant determinants of financial satisfaction. The lack of such a relationship is attributed to how the head of household is defined. As the head of household is defined to be the individuals in the household with the highest income, there is a only a small number of individual who are defined as being unemployed. In line with the existing literature, see Headey and Wooden (2004) and

Plagnol (2011), a large negative relationship is present if individual fixed effects are not accounted for.

Despite overall life satisfaction being heavily influenced by self-assessed health status, the head of household's subjective financial situation is not influenced by self-assessed health status once individual heterogeneity is accounted for. In contrast, in the pooled analysis, a large positive relationship is found between subjective financial position and self-assessed health status. That is, better health is associated with higher levels of financial satisfaction.

In line with the descriptive statistics discussed in the previous section, risk tolerance is associated with higher levels of subjective financial position. Heads of households who are relatively risk tolerant, compared to those who are relatively risk averse, are 0.83% more likely to report the highest level of subjective financial position, *ceteris paribus*. These results accord with the findings of Joo and Grable (2004) who find that risk tolerance is positively related to financial satisfaction. This result is robust to the inclusion of the monetary financial variables, as present in specifications 2, 3 and 4; however the magnitudes of the risk tolerance coefficients are reduced.

Higher levels of household disposable income are associated with higher levels of financial satisfaction. A 1% increase in household disposable income increases the probability of reporting *"prosperous"* by 1.36%, *ceteris paribus*. This result accords with Plagnol (2011), Vera-Toscano *et al.* (2006), Headey and Wooden (2004), and Hsieh (2001, 2002 and 2004) who all find a positive relationship between financial satisfaction and income.

Monetary Financial Measures

Focusing on the monetary financial variables as presented in specification 2 in Tables A4.9 and A4.10, in line with prior expectations, indicates that the household's level of total assets is positively related to the head of household's subjective financial position and total debt is inversely related to subjective financial position. A 1% increase in the level of total assets increases the probability of reporting the highest level of subjective financial position by 0.46%, *ceteris paribus*. Conversely, a 1% increase in total debt reduces the probability of reporting being *"prosperous"* by 0.06%, *ceteris paribus*.

Specification 3 separates total debt into secured and unsecured debt. Interestingly, this reveals that secured and unsecured debt contribute similar impacts on subjective

financial position, that is, a 1% increase in unsecured debt reduces the probability of reporting being *"prosperous"* by 0.04%, compared to a 1% increase in secured debt which reduces the probability by 0.04%, *ceteris paribus.* This result potentially contradicts the findings of Brown *et al.* (2005), who report it is unsecured, opposed to secured debt, which has a detrimental impact on psychological well-being in Britain.

Specification 4 shows that household net wealth is positively related to financial satisfaction, where a 1% increase in household net wealth is associated with a 0.05% increase in the probability of reporting complete financial satisfaction, *ceteris paribus*. These findings generally support the analysis presented in Plagnol (2011), Headey and Wooden (2004) and Hansen *et al.* (2008) who find that the level of household assets and net worth are positively related to subjective financial satisfaction and that household debt levels are inversely related to financial satisfaction. However, in contrast to Headey and Wooden (2004), who find that net worth and income have a similar impact on financial satisfaction, despite both being significant determinants of financial satisfaction, income has a much greater positive effect.

Germany

The results from the ordered probit model with Mundlak fixed effects for Germany are presented in Table A4.11 with the corresponding marginal effects presented in Table A4.12. The analysis indicates several disparities between the determinants of the head of household's subjective financial satisfaction across Germany and Australia. As previously explained, as the measure of the head of household's subjective financial position relates to financial concerns, positive coefficients indicate increased levels of concern, and consequently lower levels of financial satisfaction. As outlined in Section 4.3, the marginal effects correspond to the probability of reporting the highest level of financial concern, i.e. the lowest level of financial satisfaction.

In line with Bonke (2008), who find that males, on average, record higher levels of financial satisfaction than females, the analysis presented here indicates that females, on average, report higher levels of financial concern than males. This result contradicts the findings of Heish (2001), Joo and Grable (2004) and Headey and Wooden (2004), who fail to find a statistically significant relationship between gender and financial satisfaction. Females are 2.17% more likely to report being *"very concerned"* about their current financial situation compared to their male counterparts, all other things being equal.

Older heads of households report higher levels of financial worry; however, a non-linear relationship between age and financial satisfaction is not found. A one year increase in age corresponds to a 1.01% increase in the probability of reporting "*very concerned"*, *ceteris paribus*. This finding contradicts the existing literature, for example, Hansen *et al*. (2008), Vera-Toscano *et al.* (2006) and Xiao *et al.* (2009), who find that older age is associated with higher levels of financial satisfaction. This contradiction could potentially arise due to the question being analysed here. This will be further considered in the following section which provides further discussion of the results.

A higher number of people in the household is associated with higher levels of financial concern, in line with Van Praag *et al.* (2010), Vera-Toscano *et al.* (2006) and Plagnol (2011), who report that larger households, on average, report lower levels of financial satisfaction.

In accordance with the existing literature and the analysis for Australia, financial concern is positively related to being divorced or separated. Compared to being married, being divorced or separated increases the likelihood of reporting "*very concerned"* with their financial situation by 4.27%, *ceteris paribus*. This result accords with the findings of Zurlo (2009) and Headey and Wooden (2004), who report that, marriage is positively related to financial satisfaction.

As predicted and in line with the existing literature, see Vera-Toscano *et al.* (2006) and Headey and Wooden (2004) amongst others, compared to being employed, unemployment is positively related to financial concern. Being unemployed increases the probability of reporting being *"very concerned"* about their economic situation by 17.31%, *ceteris paribus*. The other labour force status variables do not exert a statistically significant impact on financial concerns.

Higher levels of education are associated with lower levels of financial concern, supporting the results presented in Lown and Ju (1992) and Joo and Grable (2004). Possessing a degree level qualification, compared to not completing school, reduces the likelihood of reporting *"very concerned"* by roughly 8.89%, *ceteris paribus*. Similarly, better health is inversely related to financial concern, with better health associated with lower levels of financial concern. Heads of households who report being in very good health are 9.71% less likely to report being "*very concerned"* about their current financial situation, *ceteris paribus.* This result accords with the existing literature, where better health is associated with higher levels of financial satisfaction.

In line with the previous literature, the household's disposable income is positively related to financial satisfaction, as it is found to significantly reduce financial concern. A 1% increase in household income reduces the probability of reporting being *"very concerned"* about the financial situation by 5.24%, *ceteris paribus.*

Consistent with the results presented for Australia, risk tolerance is associated with lower levels of financial concern. Compared to being risk averse, risk tolerance decreases the likelihood of reporting *"very concerned"* about household finances by approximately 1.09%, *ceteris paribus,* which is statistically significant at the 5% level. This result accords with Joo and Grable (2004), who find that risk attitudes are a significant determinant of financial satisfaction. This result is robust to the inclusion of the household's monetary financial measures.

Monetary Financial Measures

The household's monetary financial variables are considered next, which are presented in specifications 2 to 4 in Tables A4.11 and A4.12. The influence of the household's assets and debts indicates some interesting results. Once individual heterogeneity is accounted for, the level of total assets is inversely related to financial worry; however, this result is not statistically significant at the five percent level. The level of household debt is positively related to financial worry. A one percent increase in total debt leads to an increase in the probability of reporting the highest category of financial concern by 0.32%, *ceteris paribus*.

Similarly, the separation of total debt into secured and secured debt revels that 1% increases in secured and unsecured debt increase the probability of reporting being *"very concerned"* about the financial situation by 0.32% and 0.34%, respectively, *ceteris paribus*. This supports the findings of Australia which suggest that the two types of debt have similar impacts on financial satisfaction. In line with the existing literature, financial satisfaction is increasing in the level of net wealth. A 1% increase in net wealth leads to a reduction in the probability of reporting *"very concerned"* by 0.14%, holding all other things constant. Once again, the impacts of the household's assets and debts appear to be smaller than that of the household's level of disposable income.

4.4.2.2 Recursive Bivariate Ordered Probit Model with Mundlak Fixed Effects

Australia

Table A4.13 presents the estimated coefficients from the bivariate ordered probit analysis relating to the Australian analysis. The results from the bivariate model are discussed and compared to the existing literature and the univariate analysis. As previously explained and in line with Greene and Hensher (2010), this analysis contains the group means of the time variant variables, that is, the Mundlak fixed effects. In line with the univariate analysis, a series of specifications are implemented to allow for multicollinearity, which could arise due to the construction of the monetary financial variables.

Across all of the specifications considered, it is clear that the correlation (ρ) between the unobserved characteristics is statistically different from zero at the 5% level, implying there is interdependency between overall life satisfaction and subjective financial position. The analysis presented for Australia indicates a positive statistical relationship between the unobservable characteristics of the subjective financial position and overall life satisfaction equations. This implies that unobserved characteristics increase both the levels of financial satisfaction and overall life satisfaction. Consequently, it is argued that a joint modelling estimation technique is preferable over a series of univariate equations.

Firstly, the determinants of financial well-being will be considered, with the determinants of overall life satisfaction subsequently discussed. In general, the results of the bivariate specification relating to subjective financial well-being are consistent with the univariate specification. Both gender and age do not display a statistical relationship with subjective financial position. In line with the existing literature and prior expectations, a positive relationship is found between financial satisfaction and household income. In accordance with the univariate specification, the level of education and employment status are not statistically significant determinants of subjective financial position, contradicting the results of the univariate analysis. Compared to being married, being divorced is associated with a lower level of financial satisfaction once individual heterogeneity is controlled for, in accordance with the univariate specifications. Self-assessed health status has no statistical influence on subjective financial position which, accords with the univariate specifications, but contradicts some of the existing literature. Household heads, who are defined to be risk

tolerant, on average, report higher levels of subjective financial position compared to those who are defined to be risk averse. This result is consistent across all specifications.

Focusing on the monetary financial variables, as presented in specifications 2 through to 4 in Table A4.13, the expected relationships with subjective financial position are present and generally accord with the results of the univariate models. Subjective financial position is increasing in the level of assets held by the household. The level of total debt is inversely related to subjective financial position. In order to assess the potential asymmetries between the different types of debt, specification 3 decomposes total debt into secured and unsecured debt. The results indicate that higher levels of both unsecured and secured debt are associated with being less satisfied with their current financial position. Net worth is positively related to subjective financial position, though it is only found to be statistically significant at the 10% level. This is potentially not surprising as a linear combination of statistically significant parameters does not necessarily lead to a statistically significant relationship. These results generally support the findings of the univariate models.

The estimated overall life satisfaction equation reveals some interesting results. Compared to male heads of households, females report higher levels of overall life satisfaction. Once the analysis controls for individual fixed effects, age, household income, education, household size, and employment status fail to display statistically significant relationships with overall life satisfaction. Divorce is negatively related to overall life satisfaction. Consistent with the previous chapter, self-assessed health status maintains a significant positive relationship with overall life satisfaction: that is, better health is associated with being more satisfied with life overall. These results are generally in line with the findings of the previous chapter.

In contrast to the results presented in the previous chapter, subjective financial position is not a statistical determinant of overall life satisfaction once a recursive bivariate model is utilised. This suggests that the observed relationship between subjective financial position and overall life satisfaction found in the previous chapter is a consequence of endogeneity. Once this endogeneity is controlled for, there is not a statistically significant relationship between subjective financial position and overall life satisfaction. This suggests that the relationship observed is driven by unobserved characteristics, which disappears once the bivariate specification is implemented.

Marginal Effects

As described in Section 4.3, there are a variety of marginal effects which can be considered in a bivariate ordered probit specification. Initially, the marginal effects relating to reporting the upper most categories of financial and overall life satisfactions for all the statistically significant independent variables are discussed. The analysis then goes on to explore the impact of certain variables on the probability of reporting every potential outcome combination. All marginal effects are evaluated at the mean.

Table A4.14 reports the marginal effects relating to the recursive bivariate ordered probit specification for Australia. The analysis indicates that the household's level of disposable income increases the probability of the head of household reporting the highest categories of subjective financial position and overall life satisfaction. A 1% increase in disposable income is associated with an increase in the probability of jointly reporting the highest categories of financial satisfaction and overall life satisfaction by between 0.13 and 0.33 percentage points, *ceteris paribus*, depending on the specification considered. Compared to being married, being divorced is inversely related to reporting this category. Being divorced reduces the likelihood of reporting this category by between 0.10 and 0.24 percentage points, *ceteris paribus.* Unemployment is found to reduce the probability of reporting the upper most categories of both dependent variables by between 0.08 and 0.18 percentage points across all of the specifications, *ceteris paribus.*

Risk tolerant individuals are more likely to report the highest categories of both subjective financial position and overall life satisfaction. Heads of households who report being risk tolerant are between 0.06 and 0.18 percentage points more likely to report the highest categories of the dependent variables. The magnitude of the impact of risk tolerance is similar to that of unemployment. This demonstrates the potential importance of accounting for risk attitudes when analysing subjective financial position. Similarly, a 1% increase in total household assets is associated with an increase in the likelihood of reporting this category by around 0.06 percentage points, whereas, a 1% increase in total debt and unsecured debt reduces the probability by 0.01 percentage points, *ceteris paribus*. The marginal effect related to secured debt is however effectively zero, despite being statistically significant. The level of net wealth is not a statistically significant determinant of reporting the upper most categories of financial

and overall life satisfaction. Once again, in line with the univariate analysis, the impact of total assets appears to have a smaller impact than that of household income.

Tables A4.15 to A4.18 present the marginal effects associated with selected variables, based upon specification 2, which relate to the probability of reporting each potential category. The variables considered are the household's level of income, total assets, total debt and risk attitudes. Table A4.15 presents the marginal effects relating to household income. The analysis indicates that, evaluated at the mean, conditional on reporting being prosperous, a 1% increase in disposable income increases the probability of reporting the highest level of life satisfaction by 0.14 percentage points, *ceteris paribus.* A 1% increase in disposable income is associated with reporting higher levels of financial satisfaction, and a reduction in the likelihood of reporting lower levels of financial satisfaction, *ceteris paribus*. For example, conditional on reporting a level of overall life satisfaction of four (the median), it is clear that the level of disposable income reduces the probability of being in the lower financial satisfaction categories, whilst increasing the probability of being in the highest categories of subjective financial position, *ceteris paribus.* A 1% increase in disposable income reduces the probability of reporting being in the lowest three categories of financial satisfaction by 0.07, 3.50 and 0.66 percentage points, *ceteris paribus*. Conversely, a 1% increase in income increases the probability of reporting the highest two levels of financial satisfaction by 4.04 and 0.35 percentage points, *ceteris paribus*, conditional on reporting the median overall life satisfaction score.

The results suggest that an individual's risk attitudes have a significant impact on the joint probability of financial satisfaction and overall life satisfaction[39]. Changing from being relatively risk averse to being risk tolerant increases the probability of reporting the highest levels of financial satisfaction and overall life satisfaction by 0.06 percentage points, *ceteris paribus.* The level of risk tolerance does not have a statistically significant impact on jointly reporting the lowest levels of financial satisfaction and overall life satisfaction, *ceteris paribus*. Reporting being risk tolerant is inversely related to reporting all levels of overall life satisfaction, conditional on

[39] To further explore the relationship between risk attitudes, financial satisfaction and overall life satisfaction, a trivariate specification, where possible was estimated. Due to limitations of the German data relating to the questions contained in each wave of the survey, it was not possible to implement the analysis. For Australia, the trivariate model does not support the use of such joint modelling as the correlations between the residual terms are not statistically significant. For example, in the base line specification, the relevant test statistics are $\rho_{1,2}$ = 0.0485 (p-value=0.606), ρ_{13}=-0.0552(p-value =0.110) and $\rho_{2,3}$ = 0.1294 (p-value = 0.178). This suggests that risk tolerance is not an endogenous variable in the financial satisfaction equation.

reporting *"getting along", ceteris paribus.* Conditional on reporting the median level of overall life satisfaction, it is clear that the level of risk tolerance increases the probability of reporting the highest two categories of financial satisfaction and reduces the likelihood of reporting the three lowest levels of financial satisfaction, *ceteris paribus*. Conditional on reporting the median level of overall life satisfaction, compared to being risk averse, risk tolerant household heads are 1.86 and 0.18 percentage points more likely to report being *"very comfortable"* and *"prosperous", ceteris paribus.*

The level of total assets is generally positively related to reporting being more satisfied with the current financial position. A 1% increase in the level of total assets increases the likelihood of reporting the highest categories of financial satisfaction and overall life satisfaction by 0.06 percentage points, *ceteris paribus.* Once again, conditional on reporting the median level of overall life satisfaction, the level of total assets increases the probability of reporting the two highest levels of financial satisfaction and serves to reduce the likelihood of reporting the two lowest levels of financial satisfaction. A 1% increase in total assets reduces the probability of reporting a financial satisfaction score of 0, 1 and 2 by 0.03 and 1.71 and 0.38 percentage points, respectively, *ceteris paribus.* Conversely, a 1% increase in total assets increases the probability of reporting a financial satisfaction score of 3 and 4 by 1.95 and 0.17 percentage points, respectively, *ceteris paribus.*

In line with prior expectations, total debt has an opposite effect to that of total assets. The level of total debt appears to reduce the probability of reporting the highest levels of financial satisfaction; whilst increasing the probability of reporting the lower levels of financial satisfaction. A 1% increase in the total household debt level reduces the probability of reporting the highest levels of both financial satisfaction and overall life satisfaction by 0.01 percentage points, *ceteris paribus*. The level of total debt does not exert a statistically significant effect on reporting the highest level of financial satisfaction, conditional on being in the lowest category of overall life satisfaction. Similarly, total debt is not a statistically significant determinant of reporting the highest level of overall life satisfaction conditional on reporting the lowest level of financial satisfaction and reporting the lowest categories of both financial satisfaction and overall life satisfaction. Once again, conditional on reporting the median level of overall life satisfaction, total debt increases the probability of reporting lower levels of financial satisfaction, while reducing the probability of reporting the highest financial satisfaction

categories. A 1% increase in total debt reduces the likelihood of reporting financial satisfaction scores of 4 and 3 by 0.02 and 0.27 percentage points respectively, *ceteris paribus.* A 1% increase in total debt increases the probability of reporting a subjective financial position score of 1 and 2 by 0.24 and 0.05 percentage points, *ceteris paribus*, respectively.

Germany

Table A4.19 presents the results from the recursive bivariate ordered probit model for overall life satisfaction and financial concern in Germany. As previously explained, financial satisfaction is measured via financial concern; therefore, higher values correspond to lower levels of subjective financial position. The results support a positive correlation in the unobserved residual terms between the financial satisfaction and overall life satisfaction equations across all of the specifications considered. It follows that there are unobserved characteristics which make a head of household more likely to report higher levels of financial concern but also higher levels of overall life satisfaction. For example, improvements in the head of household's leisure time, or pursuit of leisure activities, such as holidays, could increase the head of household's level of overall life satisfaction, but increase the individual's level of financial concern. Similarly, financial concern could be reduced by working longer hours; however, this could reduce the head of household's overall life satisfaction.

The results from the recursive bivariate specification for subjective financial position are generally in line with the univariate analysis. The results indicate that females report higher levels of financial concern than male heads of household. Older heads of household report higher levels of financial concern, whilst there are no nonlinear effects present due to the statistically insignificant age squared term. Household size increases financial concern, however, this is only significant at the 10% level. As predicted by the previous literature and prior expectations, household income reduces the financial concern of the head of household, whereas being divorced and unemployed are both associated with higher levels of financial concern. Higher levels of education are negatively related to financial concern and in contrast to the findings for Australia, better health is associated with lower levels of financial concern.

In line with the results of Australia and the analysis presented in Joo and Grable (2004), risk tolerance displays a statistical relationship with financial satisfaction. Risk

tolerance is negatively related to financial concerns, supporting the findings presented from the univariate specifications.

Focusing on the financial variables reveals that the level of household assets is not a statistically significant determinant of financial satisfaction, in line with the univariate specifications. In contrast, financial concerns are increasing in the level of household total debt. The separation of total debt into secured and secured debt reveals that both are positively related to financial concern and, as expected, financial concern decreases with higher levels of net wealth. These results accord with those presented in the univariate specifications.

The results relating to the determinants of overall life satisfaction generally support the findings presented in the previous chapter, however some interesting differences are found. Females report higher levels of life satisfaction compared to their male counter parts. In contrast with the existing literature, life satisfaction has a concave pattern in age once jointly modelled with financial satisfaction. In contrast to the previous literature and the previous chapter, the level of household income does not have a significant impact on the level of overall life satisfaction, but does however significantly reduce financial concern. This potentially suggests that the effect of household income on overall life satisfaction is mediated through financial satisfaction.

Compared to being married, having never married and being widowed are not statistically related to overall life satisfaction whilst, being divorced is negatively related to overall life satisfaction. Both labour force status and education do not display a statistically significant relationship with overall life satisfaction. The expected negative relationship between being unemployed and overall life satisfaction is not present in the bivariate specification. Once again, unemployment may be indirectly related to overall life satisfaction through the individual's subjective financial position. As expected, higher levels of self-assessed health status are associated with an increased level of overall life satisfaction.

Self-reported financial concern is negatively related to overall life satisfaction. Compared to reporting *"not concerned"*, individuals who report being *"concerned"* or *"very concerned"* about their finances, report, on average, lower levels of overall life satisfaction. Following the analysis presented in the previous chapter, the household monetary financial measures are included in the overall life satisfaction equation. It is found, however, that none of these measures are statistically significant in the overall

life satisfaction equation in a bivariate framework. This suggests that the impact of the household's financial situation on overall life satisfaction is mediated through the individual's financial satisfaction. This is in accordance with the findings of Bridges and Disney (2010) who find that the impact of debt levels on the likelihood of reporting depression is mediated through the subjective burden of debt repayments.

Marginal Effects

The marginal effects relating to the recursive bivariate ordered probit model are presented in Table A4.20, whilst Tables A4.21 to A4.24 explore the impact of selected variables in greater detail. The marginal effects relate to the probability of reporting not concerned about their financial situation and the highest level of overall life satisfaction. Reporting "*not concerned"*, as opposed to *"very concerned"*, is focused on to be more comparable to the marginal effects presented for Australia, where both overall life satisfaction and financial worries are measured in the most "positive" categories. The discussion presented will focus on the statistically significant variables.

The analysis finds, in specifications 2, 3 and 4, that the household's level of income is positively related to reporting no concerns and being completely satisfied with life overall. A 1% increase in income corresponds to roughly a 0.03 percentage point increase in the probability of being in this category, *ceteris paribus*. Similarly, compared to being married, divorced heads of household are 0.03 percentage points less likely to jointly report no financial concerns and the highest category of overall life satisfaction. Specifications 3 and 4 demonstrate that unemployment is inversely related to jointly reporting these categories. Compared to being employed, unemployment is associated with a 0.04 percentage point reduction in the probability of reporting no financial concerns and the highest level of overall life satisfaction. As expected, better health is associated with jointly reporting higher levels overall life satisfaction and no financial concerns. Specifications 2, 3 and 4 indicate that reporting very good health is associated with a 2.50 percentage point increase in the likelihood of reporting no financial concerns and complete life satisfaction, *ceteris paribus.* The level of risk tolerance is found to be a statistically significant determinant across all four specifications. Household heads who report being risk tolerant are associated with an increase in reporting no financial concerns and the highest level of financial satisfaction by 0.01 percentage points, *ceteris paribus*.

Tables A4.21 through to A4.24 present the marginal effects relating to household disposable income, risk attitudes, total assets and total debts respectively. Table A4.21 presents the marginal effects relating to households income. The level of disposable income, conditional on reporting a median overall life satisfaction score (seven), increases the probability of reporting being "*not concerned"* about the financial situation and decreases the probability of reporting being *"concerned"* or "*very concerned*". Conditional on reporting the median level of overall life satisfaction, a 1% increase in disposable income reduces the probability of reporting being "*very concerned"* by 1.46 percentage points, *ceteris paribus.* Similarly, a 1% increase in disposable income reduces the probability of reporting being concerned and increases the probability of reporting not concerned by 1.10 percentage points and 2.38 percentage points, respectively, *ceteris paribus.* Similar to risk tolerance, it appears that, conditional on reporting being *"concerned"*, disposable income increases the probability of reporting the highest levels of overall life satisfaction and reduces the probability of reporting the lowest levels of financial satisfaction, *ceteris paribus*.

Table A4.22 presents the marginal effects of reporting being risk tolerant on the joint probabilities associated with the two dependent variables, evaluated at the means. The analysis considers the effects of risk attitudes conditional on reporting the median level of overall life satisfaction. It is clear that, compared to being risk averse, being risk tolerant increases the probability of reporting no financial concerns, by 0.81 percentage points, *ceteris paribus*. Also, reporting being risk tolerant reduces the probability of reporting *"very concerned"* and *"concerned"* by 0.34 and 0.46 percentage points, respectively, *ceteris paribus*.

Similarly, conditional on reporting the median level of financial satisfaction, that is being *"concerned"*, risk tolerance is positively associated with overall life satisfaction. Reporting being risk tolerant increases the probability of reporting an overall life satisfaction score of 9 and 10 by 0.21 percentage points and 0.06 percentage points respectively, *ceteris paribus.* Similarly, risk tolerance reduces the probability of reporting lower levels of overall life satisfaction, conditional on reporting *"concerned"*.

Tables A4.23 and A4.24 present the marginal effects, evaluated at the means, relating to total assets and total debt, respectively. Conditional on reporting the median level of overall life satisfaction, the level of total assets increases the probability of reporting "*not concerned"* whilst the level of total debt increases the probability of reporting

"*very concerned"*. Conditional on reporting the median level of overall life satisfaction, a 1% increase in total assets is associated with a 0.08 percentage point increase in reporting not concerned and reduces the probability of reporting *"very concerned"* by 0.05 percentage points, *ceteris paribus.* Conversely, a 1% increase in total debt reduces the likelihood of reporting not concerned by 0.12 percentage points, whilst it is found to increase the probability of reporting *"very concerned"* by 0.07 percentage points, *ceteris paribus.*

4.5 Discussion

This section will provide further discussion and comparison of the results of both the univariate and bivariate specifications for Australia and Germany. The section will compare the estimation results with the existing literature, with a particular focus on the differences which potentially arise as a consequence of the recursive bivariate regression approach. Initially, the univariate models will be considered.

Considering the univariate specifications, in line with prior expectations, the level of household income has a significant impact on the level of financial satisfaction in both Australia and Germany. In Australia, higher levels of household income are associated with higher levels of financial satisfaction. Similarly, in Germany, the level of household income is inversely related to concerns relating to the household's financial situation. This result supports the existing literature where income is found to be a positive and statistically significant determinant of financial satisfaction.

As expected and in accordance with Plagnol (2011) and Hansen *et al.* (2008), the level of household debt is a significant determinant of financial satisfaction and financial concern in Australia and Germany, respectively. For Australia, the level of total debt is inversely related to the head of household's subjective financial position. Once this debt is separated into secured and unsecured debt, both types of debt have a detrimental effect on financial satisfaction.

In line with the existing literature, for example, Plagnol (2011), Headey *et al.* (2008), Headey and Wooden (2004) and Hansen *et al.* (2008), the results from the Australian analysis indicate that the household's level of total assets and net wealth are positively related to financial satisfaction. These findings potentially suggest that the relationship between the household's monetary financial position and overall life satisfaction is mediated through financial satisfaction. However, the bivariate analysis suggests

otherwise, as the subjective financial position is not a statistically significant determinant of overall life satisfaction once unobserved characteristics are accounted for.

The results presented in this chapter challenge those reported in Headey and Wooden (2004) who find that the household's level of net wealth is as important to overall life satisfaction and financial satisfaction as the level of household income. The empirical analysis presented in this chapter suggests that income has a greater impact on financial satisfaction than household net wealth. This disparity could be attributed to the fact that Headey and Wooden (2004) analyse cross sectional data, and therefore do not control for individual heterogeneity, which could potentially influence the estimated coefficients. In addition, the analysis presented in this chapter focuses on the head of household, whereas Headey and Wooden (2004) consider all members of the household.

For Germany, similar to Australia, higher levels of total debt are associated with higher levels of financial concern, as are the levels of secured and unsecured debt. In contrast to the analysis for Australia, the analysis for Germany indicates that the level of total assets held by the household does not influence the head of household's level of financial concern. One potential reason for the lack of a statistical relationship between the level of total assets and net worth and subjective financial position relates to the wording of the question. As discussed previously, the question uses the word *"concern"* which could cause the respondent to interpret the question differently. MacKerron (2012) argues that the wording of questions relating to subjective measures can have a dramatic impact on the response. The "negative" wording of the question could cause individuals to consider the negative aspects of their financial situation, such as debt, rather than the positive aspects, such as assets.

The empirical analysis indicates that the head of household's attitudes towards risk are an important determinant of the head of household's subjective financial position for both Australia and Germany. One potential explanation for this relationship is that risk attitudes capture an individual's level of financial knowledge. More risk tolerant individuals are found, in the existing literature, to have a greater level of financial knowledge, which may lead to them making more informed financial decisions, and therefore obtaining higher levels of financial satisfaction. An alternative argument is that more risk tolerant individuals feel more in control of their current financial position, may cause them to be more satisfied with their current financial position. This

supports the findings of Joo and Grable (2004). This analysis suggests that, where possible, risk attitudes should be included in the analysis of financial satisfaction.

The results obtained from the recursive bivariate ordered probit model, for both Australia and Germany, advocate a joint modelling approach as a statistically significant relationship between the unobserved characteristics of the overall life satisfaction and subjective financial position equations is observed. The findings suggest that the relationships between overall life satisfaction and subjective financial position presented in the previous chapter are potentially biased due to endogeneity. The empirical analysis presented for Australia suggests that, once techniques which account for potential endogeneity are employed, the head of household's subjective financial position does not exert a statistically significant influence on overall life satisfaction.

The bivariate results presented for Australia indicate that the household's monetary financial measures influence the head of household's subjective financial position. However, there is no evidence that the financial satisfaction mediates the relationship between the household's monetary financial situation and overall life satisfaction. This result contradicts the findings of Bridges and Disney (2010) who find that the subjective debt burden mediates the relationship between the household's debt levels and depression.

Interestingly, the level of household disposable income does not have a direct impact on the level of overall life satisfaction. In the recursive bivariate specification, income has a statistically significant impact on subjective financial well-being yet, does not display a significant effect on overall life satisfaction. The positive correlation between the unobserved characteristics indicates that unobserved characteristics which cause people to report higher levels of financial satisfaction also lead to individuals reporting higher levels of financial satisfaction.

For Germany, the results from estimating the recursive system indicate that financial well-being mediates the relationship between the household's monetary financial situation and overall life satisfaction, supporting the analysis presented in Bridges and Disney (2010). In the recursive framework, the head of household's subjective position remains a statistically significant determinant of overall life satisfaction, supporting the findings presented in the previous chapter. However, the monetary levels of the household's finances fail to have a statistically significant direct impact on overall life satisfaction. What is found is that the monetary financial measures influence the head

of household's subjective financial measure. These results support the analysis presented in Bridges and Disney (2010) and are also in accordance with the theory of domain satisfaction.

The estimation results indicate a positive correlation between the unobserved characteristics of the financial satisfaction and overall life satisfaction equations. Consequently, unobserved characteristics, which cause the level of financial concern to decrease, also make the level of overall life satisfaction decrease. One potential explanation relates to the hours worked by the head of household. A decrease in the hours worked could increase overall life satisfaction by increasing the amount of leisure time. However, a decrease in the number of hours worked could increase financial concern due to loss of earnings[40]. A similar explanation is if the head of household gives up time to work for local charities. This could increase the individual's level of overall life satisfaction, whilst the potential loss of earnings increases level of financial worries.

Interestingly, in contrast with the previous chapter, which finds unemployment to be inversely associated with overall life satisfaction, unemployment fails to display a statistically significant impact on overall life satisfaction. Unemployment is found, however, to increase the level of financial worries experienced by the head of household. This suggests that the negative relationship between overall life satisfaction and unemployment is mediated through a reduction in financial well-being. This finding supports the results of Thomas *et al*. (2007) who report that movements into unemployment have both direct and indirect effects on psychological well-being. They suggest that the detrimental impact on psychological well-being caused by unemployment is partly explained through the increase in financial worry experienced by the individual.

A similar result is found for household income. It appears that the positive relationship between overall life satisfaction and income is mediated through financial well-being. The positive relationship between overall life satisfaction and income is not present in the recursive bivariate specifications. Household income is found to reduce the level of financial worry, which in turn is inversely related to the level of overall life satisfaction. This finding supports the theory of domain satisfaction which hypothesises that various domains are influenced by domain specific characteristics. The analysis presented in

[40] A positive relationship remains present once the level of hours worked is controlled for in the analysis.

this chapter suggests that financial variables have a significant impact on the level of financial well-being, which in turn influences overall life satisfaction.

4.6 Conclusions

Despite the significant increase in the number of studies which explore the determinants of overall life satisfaction, the existing literature which aims to ascertain the determinants of financial satisfaction is relatively sparse. In particular, explorations of the relationship between household financial assets and debt and the head of household's subjective financial position are limited. This lack of investigation has previously been attributed to the lack of suitable data to analyse, as self-reported financial measures are notorious for missing data and underreporting. The existing literature, in line with the theory of domain satisfaction, repeatedly finds that the household's financial satisfaction is an important determinant of overall life satisfaction and well-being. Consequently, it is important to fully understand the determinants of financial satisfaction and the relationship between financial satisfaction and overall life satisfaction.

The empirical analysis presented in this chapter aims to develop the literature in several distinct ways. Initially, it explores the determinants of financial satisfaction in Australia and Germany whilst accounting for time invariant individual effects. Previously, only Plagnol (2011), who analyses U.S. data, and Headey *et al.* (2008), who consider Hungary and the Netherlands, have accounted for individual heterogeneity when analysing subjective financial satisfaction. In addition to the analysis of the determinants of financial satisfaction presented in this chapter, there is a particular focus on the role of the head of household's risk attitudes and the household's monetary financial status.

Finally, leading on from the univariate analysis and building on the analysis presented in the previous chapter, the relationship between financial and overall life satisfaction is further explored. In order to control for the potential endogeneity of subjective financial position in modelling overall life satisfaction, that is unobserved characteristics which could potentially influence an individual's response to both subjective financial position and overall life satisfaction, a recursive bivariate ordered probit model is employed. The recursive set up also allows investigation into whether the relationship between the household's assets and debt and overall life satisfaction is mediated through the household's financial satisfaction and also the theory of domain satisfaction. This joint

modelling approach follows the analysis of Bridges and Disney (2010), who explore subjective debt burden and depression.

The results indicate that, for Australia, the household's monetary financial situation has the expected impact on the head of household's subjective financial position. For example, the household's level of total assets and net wealth are positively related to financial satisfaction, whereas the level of total debt is inversely related to financial satisfaction. The decomposition of total debt into secured and unsecured debt reveals that, once other factors are accounted for, both are negatively related to subjective financial position. The analysis also suggests that individual risk attitudes are an important determinant of the subjective financial position of Australian heads of household.

The univariate analysis for Germany indicates some major discrepancies from the results obtained for Australia. In particular, the level of total assets does not display a statistical relationship with the level of worry with the current financial situation. One potential explanation for this relates to the wording of the question which focuses on *"concerns"* opposed to *"satisfaction"*. The level of total debt, unsecured debt and secured debt are all found to increase the level of financial concern of the head of household. The level of net wealth is inversely related to financial concern, as expected. Once again, the head of household's risk attitudes are found to be significant determinants of financial satisfaction. The univariate results are generally in line with prior expectations and the existing literature.

The bivariate specification applied to HILDA suggests that a joint modelling technique is preferred to a univariate specification. The analysis suggests that the relationship between the household's monetary financial situation and overall life satisfaction is not mediated through subjective financial satisfaction. Similarly, the relationship observed in the previous chapter between the household's financial satisfaction and overall life satisfaction can be attributed to the endogenous nature of subjective financial position. Once a bivariate specification is implemented, there is no statistical relationship present between the subjective financial position and overall life satisfaction. This suggests that the relationship observed in the previous chapter could be attributed to unobserved characteristics, which influence both financial satisfaction and overall life satisfaction.

The bivariate analysis presented for Germany once again advocates the use of a joint modelling approach. The analysis of German data supports the use of a recursive

framework. The relationship between the household's financial position and overall life satisfaction does appear to be mediated through the head of household's subjective financial position. This accords with the results presented in Bridges and Disney (2010). In the overall life satisfaction equation, the head of household's subjective financial worries continue to have a negative effect.

The results of the bivariate analysis also seem to support the theory of domain satisfaction, which asserts that certain satisfaction domains are influenced by domain specific characteristics. In the bivariate analysis, the household's levels of debt and net wealth have a significant impact on an individual's financial well-being, but not on the level of overall life satisfaction. Similarly, the level of household income is found to influence financial, as opposed to overall life, satisfaction.

The analysis presented in this chapter suggests that risk attitudes are an important determinant of financial satisfaction, and so should be included in subsequent analysis. This relationship can be attributed to risk tolerance capturing the head of household's level of financial knowledge. The bivariate specification suggests that added care should be taken when investigating the relationship between domain satisfactions and overall life satisfaction. The empirical analysis presented in this chapter indicates that for Australia, the relationship between subjective financial position and overall life satisfaction presented in the previous chapter is driven by unobserved characteristics, as the relationship disappears once a bivariate technique is employed. As a result, where possible, techniques which account for possible endogeneity should be employed.

It is important to acknowledge the potential short comings of the empirical analysis presented in this chapter. The first limitation relates to the measures of subjective financial position and overall life satisfaction used in the analysis for Australia and Germany. Despite the measures arguably capturing the same effects, due to the wording of the questions and the scale each variable is measured on, making direct comparisons across the countries is potentially problematic as it is not possible to compare magnitudes of the effects. In addition, the risk attitudes measures differ across both Australia and Germany, which could influence the results reported in Australia and Germany.

The analysis could potentially be extended by considering the relationship between portfolio allocation and subjective financial position. That is, whether the holding or the proportion of total assets held in a particular asset category, such as risky assets, has

an impact on an individual's subjective financial position. This analysis is not presented here due to limitations relating to the German data. The analysis presented in this chapter comprehensively explores the role of assets and debts, but does not consider the allocation of the head of household's assets.

4.7 Appendix to Chapter 4

Figure A4.1: Financial Satisfaction- HILDA

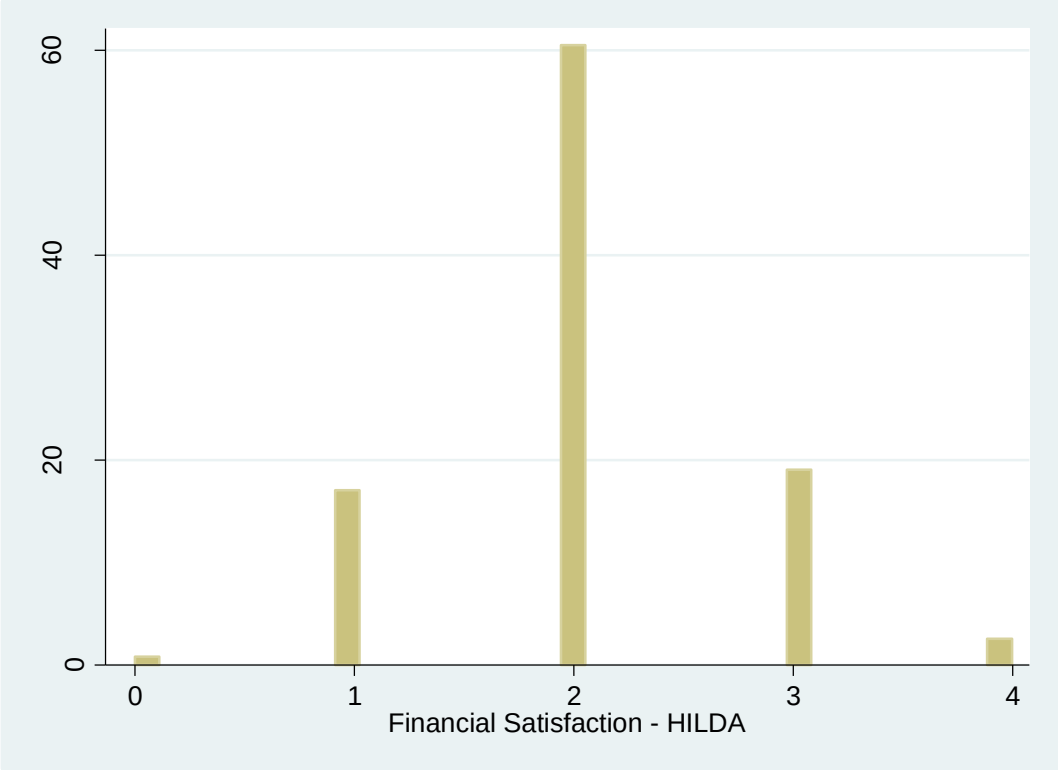


Figure A4.2: Overall Life Satisfaction - HILDA

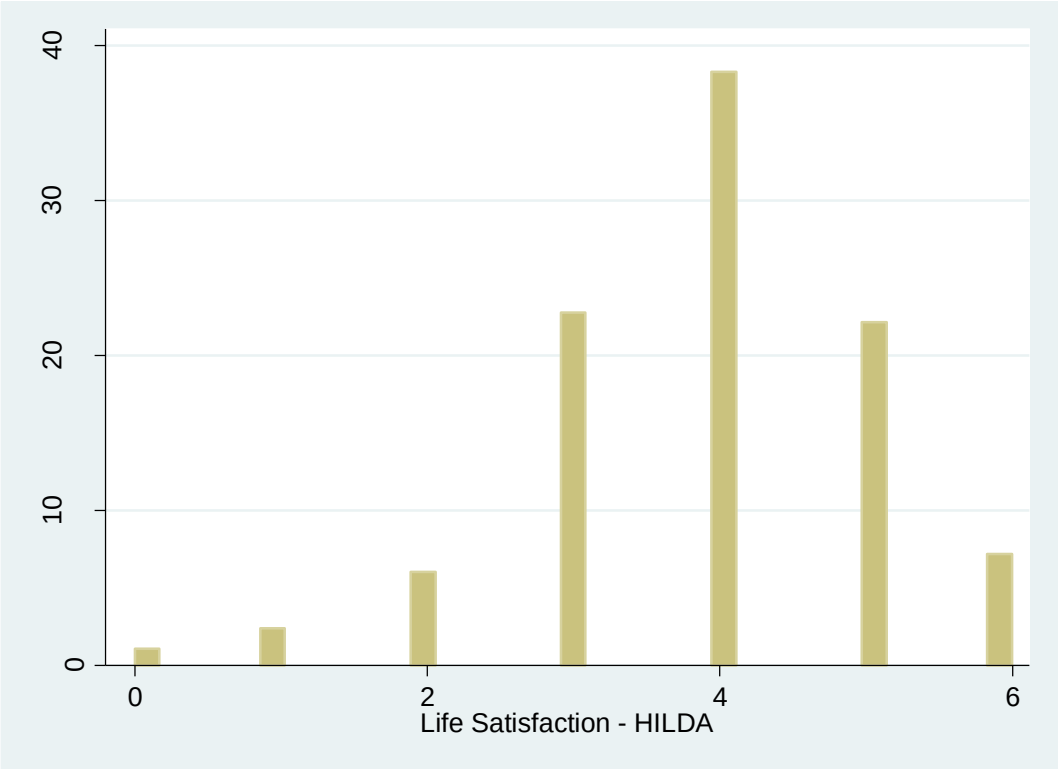


Figure A4.3: Financial Concerns - GSOEP

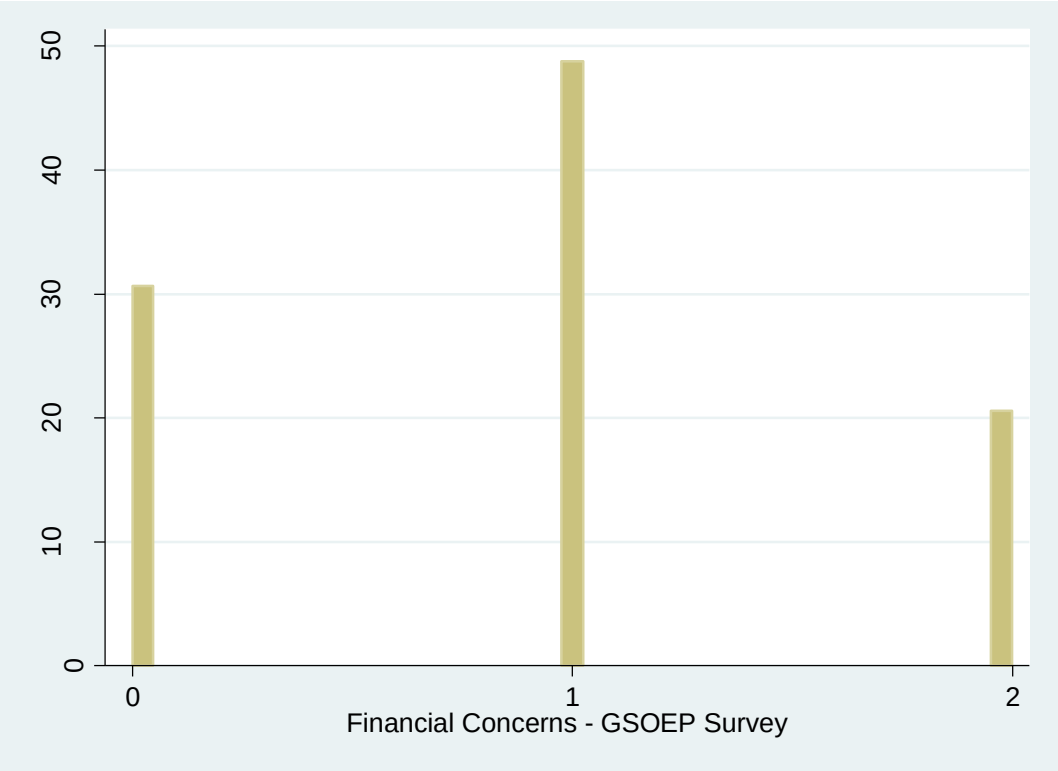


Figure A4.4: Overall Life Satisfaction - GSOEP

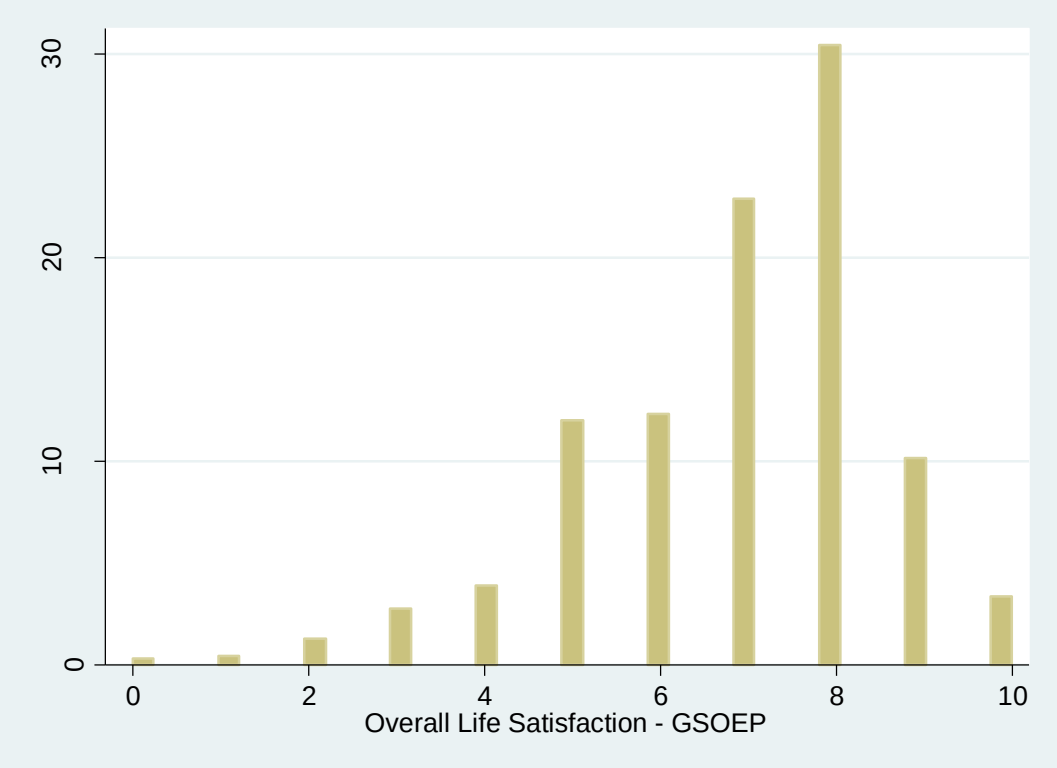


Figure A4.5: Distributions of the Monetary Financial Variables - HILDA

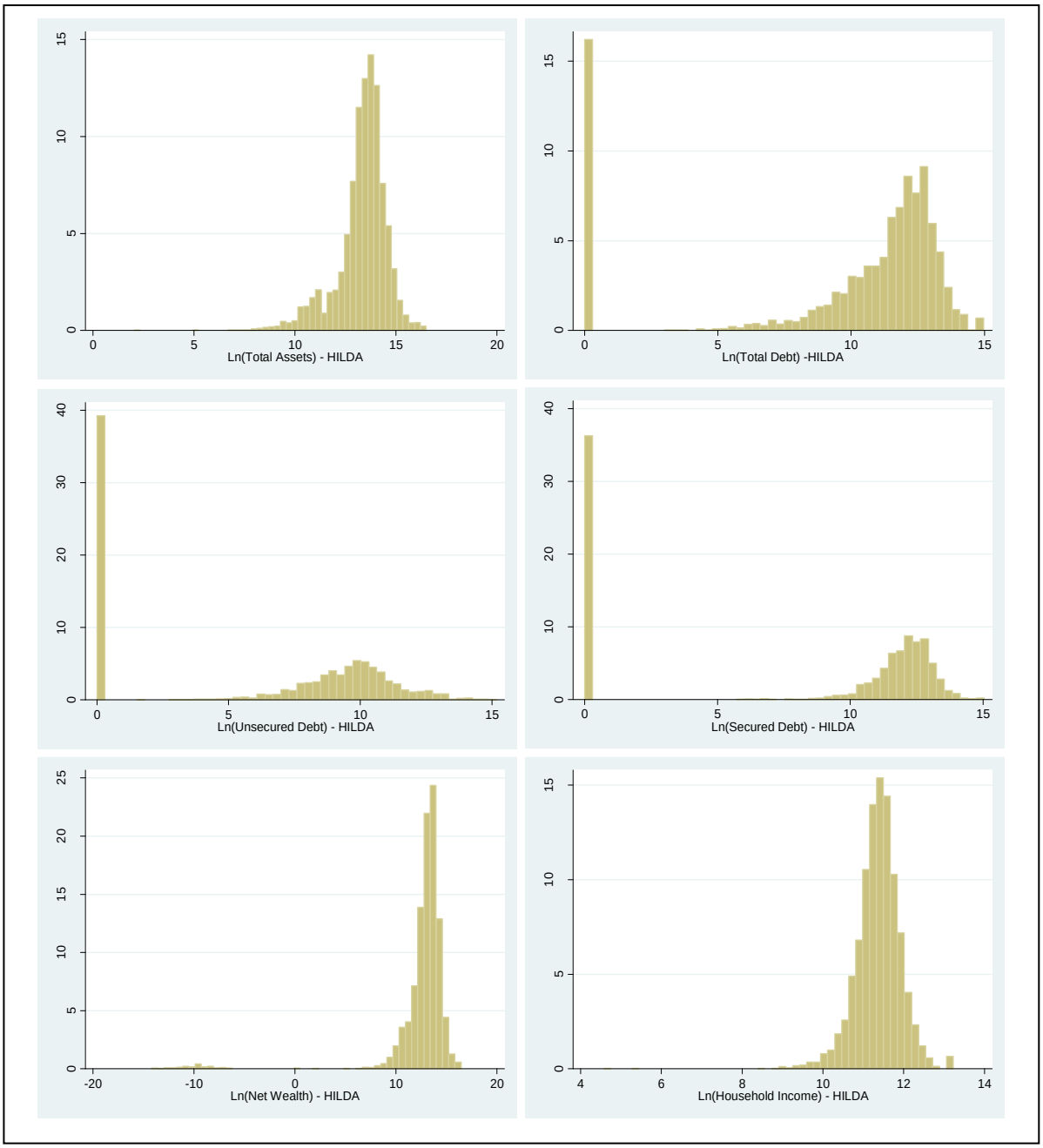


Figure A4.6: Distributions of the Monetary Financial Variables - GSOEP

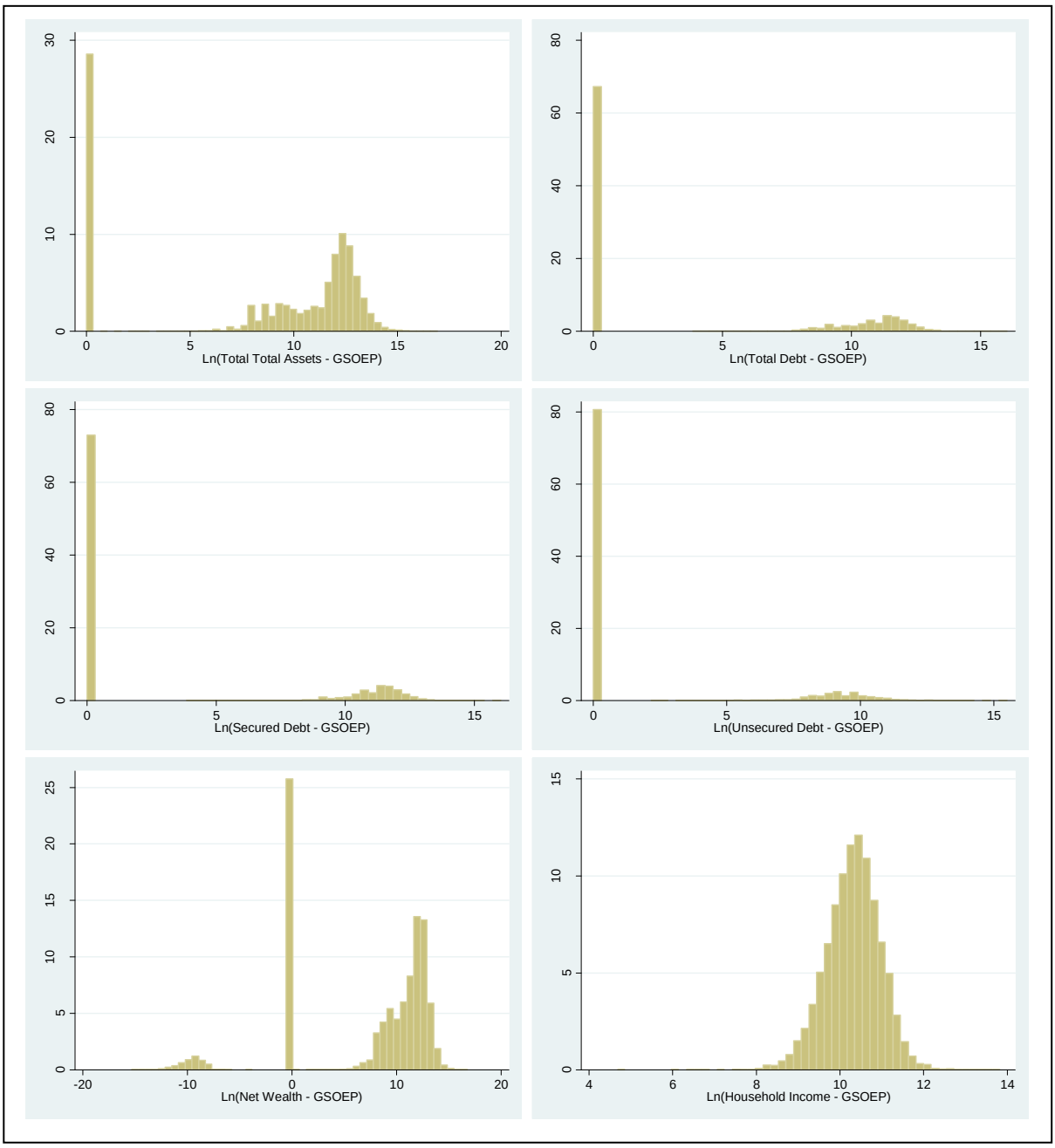


Table A4.1: Dependent Variable Correlations and Descriptive Statistics

	Financial Satisfaction			Financial Concerns		
	Australia			Germany		
	Overall	Males	Females	Overall	Males	Females
Mean	2.0542	2.0609	2.0326	0.8994	0.8496	0.9838
Standard Deviation	0.7039	0.7019	0.7105	0.7086	0.7039	0.7087
Range	0-4			0-2		
Risk Attitudes						
Risk Tolerant = 1	2.2383	2.2509	2.1207	0.8426	0.8042	0.9400
Risk Tolerant = 0	2.0179	2.0149	2.0262	0.9264	0.8749	0.9988
Correlations						
Risk Tolerance	0.1162 (0.0000)	0.1333 (0.0000)	0.0334 (0.3284)	-0.0559 (0.0000)	-0.0488 (0.0000)	-0.0363 (0.0061)
Total Assets	0.3615 (0.0000)	0.3834 (0.0000)	0.3074 (0.0000)	-0.2863 (0.0000)	-0.2909 (0.0000)	-0.2519 (0.0000)
Total Debt	-0.0544 (0.0011)	-0.0531 (0.0053)	-0.0656 (0.0545)	-0.0441 0.0000	-0.0367 0.0003	-0.0327 0.0134
Unsecured Debt	-0.0992 (0.0000)	-0.0848 (0.0000)	-0.1493 (0.0000)	0.1289 (0.0000)	0.1321 (0.0000)	0.1278 (0.0000)
Secured Debt	0.0310 (0.0623)	0.0249 (0.1916)	0.0439 (0.1982)	-0.0747 (0.0000)	-0.0683 (0.0000)	-0.0618 (0.0000)
Net wealth	0.2022 (0.0000)	0.1976 (0.0000)	0.2145 (0.0000)	-0.2818 (0.0000)	-0.2880 (0.0000)	-0.2467 (0.0000)

P-values presented in parentheses, H_0: $\rho = 0$, H_1: $\rho \neq 0$.

Table A4.2: Overall Life Satisfaction – Summary Statistics

	Mean (Median)	Standard Deviation	Minimum	Maximum	Observations
HILDA					
Overall	3.901 (4)	1.1676	0	6	3,616
Male	3.902 (4)	1.1589	0	6	2,757
Female	3.898 (4)	1.1958	0	6	859
GSOEP					
Overall	6.901 (7)	1.7478	0	10	15,424
Male	6.971 (7)	1.7250	0	10	9,702
Female	6.783 (7)	1.7797	0	10	5,722

Table A4.3: Independent Variables: Definitions - HILDA

Independent Variable	Definition
Age	Age of the head of household.
Age Squared/100	Age squared divided by 100.
Female	1 if head of household is female, 0 if male.
Ln(Household Size)	Natural logarithm of household size.
Income	
Household Annual Disposable Income	Natural logarithm of household's disposable income if disposable income is greater than zero, defined to be zero if disposable income is zero.
Marital Status *(Married or in De facto relationship omitted category)*	
Divorced/Separated	1 if head of household is divorced or separated, 0 otherwise.
Widowed	1 if head of household is widowed, 0 otherwise.
Never married	1 if head of household has never been married, 0 otherwise.
Labour Force Status *(Employed is the omitted category)*	
Unemployed	1 if head of household is unemployed, 0 otherwise.
Not in Labour Force	1 if head of household is not in the labour force, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Education (*Below high school education omitted category)*	
Degree	1 if highest level of education is degree or higher, 0 otherwise.
Vocational Degree	1 if highest level of education is a vocational degree, 0 otherwise.
High School	1 if highest level of education is high school level, 0 otherwise.
Self-Reported Health Status *(Poor health omitted category)*	
Excellent Health	1 if self-assessed health is excellent, 0 otherwise.
Very Good Health	1 if self-assessed health is very good, 0 otherwise.
Good Health	1 if self-assessed health is good, 0 otherwise.
Fair Health	1 if self-assessed health is fair, 0 otherwise.
Risk Attitudes – *(Risk averse omitted category)*	
Risk Tolerant	1 if head of household reports willing to take either "*substantial risks expecting substantial rewards*" or "*I take above average risks expecting above average returns*", 0 otherwise.
Monetary Financial Variables	
Ln(Total Assets)	Natural logarithm of household total assets.
Ln(Total Debt)	Natural logarithm of household total debt.
Ln(Unsecured Debt)	Natural logarithm of household unsecured debt.
Ln(Secured Debt)	Natural logarithm of household secured debt.
Ln(Net Wealth)	Natural logarithm of household net wealth.

Table A4.4: Independent Variables: Summary Statistics - HILDA

Independent Variable	Mean	Standard Deviation	Minimum	Maximum
Age	43.8396	11.5398	18	93
Age Squared/100	20.5504	10.6917	3.24	8649
Female	0.2376	0.4256	0	1
Ln(Household Size)	0.8998	0.5484	0	2.3026
Household Income				
Ln(Disposable Income)	11.3728	0.5580	4.5799	13.2340
Marital Status - *(Married or in de facto relationship omitted category)*				
Never Married	0.1485	0.3557	0	1
Divorced	0.1112	0.3144	0	1
Widowed	0.0160	0.1256	0	1
Labour Force Status - *(Employed is the omitted category)*				
Not in Labour Force	0.0113	0.1059	0	1
Unemployed	0.0088	0.0937	0	1
Retired	0.0224	0.1448	0	1
Education - (*Below high school education omitted category)*				
Degree	0.4187	0.4934	0	1
Vocational Degree	0.3454	0.4756	0	1
High School	0.1020	0.3028	0	1
Self-Reported Health Status - *(Poor and very poor health omitted category)*				
Excellent	0.1419	0.3490	0	1
Very Good	0.4217	0.4939	0	1
Good	0.3504	0.4772	0	1
Fair	0.0810	0.2729	0	1
Risk Attitudes - *(Risk averse omitted category)*				
Risk Tolerant	0.1648	0.3711	0	1
Monetary Financial Variables				
Ln(Total Assets)	13.3274	1.2406	2.0575	16.5095
Ln(Total Debt)	9.671006	4.5263	0	14.9786
Ln(Unsecured Debt)	5.8702	4.9176	0	15.1869
Ln(Secured Debt)	7.6611	5.8503	0	15.0499
Ln(Net Wealth)	12.6238	3.3443	-14.1881	16.4704
Observations	3,616			

All monetary financial variables for Australia are presented in Australian Dollars (A$) and inflated to 2010 prices.

Table A4.5: Independent Variables: Definitions - GSOEP

Independent Variable	Variable Description
Age	Age of head of household.
Age Squared/100	Age of head of household squared divided by 100.
Female	1 if head of household is female, 0 if male.
Ln(Household Size)	Natural logarithm of number of people present in the household.
Household Income	
Ln(Household Income)	Natural logarithm of post government annual household income.
Marital Status – *(Married or in a de facto relationship omitted category)*	
Never Married	1 if head of household has never married, 0 otherwise.
Widowed	1 if head of household is widowed, 0 otherwise.
Divorced	1 if head of household is divorced or separated, 0 otherwise.
Labour Force Status – *(Employed omitted category)*	
Not in Labour Force	1 is head of household is not to be a member of the labour force, 0 otherwise.
Retired	1 if head of household is retired, 0 otherwise.
Unemployed	1 if head of household is unemployed, 0 otherwise.
Highest Level of Education – *(Below high school omitted category)*	
Education 1	1 if head of household has *Realschule*, equivalent to GCSE level, 0 otherwise.
Education 2	1 if head of household passed *Arbitur* examination, equivalent to A-Level, 0 otherwise.
Education 3	1 if head of household has vocational degree, 0 otherwise.
Education 4	1 if head of household has tertiary qualification, 0 otherwise.
Health Status - *(Poor health omitted category)*	
Poor	1 if head of household rates their current health as poor, 0 otherwise.
Satisfactory	1 if head of household rates their current health as fair, 0 otherwise.
Good	1 if head of household rates their current health as good, 0 otherwise.
Very Good	1 if head of household rates their current health as very good, 0 otherwise.
Risk Attitudes - *(Risk averse omitted category)*	
Risk Tolerant	1 if individual reports 6 – 10 to the general risk attitudes question, 0 otherwise.
Monetary Financial Variables	
Ln(Total Assets)	Natural logarithm of household's total assets.
Ln(Total Debt)	Natural logarithm of household's total debt.
Ln(Secured Debt)	Natural logarithm of household's secured debt.
Ln(Unsecured Debt)	Natural logarithm of household's unsecured debt.
Ln(Net Wealth)	Natural logarithm of household's net wealth.

Table A4.6: Independent Variables: Summary Statistics - GSOEP

Independent Variables	Mean	Standard Deviation	Minimum	Maximum
Age	51.9922	15.2272	18	97
Age Squared	29.3505	16.5220	3.24	94.09
Female	0.3710	0.4831	0	1
Ln(Household Size)	0.7747	0.5164	0	2.5649
Household Income				
Ln(Household Income)	10.3147	0.6567	4.6812	13.8327
Relationship Status – *(Married or in a de facto relationship omitted category)*				
Never Married	0.1548	0.3617	0	1
Widowed	0.0909	0.2875	0	1
Divorced	0.1368	0.3436	0	1
Labour Force Status – *(Employed omitted category)*				
Not in Labour Force	0.1390	0.3460	0	1
Retired	0.2028	0.4021	0	1
Unemployed	0.0507	0.2194	0	1
Highest Level of Education – *(Below high school omitted category)*				
Education 1	0.0206	0.1419	0	1
Education 2	0.0175	0.1311	0	1
Education 3	0.1516	0.3586	0	1
Education 4	0.1691	0.3748	0	1
Self-Assessed Health Status – (*Poor health omitted category)*				
Poor Health	0.1437	0.3508	0	1
Satisfactory Health	0.3540	0.4782	0	1
Good Health	0.3957	0.4890	0	1
Very Good Health	0.0699	0.2550	0	1
Risk Attitudes - *(Risk averse omitted category)*				
Risk Tolerant	0.3365	0.4725	0	1
Monetary Financial Variables				
Ln(Total Assets)	8.1527	5.3728	1	16.9275
Ln(Total Debt)	3.5510	5.1527	0	16.0316
Ln(Secured Debt)	3.0101	4.9854	0	16.0316
Ln(Unsecured Debt)	1.7826	3.6983	0	15.5010
Ln(Net Wealth)	7.2861	6.4091	-15.3501	16.7987
Observations	15,424			

All monetary financial variables for Germany are presented in Euros (€) inflated to 2007 prices.

Table A4.7: Dependent Variable: Descriptive Statistics - HILDA

Independent Variable	0 – Poor or Very Poor	1 – Just Getting Along	2 – Reasonably Comfortable	3 – Very Comfortable	4 – Prosperous
Age	40.7419	41.9109	44.1299	44.7402	44.1720
Age Squared/100	25.8945	18.7712	20.8058	21.4280	20.5736
Female	0.2581	0.2561	0.2342	0.2322	0.2258
Ln(Household Size)	0.6894	0.9058	0.8951	0.9036	1.0125
Household Income					
Ln(Disposable Income)	10.6534	11.1240	11.3475	11.6323	11.9354
Marital Status					
Never Married	0.2258	0.1848	0.1473	0.1234	0.0968
Divorced	0.1935	0.1896	0.0997	0.0827	0.0430
Widowed	0.0323	0.0162	0.0178	0.0116	0.0000
Labour Force Status					
Not in Labour Force	0.0323	0.0259	0.0096	0.0044	0.0000
Unemployed	0.2258	0.0146	0.0059	0.0029	0.0108
Retired	0.0968	0.0130	0.0247	0.0232	0.0000
Education					
Degree	0.2581	0.2917	0.3852	0.5951	0.7957
Vocational Degree	0.2903	0.3679	0.3797	0.2467	0.1398
High School	0.1613	0.1394	0.0993	0.0813	0.0538
Self-Reported Health Status					
Excellent Health	0.0323	0.0891	0.1290	0.2046	0.3656
Very Good Health	0.1290	0.3566	0.4259	0.4819	0.4086
Good Health	0.4839	0.4052	0.3683	0.2612	0.1828
Fair Health	0.3226	0.1345	0.0732	0.0522	0.0430
Risk Attitudes					
Risk Tolerant	0.1613	0.1216	0.1441	0.2540	0.2796
Financial Variables					
Ln(Total Assets)	11.6322	12.6475	13.3118	13.9017	14.5150
Ln(Total Debt)	9.8941	10.1501	9.6472	9.4043	8.9537
Ln(Unsecured Debt)	6.9528	6.8739	5.8068	5.1837	5.4274
Ln(Secured Debt)	4.9948	7.2584	7.7505	7.9855	6.7166
Ln(Net Wealth)	7.0106	11.7406	12.6459	13.3688	14.3156
Observations	31	617	2186	689	93

Table A4.7 shows the means of the independent variables for each category of the dependent variable financial satisfaction for Australia.

Table A4.8: Dependent Variable: Descriptive Statistics - GSOEP

Independent Variable	0 – Not Concerned	1 – Concerned	2 – Very Concerned
Age	56.1905	50.6291	48.9507
Age Squared/100	34.0477	27.8476	25.8945
Female	0.3131	0.3788	0.4390
Ln(Household Size)	0.7205	0.8081	0.7765
Household Income			
Ln(Household Income)	10.4997	10.3241	10.0155
Marital Status			
Never Married	0.1377	0.1559	0.1775
Widowed	0.1244	0.0798	0.0673
Divorced	0.0916	0.1275	0.2265
Labour Force Status			
Not in Labour Force	0.1303	0.1331	0.1661
Retired	0.2878	0.1805	0.1286
Unemployed	0.0097	0.0306	0.1598
Highest Level of Education			
Education 1	0.0112	0.0235	0.0275
Education 2	0.0196	0.0173	0.0148
Education 3	0.1780	0.1555	0.1027
Education 4	0.2464	0.1518	0.0944
Self-Assessed Health Status			
Poor Health	0.1079	0.1339	0.2205
Satisfactory Health	0.3231	0.3717	0.3582
Good Health	0.4481	0.4022	0.3023
Very Good Health	0.1011	0.0622	0.0414
Risk Attitudes			
Risk Tolerance	0.3706	0.3320	0.2963
Financial Measures			
Ln(Total Assets)	9.9334	8.1448	5.5077
Ln(Total Debt)	3.6468	3.7604	2.9104
Ln(Secured Debt)	3.2877	3.2013	2.1403
Ln(Unsecured Debt)	1.1690	1.8628	2.5102
Ln(Net Wealth)	9.4294	7.2108	4.2587
Observations	4,736	7,522	3,166

Table A4.8 shows the means of the independent variables for each category of the dependent variable relating to concerns about current economic situation for Germany.

Table A4.9: Determinants of Financial Satisfaction: HILDA – Ordered Probit Model with Mundlak Fixed Effects – *Coefficients*

The dependent variable analysed is financial satisfaction which is measured on a 5 point scale. An ordered probit model with a Mundlak correction is used to analyse an unbalanced panel from the 2002, 2006 and 2010 waves of the HILDA survey.

	Ordered Probit with Mundlak Fixed Effects				Ordered Probit Model			
Independent Variables	Specification							
	1	2	3	4	1	2	3	4
Risk Tolerant	0.232*** (0.0665)	0.167*** (0.0618)	0.171*** (0.0612)	0.222*** (0.0653)	0.242*** (0.0650)	0.175*** (0.0617)	0.181*** (0.0612)	0.231*** (0.0643)
Ln(Total Assets)		0.208*** (0.0464)	0.210*** (0.0494)			0.355*** (0.0333)	0.375*** (0.0367)	
Ln(Total Debt)		-0.0277*** (0.00655)				-0.0481*** (0.00490)		
Ln(Unsecured Debt)			-0.0184*** (0.00519)				-0.0267*** (0.00444)	
Ln(Secured Debt)			-0.0162*** (0.00579)				-0.0310*** (0.00438)	
Ln(Net Wealth)				0.0165* (0.00925)				0.0432*** (0.00802)
Ln(Disposable Income)	0.459*** (0.0596)	0.426*** (0.0631)	0.433*** (0.0642)	0.458*** (0.0601)	0.755*** (0.0789)	0.552*** (0.0766)	0.548*** (0.0765)	0.712*** (0.0776)
Female	0.0892 (0.0628)	0.0675 (0.0622)	0.0720 (0.0622)	0.0782 (0.0627)	0.0746 (0.0603)	0.0614 (0.0599)	0.0664 (0.0599)	0.0683 (0.0601)
Age	0.0141 (0.0252)	-0.0249 (0.0282)	-0.0266 (0.0282)	0.00746 (0.0259)	-0.0291** (0.0138)	-0.0702*** (0.0133)	-0.0715*** (0.0135)	-0.0420*** (0.0139)
Age Squared	0.00391 (0.0266)	0.0299 (0.0288)	0.0318 (0.0287)	0.00977 (0.0272)	0.0417*** (0.0155)	0.0653*** (0.0144)	0.0665*** (0.0145)	0.0523*** (0.0155)
Degree	0.159 (0.330)	0.123 (0.343)	0.148 (0.343)	0.154 (0.332)	0.374*** (0.0778)	0.261*** (0.0770)	0.259*** (0.0770)	0.365*** (0.0769)
Vocational Degree	-0.262 (0.294)	-0.350 (0.299)	-0.328 (0.299)	-0.266 (0.295)	0.0929 (0.0752)	-0.0227 (0.0732)	-0.0201 (0.0732)	0.0769 (0.0741)
High School	-0.578 (0.390)	-0.668 (0.410)	-0.640 (0.409)	-0.584 (0.392)	0.0784 (0.0958)	-0.00558 (0.0956)	-0.00428 (0.0960)	0.0723 (0.0959)
Ln(Household Size)	-0.122 (0.0816)	-0.180** (0.0869)	-0.164* (0.0867)	-0.126 (0.0823)	-0.394*** (0.0611)	-0.439*** (0.0598)	-0.425*** (0.0596)	-0.403*** (0.0606)
Never Married	0.0147 (0.131)	-0.0128 (0.138)	-0.0247 (0.139)	0.0218 (0.132)	-0.162* (0.0829)	-0.177** (0.0822)	-0.191** (0.0823)	-0.144* (0.0822)
Divorced	-0.288** (0.131)	-0.274** (0.135)	-0.272** (0.134)	-0.287** (0.132)	-0.468*** (0.0859)	-0.405*** (0.0841)	-0.415*** (0.0845)	-0.450*** (0.0850)
Widowed	0.578 (0.363)	0.565 (0.382)	0.592 (0.380)	0.589 (0.361)	-0.506** (0.197)	-0.485** (0.202)	-0.470** (0.209)	-0.525*** (0.197)
Not in Labour Force	-0.285 (0.187)	-0.367* (0.193)	-0.355* (0.192)	-0.278 (0.190)	-0.460** (0.202)	-0.592*** (0.203)	-0.575*** (0.200)	-0.440** (0.202)
Unemployed	-0.471 (0.315)	-0.558* (0.317)	-0.534* (0.319)	-0.477 (0.316)	-0.847*** (0.289)	-0.690** (0.282)	-0.681** (0.286)	-0.797*** (0.284)
Retired	-0.306* (0.186)	-0.410** (0.198)	-0.394* (0.203)	-0.316* (0.188)	0.236 (0.187)	0.110 (0.172)	0.149 (0.175)	0.201 (0.185)
Excellent Health	0.182 (0.321)	0.217 (0.319)	0.217 (0.323)	0.183 (0.324)	1.433*** (0.260)	1.473*** (0.262)	1.492*** (0.262)	1.470*** (0.260)
Very Good Health	0.136 (0.314)	0.166 (0.312)	0.155 (0.316)	0.139 (0.318)	1.191*** (0.255)	1.244*** (0.257)	1.257*** (0.257)	1.230*** (0.254)
Good Health	0.0614 (0.307)	0.0881 (0.304)	0.0801 (0.308)	0.0618 (0.310)	0.949*** (0.255)	1.022*** (0.257)	1.030*** (0.258)	0.995*** (0.255)
Fair Health	0.0200 (0.302)	0.0542 (0.300)	0.0478 (0.304)	0.0258 (0.305)	0.686*** (0.261)	0.772*** (0.262)	0.783*** (0.264)	0.732*** (0.261)
Cut 1	8.339*** (1.173)	8.354*** (1.055)	8.667*** (1.051)	7.761*** (1.166)	6.306*** (0.866)	6.686*** (0.753)	6.974*** (0.750)	5.999*** (0.852)
Cut 2	10.09*** (1.183)	10.22*** (1.062)	10.52*** (1.058)	9.548*** (1.175)	8.014*** (0.875)	8.504*** (0.759)	8.787*** (0.756)	7.739*** (0.859)
Cut 3	12.07*** (1.198)	12.31*** (1.072)	12.62*** (1.068)	11.55*** (1.187)	9.974*** (0.888)	10.57*** (0.769)	10.86*** (0.766)	9.714*** (0.871)
Cut 4	13.43*** (1.217)	13.75*** (1.085)	14.07*** (1.081)	12.92*** (1.204)	11.33*** (0.907)	12.00*** (0.783)	12.30*** (0.780)	11.07*** (0.888)
Log Likelihood	-3361.245	-3210.4177	-3203.4103	-3334.3144	-3398.3947	-3243.473	-3236.7	-3374.5066
LR Model χ^2	475.31***	785.43***	772.85***	547.23***	396.82***	731.12***	710.92***	464.81***
Count R^2	0.623	0.627	0.626	0.618	0.611	0.625	0.630	0.611
AIC	6802.491	6508.835	6498.821	6752.629	6842.789	6536.946	6525.400	6797.013
BIC	7050.215	6781.33	6783.704	7012.740	6985.231	6691.774	6686.421	6945.648
Observations	3,616							

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4.10: Determinants of Financial Satisfaction: HILDA – Ordered Probit Model with Mundlak Fixed Effects – Marginal Effects of Reporting Uppermost Category (*"Prosperous"* - 4)

	Ordered Probit with Mundlak Fixed Effects				Ordered Probit Model			
Independent Variables	Specification							
	1	2	3	4	1	2	3	4
Risk Tolerant	0.00825**	0.00423**	0.00425**	0.00757**	0.00917***	0.00469**	0.00477**	0.00838***
	(0.00324)	(0.00192)	(0.00187)	(0.00297)	(0.00333)	(0.00204)	(0.00201)	(0.00309)
Ln(Total Assets)		0.00458***	0.00451***			0.00825***	0.00850***	
		(0.00121)	(0.00123)			(0.00149)	(0.00155)	
Ln(Total Debt)		-0.00061***				-0.00112***		
		(0.000171)				(0.000201)		
Ln(Unsecured Debt)			-0.00040***				-0.00061***	
			(0.000125)				(0.000133)	
Ln(Secured Debt)			-0.00035***				-0.00070***	
			(0.000134)				(0.000148)	
Ln(Net Wealth)				0.000470*				0.00131***
				(0.000273)				(0.000321)
Ln(Disposable Income)	0.0136***	0.00940***	0.00930***	0.0131***	0.0237***	0.0128***	0.0124***	0.0216***
	(0.00260)	(0.00193)	(0.00192)	(0.00250)	(0.00338)	(0.00226)	(0.00220)	(0.00312)
Female	0.00280	0.00155	0.00162	0.00234	0.00245	0.00148	0.00157	0.00215
	(0.00210)	(0.00152)	(0.00149)	(0.00199)	(0.00210)	(0.00153)	(0.00150)	(0.00200)
Age	0.000420	-0.000550	-0.000571	0.000213	-0.000912**	-0.00163***	-0.00162***	-0.00127***
	(0.000753)	(0.000624)	(0.000606)	(0.000740)	(0.000438)	(0.000380)	(0.000373)	(0.000443)
Age Squared	0.000116	0.000661	0.000683	0.000279	0.00131***	0.00152***	0.00151***	0.00158***
	(0.000788)	(0.000637)	(0.000619)	(0.000774)	(0.000502)	(0.000387)	(0.000379)	(0.000501)
Degree	0.00488	0.00279	0.00329	0.00454	0.0129***	0.00646***	0.00625***	0.0121***
	(0.0106)	(0.00803)	(0.00793)	(0.0102)	(0.00367)	(0.00234)	(0.00227)	(0.00346)
Vocational Degree	-0.00717	-0.00695	-0.00637	-0.00699	0.00302	-0.000523	-0.000453	0.00239
	(0.00758)	(0.00556)	(0.00545)	(0.00730)	(0.00261)	(0.00167)	(0.00163)	(0.00243)
High School	-0.0106**	-0.00837***	-0.00796***	-0.0102**	0.00264	-0.000129	-9.68e-05	0.00234
	(0.00446)	(0.00300)	(0.00299)	(0.00424)	(0.00350)	(0.00220)	(0.00216)	(0.00335)
Ln(Household Size)	-0.00364	-0.00398**	-0.00352*	-0.00360	-0.0124***	-0.0102***	-0.00964***	-0.0122***
	(0.00248)	(0.00200)	(0.00193)	(0.00240)	(0.00228)	(0.00187)	(0.00181)	(0.00222)
Never Married	0.000442	-0.000280	-0.000520	0.000632	-0.00449**	-0.00356**	-0.00372**	-0.00389*
	(0.00398)	(0.00298)	(0.00287)	(0.00391)	(0.00214)	(0.00154)	(0.00150)	(0.00207)
Divorced	-0.00669***	-0.00473**	-0.00458**	-0.00639***	-0.0100***	-0.00663***	-0.00656***	-0.00940***
	(0.00255)	(0.00195)	(0.00188)	(0.00246)	(0.00182)	(0.00136)	(0.00133)	(0.00174)
Widowed	0.0325	0.0243	0.0257	0.0324	-0.00937***	-0.00663***	-0.00635***	-0.00917***
	(0.0331)	(0.0273)	(0.0279)	(0.0326)	(0.00238)	(0.00172)	(0.00173)	(0.00223)
Not in Labour Force	-0.00620**	-0.00534***	-0.00509***	-0.00584**	-0.00887***	-0.00722***	-0.00694***	-0.00832***
	(0.00300)	(0.00190)	(0.00187)	(0.00294)	(0.00257)	(0.00161)	(0.00158)	(0.00253)
Unemployed	-0.00842***	-0.00663***	-0.00632***	-0.00812***	-0.0113***	-0.00762***	-0.00738***	-0.0107***
	(0.00320)	(0.00193)	(0.00195)	(0.00302)	(0.00214)	(0.00164)	(0.00161)	(0.00207)
Retired	-0.00656**	-0.00577***	-0.00548***	-0.00642**	0.00956	0.00290	0.00400	0.00759
	(0.00291)	(0.00184)	(0.00187)	(0.00276)	(0.00953)	(0.00513)	(0.00557)	(0.00851)
Excellent Health	0.00628	0.00579	0.00566	0.00611	0.146***	0.127**	0.128**	0.150***
	(0.0128)	(0.0102)	(0.0101)	(0.0125)	(0.0553)	(0.0503)	(0.0505)	(0.0561)
Very Good Health	0.00415	0.00379	0.00344	0.00408	0.0557***	0.0461***	0.0459***	0.0568***
	(0.00991)	(0.00746)	(0.00731)	(0.00964)	(0.0195)	(0.0165)	(0.0164)	(0.0196)
Good Health	0.00186	0.00201	0.00178	0.00180	0.0458**	0.0396**	0.0393**	0.0477**
	(0.00952)	(0.00719)	(0.00705)	(0.00924)	(0.0196)	(0.0169)	(0.0168)	(0.0199)
Fair Health	0.000605	0.00126	0.00108	0.000753	0.0417	0.0398	0.0400	0.0451
	(0.00931)	(0.00739)	(0.00720)	(0.00915)	(0.0268)	(0.0247)	(0.0248)	(0.0279)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4.11: Determinants of Financial Satisfaction: GSOEP – Ordered Probit Model with Mundlak Fixed Effects – *Coefficients*

The dependent variable analysed is financial concern which is measured on a 3 point scale. An ordered probit model with a Mundlak correction is used to analyse an unbalanced panel from the 2002 and 2007 waves of the GSOEP survey.

	Ordered Probit With Mundlak Fixed Effects				Ordered Probit Model			
Independent Variables	Specification							
	1	2	3	4	1	2	3	4
Risk Tolerant	-0.0440**	-0.0523**	-0.0610**	-0.0506**	-0.0484**	-0.0530**	-0.0631***	-0.0519**
	(0.0239)	(0.0239)	(0.0240)	(0.0239)	(0.0236)	(0.0235)	(0.0236)	(0.0235)
Ln(Total Assets)		-0.00552	-0.00581*			-0.0372***	-0.0361***	
		(0.00342)	(0.00347)			(0.00236)	(0.00243)	
Ln(Total Debt)		0.0129***				0.0168***		
		(0.00306)				(0.00226)		
Ln(Unsecured Debt)			0.0140***				0.0279***	
			(0.00343)				(0.00269)	
Ln(Secured Debt)			0.0131***				0.0152***	
			(0.00348)				(0.00242)	
Ln(Net Wealth)				-0.00557**				-0.0274***
				(0.00241)				(0.00177)
Ln(Household Income)	-0.211***	-0.216***	-0.221***	-0.210***	-0.634***	-0.546***	-0.554***	-0.545***
	(0.0398)	(0.0404)	(0.0405)	(0.0402)	(0.0270)	(0.0281)	(0.0281)	(0.0271)
Female	0.0865***	0.0790***	0.0792***	0.0780***	0.0925***	0.0858***	0.0840***	0.0866***
	(0.0256)	(0.0256)	(0.0256)	(0.0255)	(0.0247)	(0.0247)	(0.0247)	(0.0247)
Age	0.0406***	0.0460***	0.0351***	0.0461***	0.0325***	0.0403***	0.0394***	0.0414***
	(0.0120)	(0.0123)	(0.0123)	(0.0123)	(0.00586)	(0.00588)	(0.00588)	(0.00587)
Age Squared	-0.0124	-0.0148	-0.00805	-0.0161	-0.0445***	-0.0492***	-0.0479***	-0.0506***
	(0.0115)	(0.0117)	(0.0117)	(0.0117)	(0.00586)	(0.00588)	(0.00588)	(0.00587)
Ln(Household Size)	0.100*	0.0965*	0.101*	0.106*	0.448***	0.422***	0.412***	0.428***
	(0.0558)	(0.0566)	(0.0568)	(0.0565)	(0.0324)	(0.0324)	(0.0324)	(0.0324)
Never Married	0.0363	0.0490	0.0526	0.0336	0.0302	0.0289	0.0349	0.0232
	(0.0753)	(0.0763)	(0.0766)	(0.0763)	(0.0417)	(0.0419)	(0.0419)	(0.0417)
Widowed	-0.0194	-0.0212	-0.0184	-0.0175	-0.0855*	-0.108**	-0.113**	-0.101**
	(0.130)	(0.133)	(0.133)	(0.132)	(0.0485)	(0.0488)	(0.0489)	(0.0486)
Divorced	0.162**	0.174**	0.180**	0.158**	0.244***	0.191***	0.184***	0.192***
	(0.0743)	(0.0753)	(0.0756)	(0.0753)	(0.0380)	(0.0382)	(0.0382)	(0.0381)
Not in Labour Force	0.0332	0.0360	0.0390	0.0326	-0.129***	-0.108***	-0.0946***	-0.115***
	(0.0432)	(0.0438)	(0.0439)	(0.0438)	(0.0327)	(0.0326)	(0.0326)	(0.0326)
Retired	0.0697	0.0773	0.0824	0.0696	-0.171***	-0.139***	-0.124**	-0.158***
	(0.0624)	(0.0633)	(0.0636)	(0.0632)	(0.0499)	(0.0500)	(0.0500)	(0.0498)
Unemployed	0.565***	0.578***	0.584***	0.574***	0.754***	0.731***	0.747***	0.731***
	(0.0608)	(0.0618)	(0.0619)	(0.0617)	(0.0515)	(0.0517)	(0.0518)	(0.0518)
Education 1	-0.204	-0.197	-0.213	-0.200	0.101	0.110	0.111	0.115
	(0.288)	(0.289)	(0.292)	(0.290)	(0.0729)	(0.0718)	(0.0721)	(0.0725)
Education 2	-0.441*	-0.435*	-0.452*	-0.448*	-0.234***	-0.216**	-0.208**	-0.207**
	(0.244)	(0.246)	(0.247)	(0.247)	(0.0873)	(0.0864)	(0.0863)	(0.0858)
Education 3	-0.446**	-0.444**	-0.447**	-0.450**	-0.156***	-0.140***	-0.143***	-0.138***
	(0.198)	(0.199)	(0.200)	(0.200)	(0.0317)	(0.0314)	(0.0315)	(0.0314)
Education 4	-0.411*	-0.407*	-0.407*	-0.419*	-0.180***	-0.172***	-0.171***	-0.171***
	(0.231)	(0.232)	(0.232)	(0.234)	(0.0326)	(0.0324)	(0.0324)	(0.0324)
Poor Health	-0.0761	-0.0726	-0.0723	-0.0772	-0.323***	-0.287***	-0.287***	-0.300***
	(0.0769)	(0.0777)	(0.0780)	(0.0778)	(0.0614)	(0.0625)	(0.0626)	(0.0624)
Satisfied with Health	-0.217***	-0.216***	-0.216***	-0.221***	-0.610***	-0.565***	-0.560***	-0.578***
	(0.0799)	(0.0807)	(0.0809)	(0.0809)	(0.0588)	(0.0599)	(0.0600)	(0.0598)
Good Health	-0.367***	-0.369***	-0.369***	-0.371***	-0.893***	-0.837***	-0.824***	-0.852***
	(0.0832)	(0.0841)	(0.0842)	(0.0842)	(0.0602)	(0.0613)	(0.0615)	(0.0613)
Very Good Health	-0.488***	-0.490***	-0.494***	-0.491***	-1.160***	-1.099***	-1.084***	-1.112***
	(0.0966)	(0.0975)	(0.0978)	(0.0977)	(0.0702)	(0.0713)	(0.0715)	(0.0713)
Cut 1	-8.207***	-6.989***	-6.970***	-6.758***	-7.121***	-6.181***	-6.229***	-6.113***
	(0.338)	(0.358)	(0.358)	(0.348)	(0.294)	(0.303)	(0.305)	(0.297)
Cut 2	-6.628***	-5.386***	-5.361***	-5.154***	-5.566***	-4.604***	-4.643***	-4.536***
	(0.335)	(0.356)	(0.356)	(0.347)	(0.292)	(0.301)	(0.303)	(0.296)
Log Likelihood	-13901.09	-13736.124	-13701.568	-13742.709	-14074.66	-13921.541	-13867.393	-13932.577
LR Model χ^2	2742.20***	2978.56***	3032.82***	2978.90***	2599.40***	2861.67***	2934.32***	2855.60***
Count R^2	0.560	0.567	0.567	0.565	0.560	0.565	0.565	0.562
AIC	27,882.181	27,560.247	27,495.137	27,569.418	27882.181	27891.083	27784.786	27911.155
BIC	28,187.928	27,896.569	27,846.746	27,890.453	28187.928	28074.531	27975.878	28086.960
Observations	15,424							

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4.12: Determinants of Financial Satisfaction: GSOEP – Ordered Probit Model with Mundlak Fixed Effects – Marginal Effects of Uppermost Category (*"Very Concerned"* - 2)

	Ordered Probit With Mundlak Fixed Effects				Ordered Probit Model			
Independent Variables	Specification							
	1	2	3	4	1	2	3	4
Risk Tolerant	-0.0109*	-0.0127**	-0.0148**	-0.0123**	-0.0121**	-0.0131**	-0.0155***	-0.0128**
	(0.00586)	(0.00576)	(0.00574)	(0.00577)	(0.00585)	(0.00575)	(0.00572)	(0.00576)
Ln(Total Assets)		-0.00135	-0.00142*			-0.00926***	-0.00896***	
		(0.000839)	(0.000847)			(0.000599)	(0.000611)	
Ln(Total Debt)		0.00318***				0.00417***		
		(0.000752)				(0.000564)		
Ln(Unsecured Debt)			0.00341***				0.00691***	
			(0.000839)				(0.000672)	
Ln(Secured Debt)			0.00321***				0.00376***	
			(0.000851)				(0.000601)	
Ln(Net Wealth)				-0.00137**				-0.00683***
				(0.000592)				(0.000449)
Ln(Household Income)	-0.0524***	-0.0531***	-0.0539***	-0.0516***	-0.160***	-0.136***	-0.137***	-0.136***
	(0.00992)	(0.00993)	(0.00992)	(0.00988)	(0.00694)	(0.00712)	(0.00707)	(0.00684)
Female	0.0217***	0.0196***	0.0195***	0.0193***	0.0236***	0.0216***	0.0211***	0.0218***
	(0.00649)	(0.00640)	(0.00637)	(0.00639)	(0.00638)	(0.00629)	(0.00626)	(0.00628)
Age	0.0101***	0.0113***	0.00858***	0.0113***	0.00820***	0.0100***	0.00977***	0.0103***
	(0.00299)	(0.00301)	(0.00300)	(0.00303)	(0.00148)	(0.00146)	(0.00146)	(0.00146)
Age Squared	-0.00307	-0.00363	-0.00197	-0.00396	-0.0112***	-0.0123***	-0.0119***	-0.0126***
	(0.00285)	(0.00286)	(0.00286)	(0.00287)	(0.00148)	(0.00146)	(0.00146)	(0.00146)
Ln(Household Size)	0.0250*	0.0237*	0.0248*	0.0261*	0.113***	0.105***	0.102***	0.107***
	(0.0139)	(0.0139)	(0.0139)	(0.0139)	(0.00822)	(0.00813)	(0.00809)	(0.00812)
Never Married	0.00914	0.0122	0.0131	0.00834	0.00768	0.00726	0.00876	0.00582
	(0.0192)	(0.0193)	(0.0194)	(0.0191)	(0.0107)	(0.0106)	(0.0106)	(0.0105)
Widowed	-0.00480	-0.00516	-0.00447	-0.00427	-0.0208*	-0.0258**	-0.0268**	-0.0243**
	(0.0318)	(0.0321)	(0.0321)	(0.0320)	(0.0114)	(0.0111)	(0.0110)	(0.0111)
Divorced	0.0427**	0.0454**	0.0469**	0.0411**	0.0665***	0.0508***	0.0485***	0.0511***
	(0.0206)	(0.0208)	(0.0208)	(0.0206)	(0.0112)	(0.0108)	(0.0107)	(0.0108)
Not in Labour Force	0.00836	0.00895	0.00967	0.00809	-0.0310***	-0.0259***	-0.0227***	-0.0276***
	(0.0110)	(0.0110)	(0.0110)	(0.0110)	(0.00752)	(0.00750)	(0.00755)	(0.00746)
Retired	0.0177	0.0194	0.0206	0.0174	-0.0411***	-0.0333***	-0.0297**	-0.0376***
	(0.0161)	(0.0162)	(0.0163)	(0.0161)	(0.0114)	(0.0115)	(0.0115)	(0.0113)
Unemployed	0.173***	0.176***	0.178***	0.174***	0.245***	0.234***	0.239***	0.234***
	(0.0217)	(0.0221)	(0.0221)	(0.0220)	(0.0197)	(0.0196)	(0.0197)	(0.0196)
Education 1	-0.0459	-0.0439	-0.0469	-0.0444	0.0267	0.0289	0.0289	0.0301
	(0.0582)	(0.0578)	(0.0571)	(0.0578)	(0.0201)	(0.0197)	(0.0197)	(0.0200)
Education 2	-0.0875**	-0.0852**	-0.0872**	-0.0870**	-0.0526***	-0.0483***	-0.0465***	-0.0466***
	(0.0367)	(0.0366)	(0.0357)	(0.0361)	(0.0173)	(0.0172)	(0.0172)	(0.0173)
Education 3	-0.0945***	-0.0926***	-0.0929***	-0.0937***	-0.0372***	-0.0333***	-0.0338***	-0.0328***
	(0.0349)	(0.0345)	(0.0345)	(0.0345)	(0.00717)	(0.00709)	(0.00705)	(0.00710)
Education 4	-0.0889**	-0.0868**	-0.0864**	-0.0889**	-0.0428***	-0.0405***	-0.0400***	-0.0403***
	(0.0428)	(0.0423)	(0.0422)	(0.0422)	(0.00729)	(0.00719)	(0.00717)	(0.00719)
Poor Health	-0.0184	-0.0173	-0.0172	-0.0184	-0.0725***	-0.0644***	-0.0641***	-0.0671***
	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0121)	(0.0125)	(0.0125)	(0.0124)
Satisfied with Health	-0.0524***	-0.0514***	-0.0512***	-0.0524***	-0.141***	-0.130***	-0.128***	-0.132***
	(0.0187)	(0.0186)	(0.0186)	(0.0186)	(0.0125)	(0.0127)	(0.0127)	(0.0127)
Good Health	-0.0880***	-0.0870***	-0.0868***	-0.0877***	-0.206***	-0.191***	-0.188***	-0.195***
	(0.0192)	(0.0191)	(0.0191)	(0.0191)	(0.0129)	(0.0131)	(0.0131)	(0.0130)
Very Good Health	-0.0971***	-0.0959***	-0.0961***	-0.0961***	-0.169***	-0.163***	-0.160***	-0.164***
	(0.0148)	(0.0146)	(0.0145)	(0.0146)	(0.00544)	(0.00569)	(0.00574)	(0.00562)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4.13: Determinants of Financial Satisfaction and Overall Life Satisfaction: HILDA – Bivariate Ordered Probit Model with Mundlak Fixed Effects – *Coefficients*

The dependent variables analysed are overall life satisfaction and financial satisfaction which are measured on 6 and 5 point scales, respectively. A bivariate ordered probit model with Mundlak fixed effects is used to analyse an unbalanced panel from the 2002, 2006 and 2010 waves of the HILDA Survey.

	Specification							
Independent Variables	1		2		3		4	
	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction
Prosperous	-1.465 (0.941)		-0.659 (0.532)		-0.602 (0.529)		-0.976 (0.775)	
Very Comfortable	-0.872 (0.754)		-0.242 (0.438)		-0.196 (0.436)		-0.487 (0.624)	
Relatively Comfortable	-0.537 (0.557)		-0.110 (0.370)		-0.0787 (0.369)		-0.272 (0.476)	
Get along	-0.260 (0.378)		-0.0468 (0.322)		-0.0316 (0.322)		-0.124 (0.352)	
Risk Tolerant		0.249*** (0.0499)		0.181*** (0.0527)		0.185*** (0.0531)		0.240*** (0.0510)
Ln(Total Assets)				0.199*** (0.0481)		0.203*** (0.0497)		
Ln(Total Debt)				-0.0278*** (0.00800)				
Ln(Unsecured Debt)						-0.0187*** (0.00674)		
Ln(Secured Debt)						-0.0168** (0.00663)		
Ln(Net Wealth)								0.0169* (0.00954)
Ln(Disposable Income)	0.137 (0.0918)	0.453*** (0.0784)	0.0867 (0.0782)	0.426*** (0.0808)	0.0830 (0.0781)	0.433*** (0.0811)	0.107 (0.0859)	0.454*** (0.0786)
Excellent Health	1.370*** (0.367)	0.183 (0.394)	1.400*** (0.365)	0.217 (0.400)	1.401*** (0.365)	0.217 (0.400)	1.390*** (0.365)	0.185 (0.395)
Very Good Health	1.205*** (0.357)	0.136 (0.383)	1.235*** (0.355)	0.165 (0.389)	1.236*** (0.355)	0.154 (0.389)	1.225*** (0.355)	0.140 (0.385)
Good Health	0.960*** (0.353)	0.0635 (0.380)	0.991*** (0.352)	0.0881 (0.386)	0.992*** (0.352)	0.0796 (0.386)	0.980*** (0.352)	0.0640 (0.382)
Fair Health	0.612* (0.349)	0.0201 (0.377)	0.635* (0.349)	0.0522 (0.382)	0.636* (0.349)	0.0459 (0.382)	0.627* (0.349)	0.0262 (0.378)
Female	0.110** (0.0445)	0.0898* (0.0488)	0.106** (0.0446)	0.0681 (0.0494)	0.105** (0.0446)	0.0722 (0.0495)	0.108** (0.0446)	0.0793 (0.0489)
Age	-0.00964 (0.0285)	0.0128 (0.0309)	-0.0114 (0.0286)	-0.0233 (0.0335)	-0.0116 (0.0286)	-0.0250 (0.0336)	-0.0108 (0.0286)	0.00642 (0.0312)
Age Squared	0.0318 (0.0310)	0.00568 (0.0336)	0.0323 (0.0311)	0.0291 (0.0353)	0.0324 (0.0311)	0.0308 (0.0354)	0.0322 (0.0311)	0.0111 (0.0339)
Degree	-5.73e-05 (0.400)	0.155 (0.437)	-0.0202 (0.401)	0.122 (0.443)	-0.0214 (0.401)	0.147 (0.443)	-0.0130 (0.401)	0.153 (0.438)
Vocational Degree	0.107 (0.340)	-0.265 (0.369)	0.140 (0.339)	-0.350 (0.375)	0.143 (0.339)	-0.328 (0.375)	0.127 (0.340)	-0.267 (0.370)
High School	0.248 (0.451)	-0.584 (0.481)	0.324 (0.445)	-0.671 (0.487)	0.329 (0.445)	-0.642 (0.487)	0.294 (0.448)	-0.588 (0.482)
Ln(Household Size)	-0.0708 (0.0948)	-0.119 (0.102)	-0.0573 (0.0943)	-0.176* (0.104)	-0.0562 (0.0943)	-0.160 (0.105)	-0.0629 (0.0947)	-0.123 (0.102)
Never Married	-0.154 (0.146)	0.0137 (0.159)	-0.160 (0.147)	-0.0119 (0.161)	-0.161 (0.147)	-0.0246 (0.162)	-0.158 (0.146)	0.0223 (0.159)

Robust standard errors presented in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A4.13: Determinants of Financial Satisfaction and Overall Life Satisfaction: HILDA – Bivariate Ordered Probit Model with Mundlak Fixed Effects - *Coefficients (Continued)*

	Specification							
Independent Variables	1		2		3		4	
	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction	Overall Life Satisfaction	Financial Satisfaction
Divorced	-0.473***	-0.283*	-0.455***	-0.274*	-0.453***	-0.273*	-0.463***	-0.283*
	(0.148)	(0.159)	(0.148)	(0.162)	(0.148)	(0.163)	(0.148)	(0.160)
Widowed	-0.149	0.570	-0.234	0.564	-0.241	0.593	-0.200	0.582
	(0.733)	(0.757)	(0.731)	(0.770)	(0.731)	(0.771)	(0.732)	(0.760)
Not in Labour Force	0.172	-0.283	0.214	-0.361	0.216	-0.350	0.198	-0.275
	(0.235)	(0.250)	(0.232)	(0.254)	(0.232)	(0.254)	(0.234)	(0.251)
Unemployed	0.0938	-0.474	0.159	-0.560*	0.163	-0.535*	0.134	-0.478
	(0.294)	(0.305)	(0.287)	(0.310)	(0.287)	(0.310)	(0.291)	(0.306)
Retired	0.117	-0.293	0.158	-0.401	0.161	-0.387	0.142	-0.306
	(0.265)	(0.282)	(0.263)	(0.286)	(0.263)	(0.286)	(0.264)	(0.283)
Cut 1,1	-0.863		-1.894**		-1.969**		-1.410	
	(1.222)		(0.797)		(0.792)		(1.042)	
Cut 1,2	-0.336		-1.349*		-1.423*		-0.871	
	(1.202)		(0.793)		(0.788)		(1.031)	
Cut 1,3	0.209		-0.783		-0.857		-0.312	
	(1.182)		(0.791)		(0.786)		(1.021)	
Cut 1,4	1.129		0.170		0.0975		0.628	
	(1.148)		(0.786)		(0.782)		(1.003)	
Cut 1,5	2.204**		1.282		1.211		1.727*	
	(1.110)		(0.780)		(0.776)		(0.983)	
Cut 1,6	3.173***		2.284***		2.215***		2.718***	
	(1.076)		(0.776)		(0.772)		(0.965)	
Cut 2,1	8.302***		8.321***		8.632***		7.749***	
	(0.708)		(0.720)		(0.723)		(0.714)	
Cut 2,2	10.05***		10.18***		10.49***		9.535***	
	(0.712)		(0.724)		(0.728)		(0.718)	
Cut 2,3	12.03***		12.28***		12.59***		11.54***	
	(0.718)		(0.731)		(0.735)		(0.724)	
Cut 2,4	13.40***		13.72***		14.04***		12.91***	
	(0.724)		(0.737)		(0.741)		(0.729)	
Rho	0.364**		0.208***		0.198***		0.270**	
	(0.173)		(0.0702)		(0.0691)		(0.130)	
Wald Chi Squared	4.85 p-value = 0.0276		8.93 p-value = 0.0028		8.27 p-value = 0.0040		4.23 p-value = 0.0398	
Observations	3,616		3,616		3,616		3,616	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4.14: Determinants of Financial Satisfaction and Overall Life Satisfaction: HILDA – Marginal Effect's Corresponding to the Upper Most Category of both Financial Satisfaction (4) and Overall Life Satisfaction (6)

Independent Variables	Specification			
	1	2	3	4
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Prosperous	-0.0028	-0.0008	-0.0007	-0.0017
	(0.0020)	(0.0006)	(0.0006)	(0.0013)
Very Comfortable	-0.0026	-0.0004	-.0003	-0.0012
	(0.0027)	(0.0007)	(0.0007)	(0.0017)
Relatively Comfortable	-0.0021	-0.0002	-0.0001	-0.0008
	(0.0027)	(0.0007)	(0.0007)	(0.0017)
Get Along	-0.0009	-0.0001	-0.0001	-.0003
	(0.0014)	(0.0006)	(0.0005)	(0.0010)
Risk Tolerant	0.0018*	0.0006**	0.0006**	0.0012*
	(0.0011)	(0.0003)	(0.0002)	(0.0006)
Ln(Total Assets)		0.0006***	0.0005***	
		(0.0002)	(0.0002)	
Ln(Total Debt)		-0.0001**		
		(0.0000)		
Ln(Unsecured Debt)			-0.0001**	
			(0.0000)	
Ln(Secured Debt)			-0.0000**	
			(0.0000)	
Ln(Net Wealth)				0.0001
				(0.0001)
Ln(Disposable Income)	0.0033*	0.0014**	0.0013***	.0023*
	(0.0019)	(0.0005183)	(0.0005)	(.0012)
Excellent Health	0.0097	0.0064	0.0062	0.0085
	(0.0088)	(0.0067)	(0.0064)	(0.0088)
Very Good Health	0.0060	0.0034	0.0031	0.0048
	(0.0044)	(0.0026)	(0.0025)	(0.0039)
Good Health	0.0045	0.0026	0.0024	0.0037
	(0.0041)	(0.0025)	(0.0024)	(0.0037)
Fair Health	0.0029	0.0018	0.0017	0.0025
	(0.0045)	(0.0030)	(0.0028)	(0.0042)
Female	0.0011	0.0004*	0.00040*	0.0007
	(0.0008)	(0.0002)	(0.0002)	(0.0004)
Age	0.0000	-0.0001	-0.00009	-0.0000
	(0.0002)	(0.0001)	(0.0001)	(0.0002)
Age Squared	0.0002	0.0001	.0001	0.0001
	(0.0002)	(0.0001)	(.0001)	(0.0002)
Degree	0.0010	0.0003	0.0004	0.0006
	(0.0027)	(0.0016)	(0.0015)	(0.0026)
Vocational Degree	-0.0012	-0.0007	-0.0006	-0.0008
	(0.0021)	(0.0011)	(0.0011)	(0.0019)
High School	-0.0021	-0.0009	-0.0008	-0.0014
	(0.0019)	(0.0008)	(0.0007)	(0.0015)
Ln(Household Size)	-0.0010	-0.0006	-0.0005	-0.0007
	(0.0000)	(0.0004)	(0.0004)	(0.0007)
Never Married	-0.0005	-0.0003	-0.0003	-0.0004
	(0.0009)	(0.0005)	(0.0004)	(0.0008)
Divorced	-0.0024*	-0.0010***	-0.0010***	-0.0017*
	(0.0013)	(0.0004)	(0.0004)	(0.0009)
Widowed	0.0039	0.0014	0.0014	0.0025
	(0.0091)	(0.0056)	(0.0054)	(0.0090)
Not in Labour Force	-0.0010	-0.0005	-.0005	-0.0006
	(0.0014)	(0.0005)	(0.0005)	(0.0011)
Unemployed	-0.0018*	-0.0008**	-0.0008*	-0.0012*
	(0.0014)	(0.0005)	(0.0004)	(0.0010)
Retired	-0.0012	-0.0006	-0.0006	-0.0008
	(0.0012)	(0.0005)	(0.0005)	(0.0011)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Marginal effects relating to reporting the highest category of overall life satisfaction (*Totally Satisfied* - 6) and financial satisfaction (4 – *"prosperous"*).

Table A4.15: Marginal Effects Relating to Household Disposable Income (Specification 2 from Table A4.13)

Disposable Income		Financial Satisfaction				
		0 – *"Poor or Very Poor"*	1	2	3	4 – *"Prosperous"*
Overall Life Satisfaction	0- *"Totally Dissatisfied"*	-0.0004 (0.0000)	-0.0011** (0.0005)	-0.0003 (0.0007)	0.0002 (0.0001)	0.0000 (0.0000)
	1	-0.0001** (0.0001)	-0.0028*** (0.0010)	-0.0010 (0.0019)	0.0007* (0.0003)	0.0000 (0.0000)
	2	-0.0003** (0.0001)	-0.0075*** (0.0022)	-0.0025 (0.0045)	0.0026** (0.0010)	0.0001* (0.0001)
	3	-0.0007*** (0.0002)	-0.0270*** (0.0057)	-0.008087 (0.0114)	0.0162*** (0.0045)	0.0011*** (0.0004)
	4	-0.0007*** (0.0002)	-0.0350*** (0.0071)	-0.0066*** (0.0025)	0.0404*** (0.0079)	0.0035*** (0.0009)
	5	-0.0002* (0.0001)	-0.0125*** (0.0037)	0.0007 (0.0118)	0.02802*** (0.0062)	0.0032*** (0.0008)
	6 – *"Totally Satisfied"*	0.0000 (0.0000)	-0.0203** (0.0009)	0.0011 (0.0055)	0.0090*** (0.0030)	0.0014*** (0.0005)

Table A4.16: Marginal Effects Relating to Risk Attitudes (Specification 2 from Table A4.13)

Risk Tolerance		Financial Satisfaction				
		0 – *"Poor or Very Poor"*	1	2	3	4 – *"Prosperous"*
Overall Life Satisfaction	0- *"Totally Dissatisfied"*	-0.0000 (0.0000)	-0.0003** (0.0001)	0.0002* (0.0001)	0.0001** (0.0000)	0.0000 (0.0000)
	1	-0.0000* (0.0000)	-0.0009*** (0.0003)	0.0005* (0.0002)	0.0004*** (0.0002)	0.0000 (0.0000)
	2	-0.0001** (0.0001)	-0.0025*** (0.0008)	0.0009 (0.0006)	0.0016*** (0.0005)	0.0001* (0.0000)
	3	-0.0002*** (0.0001)	-0.0100*** (0.0029)	0.0010 (0.0013)	0.0087*** (0.0027)	0.0006** (0.0003)
	4	-0.0002** (0.0001)	-0.0145*** (0.0039)	-0.0057** (0.0025)	0.0186*** (0.0057)	0.0018*** (0.0007)
	5	-0.0001** (0.0000)	-0.0057*** (0.0016)	-0.0067** (0.0027)	0.0110*** (0.0034)	0.0015*** (0.0006)
	6 – *"Totally Satisfied"*	0.0000 (0.0000)	-0.0010*** (0.0003)	-0.0025** (0.0010)	0.0029*** (0.0009)	0.0006** (0.0003)

Table A4.17: Marginal Effects Relating to Household Total Assets (Specification 2 from Table A4.13)

Total Assets		Financial Satisfaction				
		0 – *"Poor or Very Poor"*	1	2	3	4 – *"Prosperous"*
Overall Life Satisfaction	0- *"Totally Dissatisfied"*	-0.0000* (0.0000)	-0.0003*** (0.0001)	0.0002** (0.0001)	0.0001** (0.0000)	0.0000 (0.0000)
	1	-0.0000** (0.0000)	-0.0010 (0.0000)	0.0006** (0.0002)	0.0004*** (0.0002)	0.0000 (0.0000)
	2	-0.0001** (0.0000)	-0.0029*** (0.0008)	0.0013** (0.0007)	0.0016*** (0.0005)	0.0001** (0.0000)
	3	-0.0003*** (0.0001)	-0.0116*** (0.0029)	0.0025 (0.0016)	0.0089*** (0.0023)	0.0006*** (0.0002)
	4	-0.0003*** (0.0001)	-0.0171*** (0.0042)	-0.0038*** (0.0012)	0.0195*** (0.0047)	0.0017*** (0.0005)
	5	-0.0000* (0.0000)	-0.0069*** (0.0019)	-0.0061*** (0.0020)	0.0117*** (0.0029)	0.0014*** (0.0004)
	6 – *"Totally Satisfied"*	-0.0000 (0.0000)	-0.0012*** (0.0004)	-0.0025** (0.0009)	0.0032*** (0.0008)	0.0006*** (0.0002)

Table A4.18: Marginal Effects Relating to Household Total Debt (Specification 2 from Table A4.13)

Total Debt		Financial Satisfaction				
		0 – *"Poor or Very Poor"*	1	2	3	4 – *"Prosperous"*
Overall Life Satisfaction	0- *"Totally Dissatisfied"*	0.0000 (0.0000)	0.0000*** (0.0000)	-0.0000* (0.0000)	-0.0016** (0.0000)	-0.0000 (0.0000)
	1	0.0000 (0.0000)	0.0001*** (0.0000)	-0.0001* (0.0000)	-0.0062*** (0.0000)	-0.0000 (0.0000)
	2	0.0000 (0.0000)	0.0004*** (0.0001)	-0.0002* (0.0001)	-0.0224*** (0.0001)	-0.0000 (0.0000)
	3	0.0000*** (0.0000)	0.0016*** (0.0005)	-0.0003 (0.0002)	-0.1249*** (0.0004)	-0.0001** (0.0000)
	4	0.0000** (0.0000)	0.0024*** (0.0007)	0.0005*** (0.0002)	-0.0027*** (0.0008)	-0.0002*** (0.0001)
	5	0.0000* (0.0000)	0.0010*** (0.0003)	0.0009*** (0.0003)	-0.0016*** (0.0005)	-0.0002*** (0.0001)
	6 – *"Totally Satisfied"*	0.0000 (0.0000)	0.0002*** (0.0001)	0.0003** (0.0001)	-0.0004*** (0.0001)	-0.0001** (0.0000)

Table A4.19: Determinants of Financial Satisfaction and Overall Life Satisfaction: GSOEP – Bivariate Ordered Probit Model with Mundlak Fixed Effects – *Coefficients*

The dependent variables analysed are overall life satisfaction and financial concerns which are measured on 11 and 3 point scales, respectively. A bivariate ordered probit model with Mundlak fixed effects is used to analyse a balanced panel from the 2002 and 2007 waves of the GSOEP survey.

	Specification							
	1		2		3		4	
Independent Variables	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction
Concerned		-0.870*** (0.175)		-0.921*** (0.128)		-0.923*** (0.125)		-0.927*** (0.126)
Very Concerned		-1.833*** (0.342)		-1.935*** (0.249)		-1.937*** (0.241)		-1.947*** (0.244)
Ln(Total Assets)			-0.00562 (0.00343)	0.00547* (0.00328)	-0.00593* (0.00347)	0.00429 (0.00330)		
Ln(Total Debt)			0.0129*** (0.00304)	0.00139 (0.00297)				
Ln(Unsecured Debt)					0.0138*** (0.00343)	-0.00291 (0.00336)		
Ln(Secured Debt)					0.0132*** (0.00345)	0.00605* (0.00323)		
Ln(Net Wealth)							-0.00542** (0.00241)	0.00440* (0.00233)
Risk Tolerant	-0.0720*** (0.0230)		-0.0811*** (0.0219)		-0.0900*** (0.0218)		-0.0801*** (0.0218)	
Ln(Household Income)	-0.215*** (0.0400)	0.0645 (0.0457)	-0.222*** (0.0406)	0.0506 (0.0419)	-0.226*** (0.0407)	0.0515 (0.0418)	-0.216*** (0.0404)	0.0530 (0.0415)
Poor Health	-0.0823 (0.0778)	0.511*** (0.0790)	-0.0778 (0.0788)	0.501*** (0.0758)	-0.0783 (0.0790)	0.501*** (0.0755)	-0.0830 (0.0789)	0.501*** (0.0757)
Satisfactory Health	-0.222*** (0.0808)	0.745*** (0.0968)	-0.220*** (0.0818)	0.728*** (0.0879)	-0.220*** (0.0820)	0.728*** (0.0869)	-0.225*** (0.0819)	0.726*** (0.0876)
Good Health	-0.372*** (0.0840)	0.978*** (0.120)	-0.372*** (0.0850)	0.952*** (0.104)	-0.372*** (0.0852)	0.952*** (0.102)	-0.375*** (0.0852)	0.949*** (0.103)
Very Good Health	-0.485*** (0.0973)	1.168*** (0.147)	-0.484*** (0.0984)	1.134*** (0.126)	-0.488*** (0.0986)	1.135*** (0.123)	-0.486*** (0.0986)	1.131*** (0.125)
Never Married	0.0397 (0.0758)	-0.115 (0.0750)	0.0515 (0.0769)	-0.107 (0.0746)	0.0552 (0.0772)	-0.101 (0.0746)	0.0364 (0.0769)	-0.109 (0.0744)
Widowed	-0.0192 (0.128)	0.0390 (0.130)	-0.0192 (0.131)	0.0339 (0.130)	-0.0158 (0.131)	0.0313 (0.130)	-0.0163 (0.131)	0.0353 (0.130)
Divorced	0.160** (0.0748)	-0.135* (0.0753)	0.170** (0.0758)	-0.121* (0.0733)	0.175** (0.0761)	-0.118 (0.0734)	0.153** (0.0758)	-0.123* (0.0729)
Not in Labour Force	0.0252 (0.0430)	0.0593 (0.0396)	0.0273 (0.0435)	0.0603 (0.0396)	0.0305 (0.0436)	0.0609 (0.0396)	0.0238 (0.0435)	0.0610 (0.0396)
Retired	0.0625 (0.0619)	0.0903 (0.0559)	0.0703 (0.0628)	0.0917 (0.0559)	0.0760 (0.0631)	0.0944* (0.0560)	0.0628 (0.0627)	0.0928* (0.0559)
Unemployed	0.557*** (0.0602)	0.0181 (0.0784)	0.569*** (0.0610)	0.0355 (0.0676)	0.575*** (0.0611)	0.0346 (0.0671)	0.565*** (0.0609)	0.0366 (0.0669)

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A4.19: Determinants of Financial Satisfaction and Overall Life Satisfaction: GSOEP – Bivariate Ordered Probit Model with Mundlak Fixed Effects - *Coefficients (Continued)*

	Specification							
	1		2		3		4	
Independent Variables	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction	Financial Concerns	Overall Life Satisfaction
Education 1	-0.219	-0.154	-0.214	-0.157	-0.228	-0.159	-0.214	-0.161
	(0.289)	(0.266)	(0.289)	(0.266)	(0.292)	(0.264)	(0.289)	(0.266)
Education 2	-0.409*	-0.00144	-0.402	-0.00980	-0.416*	-0.0213	-0.411*	-0.0181
	(0.246)	(0.289)	(0.247)	(0.287)	(0.248)	(0.287)	(0.248)	(0.287)
Education 3	-0.399**	0.104	-0.395**	0.0833	-0.397**	0.0791	-0.398**	0.0823
	(0.201)	(0.240)	(0.200)	(0.237)	(0.202)	(0.236)	(0.201)	(0.236)
Education 4	-0.373	0.0430	-0.368	0.0263	-0.366	0.0267	-0.375	0.0282
	(0.232)	(0.275)	(0.231)	(0.273)	(0.232)	(0.272)	(0.233)	(0.273)
Female	0.0851***	0.0854***	0.0774***	0.0860***	0.0776***	0.0851***	0.0764***	0.0855***
	(0.0254)	(0.0233)	(0.0254)	(0.0226)	(0.0254)	(0.0226)	(0.0254)	(0.0226)
Age	0.0402***	0.0264**	0.0459***	0.0259**	0.0351***	0.0246**	0.0457***	0.0238**
	(0.0120)	(0.0115)	(0.0123)	(0.0115)	(0.0123)	(0.0113)	(0.0124)	(0.0116)
Age Squared	-0.0118	-0.0317***	-0.0145	-0.0301***	-0.00783	-0.0291***	-0.0157	-0.0289***
	(0.0115)	(0.0104)	(0.0117)	(0.0105)	(0.0117)	(0.0105)	(0.0117)	(0.0105)
Ln(Household Size)	0.104*	0.0298	0.100*	0.0293	0.106*	0.0243	0.110*	0.0307
	(0.0557)	(0.0527)	(0.0565)	(0.0521)	(0.0567)	(0.0522)	(0.0565)	(0.0520)
Cut 1,1	-8.096***		-6.863***		-6.844***		-6.627***	
	(0.344)		(0.360)		(0.359)		(0.350)	
Cut 1,2	-6.520***		-5.263***		-5.238***		-5.026***	
	(0.341)		(0.358)		(0.357)		(0.348)	
Cut 2,1	-4.181***		-4.222***		-4.210***		-4.159***	
	(0.907)		(0.593)		(0.577)		(0.569)	
Cut 2,2	-3.829***		-3.876***		-3.863***		-3.813***	
	(0.924)		(0.604)		(0.588)		(0.580)	
Cut 2,3	-3.379***		-3.432***		-3.420***		-3.371***	
	(0.947)		(0.621)		(0.604)		(0.597)	
Cut 2,4	-2.928***		-2.987***		-2.974***		-2.926***	
	(0.970)		(0.638)		(0.620)		(0.614)	
Cut 2,5	-2.565***		-2.629***		-2.616***		-2.569***	
	(0.989)		(0.652)		(0.633)		(0.628)	
Cut 2,6	-1.913*		-1.986***		-1.972***		-1.927***	
	(1.023)		(0.677)		(0.658)		(0.653)	
Cut 2,7	-1.458		-1.537**		-1.523**		-1.479**	
	(1.047)		(0.695)		(0.675)		(0.670)	
Cut 2,8	-0.770		-0.859		-0.844		-0.801	
	(1.083)		(0.721)		(0.700)		(0.697)	
Cut 2,9	0.304		0.200		0.215		0.255	
	(1.139)		(0.763)		(0.741)		(0.738)	
Cut 2,10	1.090		0.975		0.990		1.028	
	(1.180)		(0.795)		(0.771)		(0.770)	
ρ	0.494***		0.542***		0.542***		0.548***	
	(0.169)		(0.128)		(0.124)		(0.126)	
Wald Chi Squared	8.58 p-value = 0.0034		17.92 p-value = 0.0000		19.16 p-value = 0.0000		18.82 p-value = 0.0000	
Observations	15,424		15,424		15,424		15,424	

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A4.20: **Determinants of Financial Satisfaction and Overall Life Satisfaction: GSOEP - Marginal Effects Corresponding to the Upper Most Category of Overall Life Satisfaction (10) and the Lowest Category of Financial Concern (0)**

Independent Variables	Specification			
	1	2	3	4
	Marginal Effects	Marginal Effects	Marginal Effects	Marginal Effects
Risk Tolerant	0.0001** (0.0001)	0.0001** (0.0000)	0.0001** (0.0000)	0.0001** (0.0000)
Ln(Total Assets)		0.0000 (0.0000)	0.0000 (0.0000)	
Ln(Total Debt)		-0.0000 (0.0000)		
Ln(Unsecured Debt)			-0.0000* (0.0000)	
Ln(Secured Debt)			0.0000 (0.0000)	
Ln(Net Wealth)				0.0000* (0.0000)
Concerned	-0.0021*** (0.0005)	-0.0019*** (0.0004)	-0.0019*** (0.0004)	-0.0019*** (0.0004)
Very Concerned	-0.0019*** (0.0007)	-0.0017*** (0.0005)	-0.0017*** (0.0005)	-0.0016*** (0.0005)
Ln(Household Income)	0.0004 (0.0003)	0.0003* (0.0002)	0.0003* (0.0002)	0.0003* (0.0002)
Female	0.0000 (0.00005)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Age	0.0000 (0.0000)	-0.0000 (0.0000)	0.0000 (0.0000)	-0.0000 (0.0000)
Age Squared	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
Ln(Household Size)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
Never Married	-0.0002 (0.0002)	-0.0002 (0.0001)	-0.0002 (0.0001)	-0.0002 (0.0001)
Widowed	0.0001 (0.0003)	0.0001 (0.0002)	0.0001 (0.0002)	0.0001 (0.0002)
Divorced	-0.0004 (0.00027)	-0.0003* (0.0001)	-0.0003* (0.0002)	-0.0003* (0.0002)
Not in Labour Force	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
Retired	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	(0.0001) (0.0001)
Unemployed	-0.0005 (0.0003)	-0.0004 (0.0002)	-0.0004* (0.0002)	-0.0004* (0.0002)
Education 1	0.0000 (0.0005)	-0.0000 (0.0004)	0.0000 (0.0004)	-0.0000 (0.0004)
Education 2	0.0009 (0.0013)	0.0007 (0.0010)	0.0007 (0.0010)	0.0007 (0.0010)
Education 3	0.0012 (0.0013)	0.0010 (0.0010)	0.0009 (0.0009)	0.0009 (0.0009)
Education 4	0.0009 (0.0011)	0.0007 (0.0009)	0.0007 (0.0008)	0.0007 (0.0009)
Poor Health	0.0023 (0.0014)	0.0019* (0.0010)	0.0019** (0.0009)	0.0019* (0.0010)
Satisfied with Health	0.0035* (0.0020)	0.0028** (0.0014)	0.0028** (0.0013)	0.0028** (0.0013)
Good Health	0.0058* (0.0032)	0.0048** (0.0022)	0.0048** (0.0021)	.0047** (0.0021)
Very Good Health	0.0290** (0.0128)	0.0253*** (0.0095)	0.0253*** (0.0092)	0.0249*** (0.0093)

*** p<0.01, ** p<0.05, * p<0.1

Marginal effects relating to reporting the highest category of overall life satisfaction (*Completely Satisfied* - 10) and lowest category of financial concern (*Not at all concerned* – 0).

Table A4.21: Marginal Effects Relating to Household Disposable Income (Specification 2 from Table A4.19)

Disposable Income		Financial Concerns		
		0 – *"Not at all Concerned"*	1 – *"Concerned"*	2 – *"Very Concerned"*
Overall Life Satisfaction	0 – *"Completely Dissatisfied"*	-0.0001 (0.0009)	-0.0001*** (0.0000)	0.0000 (0.0000)
	1	-0.0001 (0.0001)	-0.0002*** (0.0000)	0.0000 (0.0000)
	2	-0.0001 (0.0005)	-0.0007*** (0.0002)	-0.0000 (0.0000)
	3	0.0005 (0.0010)	-0.0022*** (0.0005)	-0.0002 (0.0001)
	4	0.0017 (0.0014)	-0.0040*** (0.0009)	-0.0004* (0.0002)
	5	0.0097** (0.0038)	-0.0141*** (0.0032)	-0.0028** (0.0012)
	6	0.0131*** (0.0029)	-0.0127*** (0.0027)	-0.0052*** (0.0015)
	7	0.0238*** (0.0038)	-0.0110*** (0.0020)	-0.0146*** (0.0027)
	8	0.0214*** (0.0046)	0.0135*** (0.0051)	-0.0242*** (0.0049)
	9	0.0030*** (0.0011)	0.0100*** (0.0029)	-0.0064** (0.0030)
	10 – *"Completely Satisfied"*	0.0003* (0.0002)	0.0030*** (0.0008)	-0.0008 (0.0013)

Table A4.22: Marginal Effects Relating to Risk Attitudes (Specification 2 from Table A4.19)

Risk Tolerance		Financial Concerns		
		0 – *"Not at all Concerned"*	1 – *"Concerned"*	2 – *"Very Concerned"*
Overall Life Satisfaction	0 – *"Completely Dissatisfied"*	0.0000*** (0.0000)	-0.0000*** (0.0000)	0.0000 (0.0000)
	1	0.0000*** (0.0000)	-0.0000*** (0.0000)	0.0000 (0.0000)
	2	0.0002*** (0.0001)	-0.0002*** (0.0001)	0.0000 (0.0000)
	3	0.0006*** (0.0001)	-0.0005*** (0.0002)	-0.0000* (0.0000)
	4	0.0011*** (0.0003)	-0.0010*** (0.0003)	-0.0001** (0.0001)
	5	0.0044*** (0.0013)	-0.0035*** (0.0013)	-0.0008*** (0.0003)
	6	0.0049*** (0.0014)	-0.0033*** (0.0012)	-0.0016*** (0.0005)
	7	0.0081*** (0.0022)	-0.0034*** (0.0011)	-0.0046*** (0.0012)
	8	0.0067*** (0.0018)	0.0021 (0.0013)	-0.0087*** (0.0025)
	9	0.0009*** (0.0002)	0.0021** (0.0010)	-0.0030*** (0.0010)
	10 – *"Completely Satisfied"*	0.0001** (0.0000)	0.0006** (0.0003)	-0.0001** (0.0003)

Table A4.23: Marginal Effects Relating to Household Total Assets (Specification 2 from Table A4.19)

Total Assets		Financial Concerns		
		0 – *"Not at all Concerned"*	1 –*"Concerned"*	2 – *"Very Concerned"*
Overall Life Satisfaction	0 – *"Completely Dissatisfied"*	-0.0000 (0.0000)	0.0000** (0.0000)	0.0000 (0.0000)
	1	-0.0000 (0.0000)	0.0000** (0.0000)	0.0000 (0.0000)
	2	-0.00005 (0.0000)	-0.0000*** (0.0000)	0.0000 (0.0000)
	3	-0.0000 (0.0009)	-0.0001*** (0.0000)	0.0000 (0.0000)
	4	-0.0001 (0.0001)	-0.0002*** (0.0001)	0.0000 (0.0000)
	5	0.0001 (0.0003)	-0.0007*** (0.0003)	-0.0001** (0.0001)
	6	0.00030 (0.0002)	-0.0006*** (0.0002)	-0.0002** (0.0001)
	7	0.0008** (0.0003)	-0.0045*** (0.0001)	-0.0005*** (0.0002)
	8	0.0001*** (0.0003)	0.0009** (0.0004)	-0.0006 (0.0004)
	9	0.0001** (0.0001)	0.0006** (0.0002)	-0.0000 (0.0021)
	10 – *"Completely Satisfied"*	0.0000 (0.0000)	0.0002** (0.0001)	0.0001 (0.0001)

Table A4.24: Marginal Effects Relating to Household Total Debt (Specification 2 from Table A4.19)

Total Debt		Financial Concerns		
		0 – *"Not at all Concerned"*	1 –*"Concerned"*	2 – *"Very Concerned"*
Overall Life Satisfaction	0 – *"Completely Dissatisfied"*	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
	1	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
	2	0.0000 (0.0000)	0.0000* (0.0000)	0.0000 (0.0000)
	3	-0.0001 (0.0001)	0.0001* (0.0000)	0.0000 (0.0000)
	4	-0.0002* (0.0001)	0.0001* (0.0001)	0.0000 (0.0000)
	5	-0.0008*** (0.0003)	0.0004* (0.0002)	0.0001** (0.0001)
	6	-0.0008*** (0.0002)	0.0004** (0.0002)	0.0002*** (0.0001)
	7	-0.0012*** (0.0003)	0.0005*** (0.0001)	0.0007*** (0.0002)
	8	-0.0010*** (0.0003)	-0.0002 (0.0004)	0.0014*** (0.0003)
	9	-0.0001** (0.0001)	-0.0002 (0.0002)	0.0005** (0.0002)
	10 – *"Completely Satisfied"*	-0.0000 (0.0000)	-0.0001 (0.0001)	0.0002 (0.0001)

5 Conclusions

The overall aim of this thesis was to contribute to the existing literature relating to the areas of household finances and individual well-being. Due to the current economic conditions and an increasing interest in measures of well-being from policy makers, fully understanding the relationship between the household's financial position and well-being has never been more relevant. Over the past three decades, there have been significant changes to the composition of household finances, following policy reforms and deregulation of the banking and financial sector in many countries. These reforms to the financial markets, implemented since the late 1970s, aimed to promote competition and reduce barriers to entry to the banking sector, increased the number of financial products available for households to invest in and also increased the ease at which it is possible to obtain credit and accumulate debt. The household's financial position can potentially have a significant impact at both the macroeconomic level, through capital investments and the effectiveness of monetary policy, and at the microeconomic level, where the household's finances could have significant impacts on well-being and utility levels. The concept of well-being has received considerable interest from a variety of academic fields in recent decades, as well as from a wider public audience. It is currently being introduced as a measure of a country's development, with a view to it being used in conjunction with more traditional measures, such as GDP. The analysis presented in this thesis explores a variety of topics relating to household finances and well-being in a variety of countries.

The first empirical chapter, Chapter 2, explored the determinants of financial portfolio allocation of households in the U.S. The study analysed the 1989 to 2007 waves of the U.S. SCF, which contain comprehensive information relating to the household's financial asset allocation. In accordance with Rosen and Wu (2008), Berkowitz and Qiu (2006) and Fan and Zhao (2009), the household's financial assets were separated into four distinct categories; risky, safe, retirement and bonds. The proportion of total financial assets held within each of these categories then formed the dependent variables analysed in the chapter.

In the existing literature, the majority of studies use either a linear regression model or a tobit model to analyse the determinants of portfolio allocation, see, for example, Shum and Faig (2006), Bertaut and Starr-McCluer (2002), Poterba and Samwick (2002), Guiso *et al.* (1996) and Cardak and Wilkins (2009). However, due to the dependent

variables considered being defined on the unit interval, opposed to being censored, the use of a tobit model and linear regression model are arguably flawed. The analysis presented in this chapter used a variety of econometric specifications, in order to ascertain the robustness of the results obtained in the existing literature. Initially, a tobit specification was implemented to serve as a baseline to which the other models were compared. The chapter then employed two univariate models, the fractional logit model and the zero-inflated beta model, to explore whether the functional form or the separation of the decisions to hold and the level held, of certain asset categories influence the results. Finally, a multivariate tobit model was utilised to account for the potential interdependence of holding asset categories.

The results indicate that both the tobit model and fractional logit model yield similar estimates; that is, the same variables exert statistically significant impacts on the dependent variables. For example, the results indicate that being female, black or Hispanic and the number of children present in the household are all inversely related to the proportion of risky assets held. The analysis indicates that higher education levels are associated with holding a larger proportion of risk assets. Similarly, in line with the existing literature, better health is associated with holding a higher proportion of risky assets, whilst, reporting a willingness to participate in risky investments is positively related to the share of risky assets. These results are in accordance with those presented in the existing literature and suggest that the functional form of the model considered does not have a dramatic impact on the determinants of household portfolio allocation.

The results obtained from the zero-inflated beta model, however, suggest that the separation of the decision to participate in holding asset categories and the decision over the proportion of total financial wealth allocated to each asset category has a significant impact on the estimated coefficients. In this specification, various independent variables are found to influence the decision to hold certain asset categories, but not the proportion of each asset held. For example, more educated individuals are more likely to hold risky assets; however, conditional on holding risky assets, the level of education does not exert a statistically significant impact on the proportion of risky assets held. This is also found for gender, race, self-assessed health status and investment horizons. The analysis reveals that, conditional on holding risky assets, the proportion of risky assets held displays a convex age pattern, whilst, being married, being employed and being retired are all inversely related to the proportion of risky assets held. Both household net wealth and household income are positively related to the proportion of

risky assets held. Risk attitudes are important determinants of the risky asset share, with more risk tolerant individuals holding a greater proportion of risky assets, in addition to increasing the probability of holding risky assets. Also, a positive outlook on the economy over the next five years is associated with holding higher proportions of risky assets. For the other asset categories, that is, safe, retirement and bonds, the separation of the decision to participate and the decision about the level of each asset held, dramatically influences the relationship between the independent and dependent variables.

The chapter then goes on to use a multivariate tobit model to account for potential interrelationships between holding different asset categories. The analysis assesses the importance of the interdependence between the proportion of risky assets, retirement funds and bonds held, via the correlation between the error terms of the series of equations. The analysis reveals interdependence between the asset categories, that is, there exists some unobservable characteristics which influence the decisions to hold the proportions of each asset category. The individual determinants of each equation are in accordance with those of the univariate tobit model and fractional logit model; however, the multivariable model estimates are more efficient.

The analysis presented in the first empirical chapter suggests that it is important to separate the decision to hold and the decision over the proportion of total financial assets allocated to each asset category and that the functional form of the regression model does not have a dramatic impact on the results as compared to the tobit specification. In addition, the multivariate tobit model indicates interdependence between different asset categories, which suggests there are unobservable characteristics which influence the levels held of risky assets, retirement assets and bonds. Consequently, where possible, a joint modelling approach should be taken.

The empirical analysis presented Chapter 2 is potentially limited in several ways. Firstly, despite the U.S. SCF containing comprehensive information on the household's assets, due to the data being cross-sectional in nature, it is not possible to account for individual heterogeneity, which, following Fan and Zhao (2009) and Love and Smith (2010), could potentially have a dramatic impact on the estimated coefficients. Similarly, the analysis presented in this chapter does not contribute to the debate on causality; it only considers associations between the household's financial portfolio allocation and a variety of covariates.

The analysis presented in the second empirical chapter explores the relationship between the household's financial situation and well-being in Australia, Britain and Germany, with the HILDA, BHPS and GSOEP surveys analysed, respectively. This chapter contributes to the existing literature in several distinct ways. Initially, the study provides a longitudinal analysis of the relationship between household finances and well-being in Australia. Following Ferrer-i-Carbonell and Frijters (2004), it is important to control for individual heterogeneity when analysing subjective well-being measures. The existing literature which explores the relationship between well-being and the household's financial position in Australia only considers cross sectional data; see for example, Headey and Wooden (2004) and Headey *et al*. (2008). Secondly, in line with Brown *et al.* (2005), the analysis across all three countries, separates the household's net wealth into its constituent parts of total assets and total debt, and total debt further into unsecured and secured debt. In addition, following Bridges and Disney (2010) and Wildman (2003), the head of household's subjective financial position is accounted for across the three countries as it is argued that the subjective financial position captures information beyond the monetary financial measures.

Focusing on the impact of the household's financial situation, in Australia and Britain, it is the subjective, opposed to monetary, financial position which has a statistically significant impact on the head of household's well-being once individual heterogeneity is accounted for. This result accords with those presented in Bridges and Disney (2010) who find that it is subjective debt burden which influences the probability of reporting depression. The analysis shows that the monetary levels of household debt and assets have a limited impact on overall life satisfaction or psychological well-being.

In contrast, the monetary levels of the household's assets and debt have a direct impact on the well-being measures in Germany. Higher levels of assets are associated with better well-being, whilst total debt is inversely related to well-being. The separation of total debt shows, in line with Brown *et al.* (2005), that it is unsecured, rather than secured, debt which has a detrimental effect on the head of household's well-being. The analysis indicates, in line with that for Australia and Britain, that the subjective financial position is a statistically significant determinant of an individual's well-being.

It should be acknowledged that, there are potentially some shortcomings of the analysis presented in Chapter 3. For example, the wording relating to each of the dependent variables and some key independent variables are different across the three countries

analysed, which makes it hard to make quantitative comparisons. However, although it is not possible to attach a quantitative impact, the analysis allows the exploration of the significant determinants of well-being across each of the countries. The analysis reveals that the subjective financial position is a significant determinant of overall life satisfaction; however, the analysis does not explore the factors which influence the head of household's subjective financial position. In addition, endogeneity could potentially yield biased results. As the dependent variables considered and the potentially endogenous independent variable, the head of household's subjective financial position, are self-reported subjective measures, there could exist unobservable characteristics which are correlated with both variables.

The final empirical chapter further explores the relationship between overall life satisfaction and the household's subjective financial position in Germany and Australia. The analysis initially aims to ascertain the determinants of the head of household's subjective financial position in Australia and Germany. In line with Chapter 3, the household's net wealth, total assets, total debt, secured and unsecured debt are included in the analysis of the head of household's subjective financial position. Also, in accordance with Joo and Grable (2004), the head of household's risk attitudes are also included in the analysis of subjective financial position. It is argued that, see, for example, Goldberg (1995) and Grable and Joo (1997), risk attitudes potentially capture the financial knowledge of the individual which is potentially related to subjective financial position. The analysis then attempts to account for the potential endogeneity of the subjective financial position in the overall life satisfaction equation by employing a recursive bivariate ordered probit model. In addition, the recursive set up allows the exploration of whether the subjective financial position mediates the relationship between the household's monetary financial position and overall life satisfaction.

Focusing on Australia, the results show that the level of assets and net wealth are associated with a better subjective financial position, whilst, in line with prior expectations, total debt, unsecured debt and secured debt are all inversely related with the head of household's subjective financial position. Household income is also positively related to subjective financial position. The risk attitudes of the head of household are found to be statistically significant determinants of the subjective financial position, with more risk tolerant household heads reporting, on average, being more satisfied with their present financial position. The results for Australia advocate the bivariate analysis and indicate that, once endogeneity is accounted for, there is not a

statistically significant relationship between overall life satisfaction and subjective financial position. This suggests that the relationship observed in Chapter 3 is biased and that there exist some unobservable characteristics which influence both overall life satisfaction and subjective financial position.

The analysis for Germany indicates some major differences with those presented for Australia. As expected, and in accordance with the analysis for Australia, total debt increases the level of financial concern, as does the levels of secured and unsecured debt. However, it is found that the level of household assets does not exert a statistically significant impact on the head of household's concerns relating to their financial situation. This lack of a relationship could be attributed to the wording of the question, which asks the respondents to consider potentially negative, opposed to positive, aspects relating to their financial situation. Once again, the risk attitudes of the head of household are an important determinant of the subjective financial position, with risk tolerant household heads reporting lower levels of financial concern.

The results for Germany advocate a joint modelling approach, rather than a series of univariate models. Once the endogeneity is accounted for, the level of financial concern maintains a statistically significant impact on the level of overall life satisfaction, with more concerns associated with lower levels of overall life satisfaction. Once the bivariate analysis is employed, the monetary financial variables have the same, statistically significant, relationships with the subjective financial position as found in the univariate analysis. It is found, however, that the monetary financial measures do not have a direct influence on the head of household's level of overall life satisfaction. Also, in line with the theory of domain satisfaction, the independent variables closely related to finances are statistically related to subjective financial position; however they are not directly related to overall life satisfaction.

The analysis presented in the final empirical chapter has some potential short comings. Firstly, due to data limitations, the wording of the questions the dependent variables are based upon, are different across Australia and Germany, in addition to them being measured on different scales. Consequently, directly comparing the magnitude of the effects of the independent variables across countries is difficult. In addition, the analysis considers the impact of assets and debts; however the analysis could be developed by exploring the relationship between the household's financial portfolio allocations. Dependent on the individual's attitudes towards risk, the household's

portfolio allocation could potentially have an impact on the level of subjective financial position.

The empirical studies presented in this thesis explored three topics related to household finances and well-being across a variety of counties. For many reasons, including the current economic downturn and increased interest in well-being in academia and a wider audience, the topics of well-being and household finances remain a high priority on public policy agendas across the world. Consequently, furthering our understanding of the links between household finances and well-being are of increased importance, and the empirical analysis presented in this thesis has hopefully served to shed further light on these relationships.

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