Multidimensional inequality, earnings mobility and the tunnel effect: Evidence from Indonesia

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Abstract

This thesis analyses multidimensional inequality, earnings mobility and the tunnel effect with empirical data from Indonesia. Chapter 2 provides the context of the country, including discussions on economic performance, demography, employment, religion, taxation, the education system, the health system, the Human Development Index, and inequality. Chapter 3 applies the hedonic method for the analysis of multidimensional inequality with an expenditure group weighting scheme. The results from the regressions part in this chapter are utilised to get proportional weights of expenditure, health, and education to be used for Maasoumi's multidimensional inequality and Decancq and Lugo's multidimensional Gini indices. It is found that, while equal and all-samples weighting schemes show almost similar results, multidimensional inequality measures with an expenditure group weighting scheme shows higher results, indicating a variation in each expenditure group in valuing dimensional weights. Chapter 4 analyses the segmented labour market between formal and informal labour and earnings mobility of the two types of labour within the context of a monetary crisis. In addition to proving a segmented labour market between formal and informal labour, the results confirm the concept of safety net function of informal labour and the countercyclical nature of the informal sector in the crisis period. In terms of methodology, GMM estimators are also proven to yield more efficient results compared to pooled OLS and fixed effect estimators. Chapter 5 investigates the tunnel effect in terms of the association between expected future economic level and the reference group's income. The ordered probit model is applied to different types of reference groups based on the geographical location of the community, sub-district, district and province. The model also incorporates income inequality and variables related to social capital. The results show the indication of a tunnel effect with the reference group of people who live in the same province, which also indicates that the tunnel effect is not sourced only from altruism. Inequality makes the tunnel effect stronger, while social capital variables do not make significant differences on the effect. When applied to religious groups, the tunnel effect is only found in the Muslim group. It is not proven that the tunnel effect is affected by adaptive expectations based on the regression results of income quintile groups.

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Declaration

I hereby declare that the work presented in this thesis is my own work and I am the sole author of all chapters. I also declare that this thesis has never been submitted for any other degree at any other university or educational institution. The views expressed here are my own.

The early version of Chapter 3 has been presented at 3rd White Rose Doctoral Training Centre Economics Conference (Sheffields, 2015), 10th Winter School on Inequality and Collective Welfare Theory (Alba di Canazei, 2015), The Economics, Health and Happiness conference (Lugano, 2016) and 5th Southeast Asian Studies Symposium (Oxford, 2016).

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Chapter 1

Introduction

This thesis covers several topics related to economic welfare in a developing country. Multidimensional inequality, earnings mobility and the tunnel effect are discussed through empirical approach with Indonesian data. The increasing trends of inequality, high informal employment proportion, and specific features of the society are the backgrounds of the analyses in this thesis.

Chapter 2 describes general information about the country in order to understand the condition of Indonesia as the source of empirical data in this thesis. In addition to economic performance of the country, this chapter explains the population and employment situations. This chapter also elaborates on the education system and government's policy on health. The taxation section in this chapter covers the types of taxes and the development in tax ratio. The last sections of the chapter shows the progress of the Human Development Index in Indonesia and the results of the calculations of Gini coefficients of expenditure, health and education. Gini coefficient estimations in this chapter use data from the National Socioeconomic Survey.

An increasing trend to evaluate welfare beyond income encourages the use of multidimensional welfare measurements. This allows for the utilisation of different types of weighting approaches for each dimension in multidimensional welfare measures. Chapter 3 discusses the multidimensional inequality with a hedonic approach to determine the weights of different dimensions. Apart from using the hedonic method, which has been used to a very limited extent in multidimensional inequality analyses,[1] this chapter differs from previous studies, as it considers the differences between each expenditure group in determining the weights.

The data source for Chapter 3 is the 4th wave of the Indonesian Family Life Survey (IFLS4). The widening income gap among Indonesians has become a concern for the government and the House of Representatives in Indonesia. According to existing studies on inequality in Indonesia, the increasing trend of inequality could slow economic growth in Indonesia, could affect unemployment rates (Yumna et al., 2015), and has also been proven to increase the potential for conflict and violent crime (Tadjoeddin et al., 2016). Even though a multidimensional inequality mea-

[1]The study used hedonic method so far found is Fleurbaey and Gaulier (2009) for the analysis of international comparison of living standards.

sure has not been a concern of policymakers or researchers in Indonesia, according to a survey in 2015, the respondents recognised different types of inequalities they were exposed to, including inequalities in health and education.

An ordered probit model of subjective well-being is applied as the econometric strategy of the hedonic approach in this study. The regression is applied to all samples and each of the five quintiles of expenditure groups. The results from the regression's coefficients of expenditure, health, and education are used to determine the weight of each dimension. Then, the weights from the regression results are applied to Maasoumi's (1986) multidimensional inequality measure and the multidimensional Gini index of Decancq and Lugo (2012) to estimate multidimensional inequality with Indonesian data. The estimations of multidimensional inequality as are presented in three different schemes of weighting: equal weights, all-samples weights, and expenditure group weights.

It is shown from the results that applying dimensional weights based on expenditure group provides different insights into multidimensional inequality. Dimensional weights from the regression of all samples, without dividing each expenditure group, results in almost equal weights for each dimension. Looking more closely at the regression results of each expenditure group, the indication of adaptive preference of the poorest group is not found, while the richest group indicates diminishing marginal return of happiness.

Another issue in developing countries is the large proportion of workers engaged in informal employment. While it is considered related to poverty (Rosenbluth, 1994; Wodon et al., 2001; Jütting and de Laiglesia, 2009; ILO, 2012; Gunther and Launov, 2012), informal employment could have a role as an exit strategy to avoid unemployment in crisis periods (Booth, 1999; Cunningham and Maloney, 2000; Jutting and De Laiglesia, 2009). As a country with an increasing number of people in the productive age in the next decades,[2] providing sufficient employment is a challenge for Indonesia. Informal employment could be an alternative for tackling the issue of unemployment, considering that informal employment rates have been

[2]Indonesia is projected to have a demographic dividend between 2020 and 2030 (Bappenas, Statistics Indonesia and UNFPA, 2013).

larger than formal employment rates in Indonesia recently. Therefore, it is important to understand the dualism of formal and informal labour in the labour market of Indonesia and how each type of labour performs in terms of earnings.

Chapter 4 investigates the segmented labour market between formal and informal labour and earnings mobility of the two labour types. The chapter contributes to the limited amount of empirical literature on segmented labour markets and the earnings mobility of formal and informal labour, covering the context of a monetary crisis period. Moreover, this study uses a different estimator of earnings mobility than previous studies used.

The methodology used to analyse the segmented labour market between formal and informal labour in Indonesia employs the Mincerian human capital model (1974) with an additional variable of formal labour status. The second part of the analysis in this chapter investigates earnings mobility in terms of macro-mobility and micro-mobility. The estimation of aggregate mobility with its decomposition is measured using Fields and Ok's (1999) formula. Micro-mobility is analysed by using dynamic panel data following the work of Fields (2003b) with five types of estimators: pooled OLS, fixed effect, first difference GMM, forward orthogonal deviation GMM, and system GMM. GMM estimators are used to overcome serial correlations of residual issues and to include the valid instrumental variables in the estimations. The analysis of earning mobility both at the macro and micro levels are linked with the period before and after the monetary crisis of 1997 in Indonesia. The data source in this study is panel data from Indonesian Family Life Survey which covers 5 waves.

The results indicate the existence of segmented labour market between formal and informal labour where higher earnings premiums of formal labour are found during the period after the monetary crisis. In terms of earnings mobility, the results suggest that informal labourers have lower mobility compared to formal labourers, except during the period of crisis recovery. Earnings convergences are also found in both types of labour, with higher convergence is found in formal labour group.

The impact of other people's income on individual's utility has been studied in economics. The tunnel effect (Hirschman and Rothschild, 1973) is one of the concepts

which explains this impact. Existing empirical studies on this topic have focused mostly on developed countries[3] and have not considered specific features of society, such as its social capital and religiosity.

Chapter 5 analyses the tunnel effect in terms of the effect of a reference group's income on a person's expected future economic level. In addition to including the contexts of religiosity and social capital of a developing country in the analysis, this study differs from previous studies by using expected future economic levels as a variable instead of life satisfaction or happiness which are used by existing studies of the impact of reference group's income.

The data source in this study is panel data from the 4th and 5th wave of Indonesian Family Life Survey (IFLS4). The methodology outlined in this chapter uses ordered probit model of the latent variable of expected future economic level. The indication of a tunnel effect is determined by the 'reference groups' income' variable, which is based on geographical location and education level. The analysis of the effect reference group's income is divided into two periods. If the tunnel effect exists, then the initial period reference group's income would have a positive association with expected future economic level. In the second period, the reference group's income would affect the change of expected future economic level negatively.

Since there is no study available using expected future economic level, the discussion of the regression model in this chapter is mostly based on empirical studies on subjective well-being (Clark and Oswald, 1996; Sloane and Williams, 2000; McBride, 2001; Levy-Garboua and Montmarquette, 2004; Luttmer, 2005; Graham and Felton, 2006; Brown and Gray, 2014). The baseline model is applied to different types of reference groups based on location, community, sub-district, district, and province. In addition to including the Gini coefficient in the model in order to understand how inequality affects the tunnel effect, several variables related to social capital have been included. The model is also applied to several religious groups (i.e., Muslim, Christian and Hindu). The tunnel effect in urban and rural locations and for different

[3]Studies on the impact of reference group income using developed countries data, among others: Sloane and Williams (2000), Clark and Oswald (1996), and Clark (1996) used British data in their studies. Ferrer-i-Carbonell (2005) used German data. Luttmer (2005) used US data and Levy-Garboua and Montmarquette (2004) used Canadian data.

income quintiles are also analysed. Several robustness checks with different types of independent and dependent variables are also applied in this chapter.

The results suggest that there is an indication of a tunnel effect, even after controlling for inequality and social capital related variables. The effect is found to be higher in the province reference group. In the results based on religious groups, only the Muslim group indicates a tunnel effect.

Chapter 6 summarizes the findings of Chapters 2, 3, 4 and 5. This chapter also provides ideas for possible future research that could improve and extend the present study.

Chapter 2

Country context

This chapter aims to provide general information of Indonesia as the background for the discussions in the following chapters of this thesis. This chapter also gives estimations of Gini coefficients on expenditure, health and education to understand the trend of inequality in these three aspects.

2.1 Economic performance

Indonesia was among the countries with highest economic growth in the region in the early 1990s.[1] In late 1997, along with some other Asian countries, Indonesia was hit by monetary crisis causing political and economic reform. The monetary crisis has caused negative growth in 1998, increasing poverty and very high inflation rate (Table 2.1). Since 2000 the GDP growth had been recovered from monetary crisis although the growth has not reached the level before the crisis. In the last decade, GDP growth has been around 5% to 6%. In terms of poverty rate, in 2016 Indonesia also has successfully alleviated poverty rate to less than a half of the rate in the period of monetary crisis. Since 1999 Indonesia became a member of G20[2] which shows the important role of Indonesia's economy.

Table 2.1: Economic performance: 1995-2016

	1995	1997	1998	2000	2005	2010	2016
GDP Growth (%)	8.2	4.7	-13.1	4.9	5.7	6.4	5.02
GDP per capita (constant US$)	1,254	1,308	572	870	1,404	3,178	3,652
Inflation (%)	9.0	12.6	75.3	9.3	17.7	7	3.02
Poverty rate (%)	11.3	24.2	23.4	19.1	16.0	13.3	10.7

Source: Statistics Indonesia, World Bank and Countryeconomy.com

[1] According to World Bank's data(https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG), in 1990 Indonesia's economic growth was in the third position in Asia after Bhutan and Singapore.

[2] G20 consists of 19 countries and one regional organisation of European Union which represent 85% of world's economy, 79% of global trade and 65% of global population. (source:.http://sherpag20indonesia.ekon.go.id/index.php?r=site/index)

2.2 Demography, employment and religion

Indonesia is projected to have 265.02 million of population in 2018 (Bappenas, Statistics Indonesia and UNFPA, 2013) with the average population growth of 1.36% in the last decade.[3] It is the fourth most populous country in the world, and it is projected to have 321 million population in 2050. While in the 1980s almost 80% of the population lived in rural area, in 2014 less than 50% of population lived in the rural area which indicates migration from rural to urban area. There are 34 provinces, 416 districts, 98 municipalities, 7,071 sub-districts and 81,936 villages in Indonesia (Statistics Indonesia, 2016).

Table 2.2: Employment in Indonesia: 1995-2016

	1995	2000	2005	2010	2015	2016
Labour force (million)	87.83	95.65	105.86	116.53	122.38	125.44
Unemployment rate(%)	7.2	5.1	10.5	7.0	6.2	5.6
Informal employment (%)	64.3	64.9	70.5	68.4	57.8	57.6

Source: Statistics Indonesia

In terms of age composition, 64.1% of the population are between 15-59 year-old. With decreasing dependency ratio until 2025, Indonesia is expected to have a demographic dividend between 2020-2030 (Bappenas, Statistics Indonesia, and UNFPA, 2013). As the result of the demographic dividend, the labour force in 2020 is projected to be around 157 million. One of the features of employment in Indonesia is the high level of informal employment, although it has shown decreasing trend in the last decade (Table 2.2). The increasing number of labour force in the next decades because of demographic dividend raises a concern on inability of the industry to provide formal employment which could lead to higher informal employment.

There are 5 major religions, Islam, Christian, Hindu, Buddhism and Confucianism. The majority of the population (87%) are Muslims (Statistics Indonesia, 2012). This makes Indonesia as the biggest Muslim country in terms of the number of

[3]https://www.bps.go.id/statictable/2009/02/20/1268/laju-pertumbuhan-penduduk-menurut-provinsi.html

Muslim population (Pew Research Center, 2010). The second biggest religion is Christian, about 6.95%. Most of Indonesians consider themselves as religious and consider religion as important aspect of their lives (Pew Research Center, 2008 and Crabtree, 2010).

2.3 Education system

There are 4 main levels of education in Indonesia, primary school, junior high school, senior high school and university levels. Compulsory education of 6 years was mandated in the law for the first time in 1984. In the year of 1994, the government issued a new regulation of compulsory education for the citizen aged 5 to 15 year-old to have 9 years of education until junior high school. The length of study for primary school is 6 years, junior high school 3 years, senior high school is 3 years. For university level, it varies between 1 to 3 years for Diploma program, 5 years for strata 1, 2 or more additional years of strata 1 for master degree. In addition to schools with national curriculum, there are other schools which adopt Islamic curriculum namely Madrasah.

Table 2.3: Net enrollment ratio: 1995-2015

Net enrollment ratio	1995	2000	2005	2008	2010	2015
Primary school (%)	91.45	92.28	93.35	93.99	94.72	96.20
Junior high school (%)	50.96	60.27	65.37	66.98	67.62	77.45
Senior high school (%)	32.60	39.33	43.50	44.75	45.48	59.46
University(%)	7.15	7.95	8.71	10.07	11.01	17.34

Source: Statistics Indonesia

Table 2.3 shows the net enrolment ratio for each level of education in Indonesia for the last two decades with the increasing of net enrolment ratio for senior high school level is the highest among the four different levels of education.

Table 2.4 shows the increasing trend in education expenditure. Although education expenditure ratio to GDP has increase in triple in the last 20 years, the percentage is lower than world average which is about 4.7% in 2015 (World Development Indicators, 2017).

Table 2.4: Education expenditure: 1995-2014

	1995	2000	2005	2010	2015
Education expenditure as % of total expenditure	N/A	11.6	15.1	16.7	17.5
Education expenditure as % of GDP	1.0	2.5	2.9	2.8	3.6

Source: World Bank

Despite the increasing budget spent for education and the net enrolment ratio, the education quality does not show improvement in its achievement. Based on the results of Program for International Student Assessment (PISA)[4], although there was improvement of the achievement compared to the results in 2012, compared to regional and OECD's performance, Indonesian students had lower performance in all subjects in 2015.[5]

2.4 Health

Health legislation in Indonesia guarantees that every person has the equal right of access on health resources. The health care facilities are provided from the community-based health care facilities until province level public hospitals. In the period of monetary crisis 1997, the government increased the investment in health through social health insurance program for the poor as part of social safety nets. In 2014 the government launched a universal social health insurance scheme with the target of fully coverage by 2019.

According to the law of health system, allocation for health spending is 5% from the total central government budget. Table 2.5 shows that the health expenditure has been increasing compared to the expenditure in 1995.

[4]PISA test is conducted on a three-yearly basis and released education ranking for 72 countries based on tests in reading, mathematics and science taken by more than 510,000 15-year-old students.

[5]http://documents.worldbank.org/curated/en/174691483501965340/pdf/Master-Indonesia-brief-31Jan2017.pdf

Table 2.5: Health expenditure: 1995-2014

	1995	2000	2005	2010	2012	2014
Government health expenditure as % of total expenditure	4.9	4.4	4.2	6.1	6.1	5.7
Government health expenditure as % of GDP	0.7	0.7	0.8	1.0	1.1	1.1

Source: World Bank

2.5 Taxation

Tax revenue has been a major source of state revenue in Indonesia since the reform tax system in 1984. However, the tax revenue to GDP ratio of Indonesia is considered as the lowest tax ratio compared to other Asian countries (Table 2.6) and there has been decreasing trend of tax ratio since 2013.

Table 2.6: Tax to GDP ratio: Asian countries

	1998	2000	2005	2010	2012	2013	2014
Indonesia	7.4	8.6	13.5	11.4	12.5	12.5	12.2
Malaysia	17.2	14.6	16.1	14.4	16.6	16.3	15.9
Philippines	15.5	15.8	15.2	14.8	15.8	16.2	16.7
Singapore	N/A	15.5	12.1	13.0	13.9	13.6	13.9
Japan	26.4	26.6	27.3	27.6	29.4	30.3	32.0
Korea	19.4	21.5	22.5	23.4	24.8	24.3	24.6

Source: OECD

Tax types in Indonesia consists of central government tax and local government tax. Central government is responsible to collect the revenue from corporate income tax, personal income tax and value added tax. The local government's taxes including vehicle tax, cigarette tax, hotel tax, advertising tax and land and property tax.

Although the number of taxpayers has increased significantly from 22.3 million in 2011 to 33.3 million in 2015 (Directorate General of Taxes, 2016), the tax revenue from personal income tax in Indonesia is lower than the average of lower-middle income countries (Arnold, 2012). Since 1984, there had been four times of amendment of tax law with the results of declining the tariff from 35% to 25% for corporate income tax and from 35% to 30% for personal income tax. Further reduction in income tax tariff to adjust with income tax tariff of neighbour countries is planned to

be implemented in 2019 by amending the 2008 tax law.

2.6 Human Development Index

There have been some improvements in Human Development Index (HDI) of Indonesia in the last two decades where the rank of HDI is classified as at medium level with the rank of 113 in 2015[6]. In addition to a significant increasing GNI per capita, improvement in health system is reflected in life expectancy at birth which has increased almost 4 years longer in 20 years and infant mortality rate that has dropped by about 50% in 20 years time (Table 2.7). The improvement also shown in the mean year of schooling which in 2015 increased about twice compared to 1995.

Table 2.7: Human Development Index of Indonesia: 1995-2015

	1995	2000	2005	2010	2015
Human Development Index	0.566	0.606	0.635	0.665	0.689
Gross national income (GNI) per capita (2011 PPP$)	5,844	5,243	6,945	8,243	10,053
Life expectancy at birth	65	66.3	67.2	68.1	69.1
Infant mortality rate (%)	50.6	41	33.4	27.4	22.8
Expected years of schooling	10.2	10.7	11.2	12.5	13
Mean years of schooling	4.2	6.7	7.4	7.4	7.9

Source: World Bank, Statistics Indonesia

Although there are improvements in health and education, if they are compared to other developing countries, the achievements are not as expected. In terms of life expectancy at birth, Indonesia has the rank of 128 and for infant mortality rate Indonesia's rank is at 117. For education-related measures, mean years of schooling of Indonesians is at the position of 132.

2.7 Inequality

To estimate inequality in this section, Gini coefficient is used for the variables of expenditure, health and education. The inequality measure with Gini coefficient in

[6]http://hdr.undp.org/en/data

existing studies has been applied not only for income or expenditure, but also for education and health dimensions such as in Checchi (2001) and Regidor (2004).

This section follows the formula of Gini coefficient of Sen (1997) with the formula of:

$$G = (1/2n^2\mu)\sum_{i=1}^{n}\sum_{j=1}^{n}|y_{i-}y_j|$$

where n is the population size, y_i is the outcome of individual i, y_j is the outcome of individual j and μ is the outcome of the population.

The data source for the Gini coefficient estimations is taken from The National Socioeconomic Survey (Susenas) for the year of 2000, 2003, 2006, 2009 and 2012. Susenas covers a national representative samples of about 200,000 households. Each survey contains questionnaire which consists of gender, age, marital status, and educational attainment of all household members. It also includes the information on expenditure and income of households. The survey is held by Statistics Indonesia, a government institution which provides the data for government and public by conducting surveys periodically.

The calculation of Gini coefficient of expenditure uses expenditure per capita data. This is to be consistent with the published Gini coefficient by the government and because of the availability of more comprehensive data on expenditure in Susenas.[7]

Table 2.8: Gini coefficient of expenditure

Year	National	Urban	Rural
2012	0.41	0.42	0.32
2009	0.34	0.35	0.27
2006	0.35	0.35	0.27
2003	0.32	0.33	0.25
2000	0.31	0.32	0.20

The estimation result of Gini coefficient on expenditure shows an increasing trend

[7]Susenas places more emphasis on collecting expenditure data since the expenditure data can inform the standard of living of a household (Surbakti, 1995). However, there is a concern of the expenditure data is too low compared to the real value because the people in the higher level of society have less willingness to provide accurate data voluntarily.

(see table 2.8). This is in line with the previous studies of Yusuf et al. (2013) and Pratama (2014). Urban area's Gini coefficient of expenditure show consistently higher value compared to the rural area's ones. Urbanisation is indicated as the cause of the higher inequality in urban area in Indonesia (Kanbur and Zhuang, 2013).

To calculate Gini coefficient of education, the data is taken from the Susenas' information on the highest level of education attended and highest year attended. The information from the two questions then is combined to determine the number of year of schooling. The levels of education in Susenas are classified into 14 groups from primary level to university level with their varieties of types of school or program.

Table 2.9: Gini coefficient of education

Year	National	Urban	Rural
2012	0.35	0.32	0.36
2009	0.36	0.32	0.37
2006	0.35	0.30	0.36
2003	0.36	0.31	0.37
2000	0.37	0.32	0.39

Table 2.9 of Gini coefficient for education shows a modest decreasing trend in the national level and at the rural area. Decreasing trend in education inequality in the rural area can be explained referring to a study by Yusuf et al. (2013) where there was an increasing trend of enrolment in junior and senior high schools in the rural area.

For the estimation of Gini coefficient of health, the question in the survey chosen to be measured is about the frequency of becoming outpatient in the past one month. The outpatient facilities vary from the state hospital, medical worker practice, private hospital, traditional treatment, doctor/polyclinic, maternity healer, health clinic and others. The frequency of an individual becomes outpatient in each health facility then is summed up with the range between 1 to 31 days. The inverse value of becoming outpatients in the last one month is used to determine health level.

Table 2.10: Gini coefficient of health

Year	National	Urban	Rural
2012	0.12	0.12	0.12
2009	0.12	0.12	0.13
2006	0.11	0.11	0.10
2003	0.12	0.12	0.11
2000	0.11	0.10	0.11

Table 2.10 shows that inequality of health has been stable through the period with almost the same level of inequality in urban and rural areas. This result is in line with the finding in Pitriyan and Siregar (2013) which concludes that there is no improvement in some key indicators of health facilities such as access to improved water source, access to improved sanitation facilities and first child birth assisted by health care worker. This study also found that the process of reducing the gap between the rich and the poor in terms of health access and status seems to be slowing down during the post reformation era (after 1998) and the gap has been widening.

Chapter 3

Adopting an expenditure group weighting scheme in multidimensional inequality measures

Abstract

This paper uses the hedonic approach to determine the weight of each dimension in multidimensional inequality measures, via regression on all samples and each expenditure quintile group. This study aims to incorporate differences in the components of inequality for each expenditure group into existing multidimensional inequality through an ordered probit model of subjective well-being. To calculate multidimensional inequality, Maasoumi's multidimensional inequality measure and Decancq and Lugo's multidimensional Gini index are used. The data source is Indonesian Family Life Survey, which provides socioeconomic information. The multidimensional inequality indices are found to be almost identical for the equal and all-samples regression weighting schemes, but higher for the expenditure group weighting scheme. Incorporation of the valuation of the various dimensions by each expenditure group therefore provides distinct insights into multidimensional inequality. The results of regression for each expenditure group also indicate diminishing marginal return of happiness for the richest group, but there is no indication of any adaptive preferences of people in the lowest expenditure quintile.

Keywords: multidimensional inequality, subjective well-being, ordered probit model.

JEL classification: D63, I31, C43

3.1 Introduction

Most studies of multidimensional inequality use equal weight for each dimension, but there is a growing literature which applies varying weight on the dimensions. Despite of the different approaches which have been developed to determine the weight in multidimensional welfare evaluation, there exists no consensus of which standard to adopt when using differing weight methodologies. Reasons not to use methods other than equal weight in multidimensional welfare evaluation are that the results of the other methods are harder to interpret (Trauer and Mackinnon, 2001) and implement (Stapleton and Garrod, 2007)[1].

[1]Several studies provide sensitivity analysis (Saisana, Saltelli and Tarantola, 2005) and robustness checks (Foster, McGillivray and Seth, 2013; Permanyer, 2011) of different weighting methods. Some studies also provide new techniques that improve the robustness of the weighting method, such as linear programming (Cherchye, Ooghe and Puyenbroeck, 2008) or a theoretical approach

This paper applies a weighting scheme for multidimensional inequality measures where the three chosen dimensions, namely expenditure, health, and education, are assigned unequal weights. The dimension-varied weights are estimated for six groups of data: the whole sample group and five expenditure quintile groups. Hence, for each group of data there is a unique set of weight which varies across the three dimensions. The aim of this weighting scheme is to better reflect the multidimensional inequality and improve the measurement of social welfare in developing countries. For instance, the poorest group of a country may not experience a significant increase in expenditure, but there may be significant improvements in health access and education facilities which are welfare enhancing. In addition, there is not much discussion in the literature on whether wealthy people, in order to increase their well-being, value expenditure more than other dimensions relative to persons on the lowest rung of the economic ladder. This fact is largely neglected in previous literature. In fact, existing empirical studies do not explicitly include weighting measures for different groups when determining levels of well-being.

This paper utilises a regression-based approach with the hedonic variable to determine the weight of each dimension.[2] This approach is taken because the subjective well-being variable in the hedonic approach represents how persons evaluate their own situation and compare themselves to others (Ferrer-i-Carbonnell, 2004). Also, the econometric method used to determine the weights in the hedonic approach relies on data and does not use merely normative judgement.

Apart from providing information on the dimensional weights of each expenditure group, the results allow policymakers to formulate policies which focus on the most important component of the targeted group. The targeted policies are expected to increase welfare and alleviate inequality.[3]

based on social choice theory (Athanassoglou, 2015).

[2]In multidimensional welfare evaluation, weighting approaches have been classified into data-driven, hybrid and normative (Decancq and Lugo, 2013); the hedonic approach is a hybrid approach. One concern in choosing the weighting method in multidimensional welfare evaluation is that different weighting schemes might give opposite results (Esposito and Chiappero-Martinetti, 2017).

[3]The report of Stiglitz, Sen and Fitoussi (2008), and the OECD 'Beyond GDP' initiative (Boarini and d'Ercole, 2013) are examples of the growing trend of including well-being indicators for policy purposes. As to whether to use subjective well-being in economics studies, the subjective well-being measure is meant to complement other measures of welfare, not to replace

The use of subjective well-being as a variable in analysis raises an interesting question of how various expenditure groups value their subjective well-being differently. For instance, while the wealthier group experiences diminishing marginal return of happiness (Diener et al., 1993), the poorer group encounters adaptive preference as a result of experiencing adversity (Graham, 2016).

The source of empirical data in this paper is the Indonesian Family Life Survey (IFLS) data. Indonesia is an emerging country in which inequality is increasing. The concern about this trend encouraged the government and the House of Representatives in 2015 to take initiatives to focus on income inequality reduction. Although there is an increasing attention towards income inequality, initiatives towards addressing multidimensional inequality problem in Indonesia has gained little attention. The people of Indonesia have growing concerns about more types of inequality than just inequality of income. In particular, there is an awareness of increasing inequality, in terms of income and also in other dimensions including education and health as revealed by Takwin et al. (2015). They use Barometer, a survey of socioeconomic inequality in Indonesia that has existed since 2015 and describes the types of socioeconomic inequality prevailing based on the perceptions of its respondents.

In the present work, the ordered probit model for subjective well-being is used to determine the weights of the dimensions (expenditure, health, and education). To calculate the multidimensional inequality measures, Maasoumi's multidimensional inequality measure (1986) and Decancq and Lugo's multi-dimensional Gini index (2012) are applied with three different weighting schemes: equal weights, all-sample regression weights, and expenditure group weights. These multidimensional inequality measures were chosen because they allow aggregation across dimensions for each individual in the first stage, and then aggregation across dimensions in the second stage. Aggregation across dimensions for each individual allows the application of varying-weights dimensions in each expenditure group, to estimate the well-being of

them (Graham, 2016). Using subjective well-being information as an experienced utility with emotion reporting or evaluative judgement is a novel way to explore suboptimal choices (Stutzer and Frey, 2012). In terms of public policy, subjective well-being data, such as that from a happiness survey, have been used as an important complementary tool, and some countries have begun to incorporate well-being metrics in national data collections.

each individual.

This paper is divided into six sections. Section 3.2 explains multidimensional inequality measures with weighting by expenditure group. Section 3.3 discusses the econometric strategy for determining the weights. Section 3.4 provides a discussion of the data, and Section 3.5 presents the results. Finally, the last section concludes.

3.2 Multidimensional inequality measures with expenditure group weighting scheme

3.2.1 Maasoumi's multidimensional inequality measure

The multidimensional inequality measure developed by Maasoumi is based on general entropy theory (Maasoumi, 1986). There are two steps in this measure. The generalized relative entropy in Maasoumi's measure is $D_\beta(S, X; \alpha)$ with the actual utility function of individual i (individual welfare) of S_i, here, X_{if} is amount of dimension f received by individual i, α_f is the relative weight of dimension f, and δ_f is the weight of dimension f where $\delta_f = \frac{\alpha_f}{\sum_f \alpha_f}$. The degree of substitution between dimensions σ and -β is equal to $1 - (1/\sigma)$. For this paper, the degree of substitution between dimensions (σ) is equal to ∞ and β is equal to -1, so that the linear combination of all dimensions determines individual well-being.

The individual welfare formula (Maasoumi, 1986) is derived from the divergence function :

$$D_\beta(S, X; \alpha) = \sum_{f=1}^{M} \alpha_f \left\{ \sum_{j=1}^{N} S_i \left[\left(\frac{S_i}{X_{if}} \right) - 1 \right] / \beta(\beta + 1) \right\} \tag{3.1}$$

$$= \sum_{f} \alpha_f \left\{ \sum_{j=1}^{N} X_{if} \log \left(\frac{X_{if}}{S_i} \right) \right\}, \beta = -1 \tag{3.2}$$

The weights of expenditure groups are incorporated in this measure by adjusting the weight of dimension f, δ_f, by expenditure group's weight of dimension f, w_f^g

which will affect individual welfare of S_i:

$$S_i \propto \left[\sum_{f=1}^{M} w_f^g X_{if}^{-\beta} \right]^{-1/\beta} \tag{3.3}$$

here S_i is individual welfare, X_{if} is amount of dimension f received by individual i, and w_f^g is the weight of dimension f within its respective expenditure group.

Multidimensional inequality indices using this approach are part of the General Entropy family with the formula of:

$$I_\gamma(S) = \sum_{f=1}^{N} p_i \left[(S_i^*/p_i)^{1+\gamma} - 1 \right] / \gamma(1+\gamma) \tag{3.4}$$

where γ is the degree of aversion, p_i is the proportion of population of individual ith and S_i^* is the normalized value of individual welfare $(S_i / \sum_{i=1}^{N} S_i)$, while γ=0 and γ=-1 are Theil's first $(I_0(S))$ and Theil's second measure ($I_{-1}(S)$) with the formula of:

$$I_0(S) = \sum_{i=1}^{N} S_i^* \log(S_i^*/p_i) \tag{3.5}$$

$$I_{-1}(S) = \sum_{i=1}^{N} p_i \log(p_i/S_i^*) \tag{3.6}$$

3.2.2 Decancq and Lugo's multidimensional Gini index

In Decancq and Lugo's multidimensional Gini index formula (2012), x_j^i is a member of distribution function X, which is the outcome of individual ith for dimension j where $i = \{1, 2, ...n\}$, n is the number of observations, and j is the dimension of the outcome where $j = \{1, 2, ...k\}$. Matrix X has rows consisting of individual outcomes and the columns as dimension's outcomes. X is the element of $\mathbb{R}_{++}^{n \times m}$, and there are m dimensions of well-being for each individual. The aggregation across dimensions of each individual is represented by W_m, and the aggregation across

individual by W_n.

The computation of Decancq and Lugo's multidimensional Gini index consists of two aggregation steps. The first step is to aggregate across dimensions for each individual to get W_m, and the next step is the aggregation across individuals to get W_n. Individual well-being is represented by $W_m(X) = \left(\sum_{i=1}^{m} w_j \left(x_j^i\right)^{\beta}\right)^{1/\beta}$, and the social evaluation function is described by W_{nxm}: $\mathbb{R}_{++}^{n\times m} \rightarrow \mathbb{R}_{++} : X \longmapsto W_{n\times m}(X) = W_n(W_m(x^1), ..., W_m(x^n))$. The multidimensional inequality index given by Decancq and Lugo is:

$$I\left(X\right) = 1 - \frac{\sum_{i=1}^{n}\left[\left(\frac{r^i}{n}\right)^{\delta} - \left(\frac{r^i-1}{n}\right)^{\delta}\right]\left(\sum_{j=1}^{m} w_j \left(x_j^i\right)^{\beta}\right)^{1/\beta}}{\left(\sum_{j=1}^{m} w_j \mu \left(x_j\right)^{\beta}\right)^{1/\beta}} \tag{3.7}$$

where r^i is individual rank in the observations, w_j is the weight of the dimension j, x_j^i is the outcome of an individual i in dimension j, β is the degree of substitutability between dimensions, and δ is degree of aversion in a society.

To incorporate different weights for each expenditure group it is necessary to adjust the formula by introducing sub-group weighting in the procedure for determining individual levels of well-being. Let w_j^g be the group's weight of dimension j, where the population has q subgroups and $g = \{1, 2, ...q\}$. The formula for the multidimensional Gini index is then as follows:

$$I\left(X\right) = 1 - \frac{\sum_{i=1}^{n}\left[\left(\frac{r^i}{n}\right)^{\delta} - \left(\frac{r^i-1}{n}\right)^{\delta}\right]\left(\sum_{j=1}^{m} w_j^g \left(x_j^i\right)^{\beta}\right)^{1/\beta}}{\left(\sum_{j=1}^{m} w_j^g \mu \left(x_j\right)^{\beta}\right)^{1/\beta}} \tag{3.8}$$

where r^i is individual i's rank in the observations, w_j^g is the weight of the dimension j in expenditure group g, x_j^i is the outcome of an individual i in dimension j, β is the degree of substitutability between dimensions and δ is degree of aversion in a society.

3.3 Determining the weights of dimensions

Following Nardo et al. (2005), the basic regression model for estimating the coefficient of each dimension of the multidimensional welfare measure is as follows:

$$Y_i = \alpha_1(x_1^i) + ... + \alpha_j(x_j^i) + e_i \tag{3.9}$$

where Y_i is the hedonic variable (such as life satisfaction or happiness), α_1 is the coefficient of dimension $x_{_1}, x_1^i$ is the value of dimension 1 of individual i. Also α_j is the coefficient of dimension x_j and x_j^i is the value of dimension j of individual i.

This method assumes linear behaviour and independence between explanatory variables (Nardo et al., 2005). The weight for each dimension is drawn from the coefficient of the regression results for each respective variable. The advantages of this approach are: it does not involve manipulation to determine weights, and the dimensions do not need to have correlation between them. However, the disadvantages are dimensions which are highly correlated can cause misleading results, and a large data set is needed for the estimations.

Because the method for calculating the multidimensional index sums over all of the weighted dimensions, the assumption is that the degree of substitutability (β) is equal to 1 for the Gini multidimensional index and equal to -1 for the Theil first and second indices.

In order to make the dimensions comparable, each variable included in the multidimensional welfare measure is normalised according to the following rescaling method:

$$X_{ij} = \frac{x_{ij} - \min_j(x_j)}{\max_j(x_j) - \min_j(x_j)} \tag{3.10}$$

where X_{ij} is the normalised value of X for individual i having dimension j, x_{ij} is the original value of x of individual i having dimension j, $\min_j(x_j)$ is the minimum value of original value of x in dimension j, and $\max_j(x_j)$ is its maximum value.

The baseline model in equation 3.9 is then adopted for the hedonic approach, under

the assumption of ordinal comparability of subjective well-being (Ferrer-i-Carbonnell and Frijters, 2004). As a result, the ordered probit model on happiness is chosen with the main regressors of expenditure, health, education, and some control variables.

The ordered probit model of subjective well-being is defined as follows:

$$SWB_i^* = \alpha_1 Exp_i + \alpha_2 health_i + \alpha_3 educ_i + \beta X_i + e_i \tag{3.11}$$

where SWB_i^* is a latent variable of subjective well-being for individual i, drawn from a self-assessed question on happiness. The choices of happiness levels in the survey are: very happy, happy, unhappy and very unhappy. Exp_i is expenditure for individual i (as a natural logarithm), $health_i$ is the level of individual i's self-assessed health, and $educ_i$ is the educational level of individual i. Expenditure is based on household expenditure divided by the square root of household size to take economies of scale into account.

In this probit model, X_i is a set of control variables for individual i, following existing studies on the determinants of subjective well-being. These variables consist of: 'female' to define gender; age; 'married', for marital status; 'religious' for the self-assessed level of religiosity; and 'working,' which is an employment-related variable. In the model, e_i is the random error term.

Income and expenditure have been used as determinants of subjective well-being in empirical studies, where income is used as the main determinant in most studies. Such studies reveal significant association between income and subjective well-being, whether based on cross-country data (Diener et al., 1995) or within-country data (Gerdtham and Johannesson, 2001; Selim, 2008; Addai et al., 2013; Sohn, 2013). In considering the effect of different income levels on happiness, Diener et al. (1993) argue that there is a diminishing marginal return for income on happiness. A further argument that higher income does not imply greater happiness is based on the rising aspiration level or upward adjustment of people with high incomes (Frey and Stutzer, 2002).

Compared to studies of subjective well-being involving income, there are fewer studies on the association between consumption and subjective well-being (Stanca and Veenhoven, 2015). Such studies have found a positive association between consumption expenditure and subjective well-being (Headey and Wooden, 2004; Lewis, 2014; Noll and Wick, 2015; Wang et al., 2015). This association was also found in a study using Indonesian data (Sujarwoto and Tampubolon, 2014). Other studies have found that specific types of consumption influence subjective well-being, namely leisure consumption (DeLeire and Kalil, 2010) and durable goods consumption (Gokdemir, 2015). When the impacts of income and consumption expenditure on subjective well-being are compared, Lewis (2014) even that consumption expenditure had a stronger association with subjective well-being than income did.

Health is also a variable that is commonly used in subjective well-being determinant studies. Self-assessed health was found to have a positive association with subjective well-being in the studies of Gerdtham and Johannesson (2001), Clark and Oswald (1996), and Clark (2003). This positive association of health with subjective well-being was also found by Selim (2008) with Turkish data, and by Sujarwoto and Tampubolon (2014) in their Indonesian study.

The level of education is also a determinant of subjective well-being in many studies, but it does not exhibit a consistent positive association with subjective well-being in all of these studies. Blanchflower and Oswald (2004) found a positive association between education and happiness in the US data. A similar positive association was found in the non-US studies conducted by Hartog and Oosterbeek (1998), Selim (2008), and Addai et al. (2013). However, Clark (2003) found a negative association between education and well-being.

The control variables in the present model are the socio-demographic characteristics of the individuals. These characteristics comprise of age, female, married, religious, and working, following previous studies of the determinants of subjective well-being (Ellison, 1991; Winkelmann and Winkelmann, 1998; Hartog and Oosterbeek, 1998; Marks and Fleming, 1999; Clark, 2003; Alesina et al., 2004; Shields and Wheatley Price, 2005; Winkelmann, 2005; Lazar and Bjorck, 2008; Clark and Lelkes, 2009;

Francis et al., 2011, Abdel-Khalek, 2014).

In the studies of subjective well-being, age is found to have a "U-shaped" relationship with subjective well-being (Winkelmann and Winkelmann, 1998; Clark, 2003; Winkelmann, 2005; Shields and Wheatley Price, 2005). According to Frey and Stutzer (2002), the "U-shaped" relationship between well-being and age illustrates the finding that young and old people (the age groups at the upper points of the U) are reported as happier than middle-aged people (at the bottom of the U). Furthermore, Dolan, et al. (2008) finds that individuals with the lowest subjective well-being are those aged between 32 and 52.

The variable of female is a dichotomous variable, where female has a value of 1 and male has a value of zero. Alesina et al. (2004), Marks and Fleming (1999), and Hartog and Oosterbeek (1998) found that higher subjective well-being is reported by females. In contrast, Louis and Zhao (2002) found no significant difference between males and females in terms of subjective well-being.

Another control variable in the model is the marital status, which is also a dichotomous variable where one is the value for married individuals and zero is otherwise. Married status shows a positive relationship with subjective well-being in studies such as in Stack and Eshleman, 1998, Shields and Wheatley Price, 2005, Addai et al., 2013.

Labour market status is another determinant for subjective well-being, with unemployed status is found to be negatively associated with subjective well-being (Clark and Oswald, 1996; Winkelmann and Winkelmann, 1998; Clark, 2003; Kassenboehmer and Haisken-DeNew, 2009). Again, the employment status is included in the analysis as a dichotomous variable where one represents working and zero represents otherwise.

Religious variable in the model represents religiosity and is taken from the survey's data on self-assessed religious level. Religiosity is found to have a positive impact on subjective well-being in studies on the determinants of happiness (Ellison, 1991; Francis et al., 2011) and life satisfaction (Abdel-Khalek, 2014; Clark and Lelkes,

2009; Lazar and Bjorck, 2008).

The ordered probit model is regressed not only for the whole sample, but also for each quintile of expenditure. It is used to examine the effect of each dimension of expenditure, health and education on happiness in each expenditure group.

To determine the proportional weight of each dimension, this paper uses the method employed by Cavapozzi et al. (2015), in which the weight of dimension k (w_k) is a standardised coefficient of the three variables expenditure, health and education. Here k is the dimension to be standardised, α_k is the coefficient value of dimension k, and $\sum_{i=1}^{D} \alpha_i$ is the value of the total coefficient of all dimensions:

$$w_k = \frac{\alpha_k}{\sum_{i=1}^{D} \alpha_i} \text{ where } k = 1, ..., D \tag{3.12}$$

For comparison, an ordered probit model to the dependent variable, namely standard of living is applied, using the same set of independent variables as in Equation 3.11.

In addition to the hedonic method, this paper utilises Principal Component Analysis (PCA) and Factor Analysis (FA). However, the weak correlation between the variables chosen for measurement (Table *A.10* in Appendix A) causes low eigenvalues in components and factors in the PCA and FA results. Consequently, dimensional weighting for expenditure quintiles cannot be calculated for all quintiles (Tables A.12 and A.13, in Appendix A).

3.4 Data

The source of data for this analysis is the 2007 IFLS. IFLS is a longitudinal survey that collects socioeconomic and health information from a sample of households in 13 provinces, representing 83% of the Indonesian population. Sample selection was random within the provinces. The survey covers individuals, their households, and the communities in which they live. The information collected includes various data regarding expenditure, employment, health, and education. The first survey

(IFLS1) was conducted in 1993, and the 2007 IFLS represents the fourth survey (IFLS4). From 13,535 households and 44,103 individuals this survey interviewed, a total of 28,120 observations are included in this analysis.

Table 3.1: Descriptive statistics

Variables	Mean	Standard deviation
Expenditure (in 1,000 Rupiah)	1,344.46	1,290.52
Health level	2.96	0.50
Education level	3.07	1.3
Age	36.91	15.64
Female	0.52	0.50
Married	0.69	0.46
Religious	2.82	0.57
Working	0.60	0.49
Happiness	1.98	0.39
Living standard	1.95	0.55

IFLS4 was selected as the source of data because it includes a section on subjective well-being. The questions on subjective well-being were addressed only to respondents who were at least 15 years old. The dependent variable used in the present model is subjective well-being in relation to happiness, with the four possible categories: very happy, happy, unhappy, and very unhappy. The question related to happiness on IFLS4 is as follows:

"Taking all things together, how would you say things are these days - would you say you were very happy, happy, unhappy or very unhappy?"

The responses to this question were as follows: 6.3% of the respondents answered very happy, 85.09% answered happy, 8.31% answered unhappy and 0.3% answered very unhappy. The unhappy and very unhappy categories are combined due to the small number of very unhappy responses. As a consequence, the categories were reduced to very happy, happy and unhappy, with respective numerical assignments 3, 2, 1.

The main independent variables in the model are expenditure, self-assessed health, and level of education. As explained previously, expenditure is calculated from household monthly expenditure divided by the square root of household size.

The data for self-assessed health is obtained from the responses of question:

"In general, how is your health? Very healthy, somewhat healthy, somewhat unhealthy, or unhealthy."

The answers are categorised into ordinal groups as follows: 1 corresponds to unhealthy, 2 to somewhat unhealthy, 3 to somewhat healthy, and 4 to very healthy. The majority of respondents answered somewhat healthy (or "3").

Data for education are derived from the responses of question:

"What is the highest education level attained?"

There are eight possible answers as follows: no education, elementary school, junior high school, senior high school, college, bachelor's degree, master's degree, and doctoral degree. Most persons answered junior high school.

Other socioeconomic characteristics that are controlled for the model include female, age, marital status, religiosity, and employment status. Table 3.1 shows that more than half of the respondents are female, and the average age of the sample is 36 years. Regarding the marital status, the majority of respondents are married, while on the employment status, most are working.

Religious data is obtained from the self-assessed religiosity question on the IFLS4. The information for religiosity derives from the following question:

"How religious are you? There are four possible answers: 1. Very religious, 2. Religious, 3. Somewhat religious, and 4. Not religious."

For the model analysis, the levels of religiosity are reversed and the responses are categorised into ordinal groups as follows: Very religious corresponds to 4, religious to 3, somewhat religious to 2, and not religious to 1. On average, the respondents assess themselves as religious.

For comparison, the analysis uses self-assessed living standard as the dependent variable in a further specification of the model. The information for self-assessed living standard is obtained from the following question:

"Concerning your current standard of living, which of the following is true? It is less than adequate for my needs (1), it is just adequate for my needs (2), or it is more than adequate for my needs (3)?"

Most respondents answered that their living standard is just adequate for their needs.

Table A.9 (in Appendix A) shows the descriptive statistics for each expenditure quintile. In terms of happiness level and education, Quintile 1 has the lowest average happiness and lowest education level among all quintiles. In terms of health there is little difference between the quintiles. For self-assessed living standard, the lowest mean is found in Quintile 1. There is also a lower percentage of working respondents in Quintile 1. There is little difference in religiosity, gender, or age between the expenditure groups. Quintile 5 has the lowest percentage of married respondents.

3.5 Results

3.5.1 Regression results

Table 3.2 shows the regression results on all-samples (column (1)). Expenditure, health, and education have significant associations with happiness at the 1% significance level. Of these three variables, expenditure has the largest coefficient, followed by health and education.

These results reveal that higher expenditure corresponds to a greater probability of being happy. This is consistent with previous studies on determinants of subjective well-being, in which expenditure was found to be positively associated with happiness or life satisfaction (Headey and Wooden, 2004; Lewis, 2014; Noll and Wick, 2015; Wang et al. , 2015).

Health is also found to have a positive association with happiness or having a higher level of self-assessed health raises the probability of a higher level of happiness. This finding is in line with the studies of Clark and Oswald (1996), Gerdtham and Jo-

hannesson (2001), Clark (2003), Selim (2008), Addai et al. (2013), Sohn (2013), and Sujarwoto and Tampubolon (2014), which all found a positive association between self-assessed health and life satisfaction or happiness.

In terms of education level, the results show that the higher the level of education is, the higher the probability that a person is happy. This is consistent with the results of the studies by Gerdtham and Johannesson (2001), Blanchflower and Oswald (2004), Ferrer-i-Carbonnel (2005), Sohn (2013), and Sujarwoto and Tampubolon (2014).

Table 3.2: Subjective well-being regressions, ordered probit model

Dep. variable:	All-samples	Q1	Q2	Q3	Q4	Q5
Happiness	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	0.867***	0.919**	2.044*	1.041	1.305	1.157***
	(0.081)	(0.404)	(1.130)	(1.172)	(0.969)	(0.285)
Health	0.829***	1.023***	0.629***	0.908***	0.706***	0.853***
	(0.05)	(0.113)	(0.112)	(0.114)	(0.112)	(0.109)
Education	0.751***	0.559***	0.641***	0.637***	0.815***	0.917***
	(0.055)	(0.157)	(0.139)	(0.126)	(0.116)	(0.102)

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01
Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

In the regression results for each expenditure group, expenditure also has greater coefficients in Quintiles 2 and 5 than do health and education (Table 3.2). Expenditure does not appear to have a significant association with happiness in Quintiles 3 and 4, however. This is because there is less variation in happiness in Quintiles 3 and 4 compared to variation in expenditure. Health and education have significant associations with happiness in all expenditure groups.

In terms of marginal effects, the regression results for all-samples show that a one percent increase in the normalised value of expenditure increases the probability of being happy by 1.02%. In the regression results for each expenditure group, the highest marginal effect of expenditure is found in Quintile 2. In this quintile, a one percent increase in the normalised value of expenditure increases the probability of

having outcome (3) for happiness by about 2.09%. In the richest group, Quintile 5, a one percent increase in normalised value of expenditure increases the probability of achieving the very happy level by 1.9% (see Table A.2 column (6)).

The marginal effect of health in the regression on all-samples indicates that an increase of one percent in the normalised value of health would increase the probability of achieving outcome (3) for happiness by 0.98%. In the expenditure quintile regressions, the highest marginal effect of health is found in Quintile 5, where an increase of one percent in the normalised value of health would increase the probability of being very happy by 1.41% (column (5)). The lowest marginal effect of health occurs in Quintile 2, where there is about a 0.64% probability of outcome (3) in happiness if the normalised health level is increased by one percent.

As for the effect of education in the regression on all-samples (column (1)), an increase of one percent in the normalised value of education increases the probability of achieving outcome (3) in happiness by 0.88%. The lowest marginal effect of education is found in the poorest group, Quintile 1, in which an increase of one percent in the normalised value increases the probability of outcome (3) by 0.51%. The highest marginal effect of education is found in the richest group, Quintile 5, in which an increase of one percent in the normalised value of education would increase the probability of being very happy by 1.51%.

A glance at the results on control variables (Table A.1 in Appendix A), it is shown that age has a significant negative association with happiness. In view of the "U shaped" hypothesis of age as a determinant of subjective well-being (Frey and Stutzer, 2002), and the fact that the average age of the respondents is 36 years, the negative association between age and happiness is consistent with those of Winkelmann and Winkelmann (1998), Clark (2003), Shields and Wheatley Price (2005), and Winkelmann (2005). Religiosity is found to have a positive association with happiness which is consistent with other studies (Ellison, 1991; Clark and Lelkes, 2009; Francis et al. , 2011; Van Praag et al., 2010). From all of the control variables, 'married' has the highest marginal effect on happiness.

The results for the covariates in each quintile show that, for the lowest quintile, being

female has a positive marginal effect on happiness and age has negative association with happiness. Being married has the highest positive marginal effect on happiness, and working does not have a significant effect on happiness in Quintile 1. For the rest of the quintiles, the control variables of female, age, marital status, and working are in line with the result for Quintile 1, with the highest marginal effect in marital status. The exception is Quintile 4, where being female does not have a statistically significant effect on happiness and working has significant association with happiness.

3.5.2 Alternative subjective well-being variable

A self-assessed living standard is used as an alternative for subjective well-being variable and include it as a dependent variable in a comparative model. The regressions include the same independent variables as used in the baseline model. Again, the model for this alternative measure is an ordered probit model. Hence the alternative model is an ordered probit model of a self-assessed living standard on expenditure, health, and education, age, gender, marital status, religiosity, and working status.

Table 3.3: Living standard regressions, ordered probit model

Dep variable:	All-samples	Q1	Q2	Q3	Q4	Q5
Living standard	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	1.652***	1.830***	3.635***	0.795	2.054**	1.132***
	(0.07)	(0.351)	(0.974)	(0.976)	(0.817)	(0.249)
Health	0.688***	0.819***	0.736***	0.606***	0.650***	0.642***
	(0.043)	(0.098)	(0.098)	(0.097)	(0.095)	(0.095)
Education	1.135***	0.852***	1.137***	1.236***	1.092***	1.251***
	(0.047)	(0.133)	(0.120)	(0.105)	(0.097)	(0.089)

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01
Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table 3.3 shows the regression results for the all-sample and the five expenditure quintile groups and the dependent variable being self-assessed living standard. The results show that the three variables - expenditure, health, and education - all

have positive significant associations with self-assessed living standard. Positive significant associations with the three variables are found in all expenditure quintiles except Quintile 3. The largest coefficient for expenditure is found in Quintile 2, and the lowest coefficient for this variable is found in the richest group, Quintile 5. In all five quintile groups, expenditure has the largest coefficient, followed by education, then health.

Although the magnitudes of the coefficients for the three dimensions are different from the baseline model as shown in Table 3.2, all three variables are significantly associated with self-assessed living standard. This suggests that the choice of a hedonic variable for the dependent variable in the model affects the weightings.

Considering the regression results for the covariates, the effects of age, female, and religiosity on well-being show a similar direction as they do in the baseline model of happiness (Table A.3 in the appendix). Nevertheless, working status shows opposite signs compared to the baseline model of happiness, that is, working status has a positive association with the self-assessed living standard. This could be interpreted as people who work have a higher ability to fulfil their needs.

3.5.3 Estimations of multidimensional inequality measures

The estimations of the weight for each dimension using the regression results of the subjective well-being model set out in Table 3.4. The table shows the results for the all-samples case and each quintile of expenditure.

Table 3.4: Weights of dimensions in all-samples group and each expenditure quintile group

Variables	Equal	All-samples	Q1	Q2	Q3	Q4	Q5
Expenditure	1/3	0.354	0.367	0.617	0	0	0.395
Health	1/3	0.339	0.409	0.190	0.588	0.464	0.291
Education	1/3	0.307	0.224	0.194	0.412	0.536	0.313

In the all-samples results, the largest weight is for expenditure, and the second largest is for health. Because the coefficients for expenditure in Quintiles 3 and 4 are not significant, the weight for expenditure in these quintiles is zero. This follows

Decancq et al. (2013), in which only significant coefficients in the regression-based approach are used in weighting the dimension.

In order to calculate multidimensional inequality measures, the weights in Table 3.4 are applied to the dimensions. The total well-being for each individual is then calculated from the aggregation of the three dimensions.

Before showing the results for the multidimensional inequality indices, Table 3.5 shows the Gini coefficient for each dimension. As can be seen, the highest level of inequality is for expenditure. Health inequality is low relative to the inequality in expenditure and education; this might be due to the limited number of self-assessed health answer choices in the survey.

Table 3.5: Gini coefficients of expenditure, health and education: one dimensional measures

Dimension	Gini coefficient
Expenditure	0.42
Health	0.11
Education	0.29

Next, the multidimensional measures of Maasoumi and Decancq and Lugo are calculated. It is assumed that, for the Decancq and Lugo multidimensional Gini index, the degree of substitution is 1 and the degree of aversion in a society is 2, i.e., similar to the original Gini index. For Maasoumi's multidimensional inequality or the Theil first and second indices, β is assumed to be -1. Table 3.6 shows the results of estimation for the multidimensional inequality index under these conditions.

Table 3.6: Multidimensional Gini index, Theil first index and Theil second index in three different weighting schemes

Inequality measures	Equal weights	All-samples weights	Expenditure group weights
Multidimensional Gini index	0.153	0.150	0.236
Theil first $I_0(S)$	0.075	0.071	0.141
Theil second $I_{-1}(S)$	0.043	0.042	0.98

Inequality measures according to the expenditure group weighting scheme are higher in all three measures. The difference between using equal weights and expenditure

group weights in the multidimensional Gini index is about 50%. These results also show that the use of a regression-based approach on all samples does not yield substantially different results from those obtained by calculating multidimensional inequality using equal weights. Consequently, the incorporation of different weights for each expenditure group yields a distinct perspective on multidimensional inequality.

The decomposition of the Theil first and second indices (Table A.8 in the appendix) shows that within-group inequality is greater than between-group inequality in both the equal weighting and the all-sample schemes. Between-group inequality is greater in the expenditure group weighting scheme than in the other weighting schemes. The first and second Theil indices of expenditure group weighting are consequently greater than in the other two weighting schemes.

3.6 Conclusions

This paper uses the ordered probit model with subjective well-being as the dependent variable to determine the weights of dimensions in multidimensional inequality measures. This hedonic approach is applied to all-samples and to each expenditure quintile group. The weights are then applied to Maasoumi's multidimensional inequality index and Decancq and Lugo's multidimensional Gini index.

The regression results for the subjective well-being model demonstrate that expenditure has a greater weight than health and education in the all-samples regression. In the regression results for each expenditure quintile, not all quintiles exhibit a significant association between expenditure and happiness. Health and education have a significant association with happiness in all five quintiles.

According to the regression results, the smallest weight of expenditure is found in the poorest group, Quintile 1. These results do not indicate adaptive preferences concept, which establishes that the poorest group could have the highest correlation between expenditure and happiness because that group experiences the most adver-

sity. The regression results for the richest group, which has a lower coefficient than the poorer expenditure group of Quintile 2, indicate a diminishing marginal return of happiness.

Multidimensional inequality indices with Maasoumi's formula and also with Decancq and Lugo's formula exhibit greater levels of inequality according to the expenditure group weighting scheme than with equal weighting. The multidimensional inequality found from the all-sample regression is not very different from the inequality according to equal weighting. The difference between expenditure groups might therefore provide a different insight into multidimensional inequality.

The information about different weights in each expenditure group could have valuable policy implications, in addition to providing weights relating to multidimensional inequality. Based on these results, a possible policy would be to prioritise the health of the poorest quintile group while imposing a higher tax on the wealthiest quintile group. This is because the marginal effect of expenditure for the richest group is lower than the marginal effect of expenditure for people in Quintile 2. As a result, the imposition of a higher tax would not reduce the richest group's subjective well-being as much as imposing it upon poorer groups would.

Chapter 4

Labour market segmentation between formal and informal labour and its effect on earnings mobility

4.1 Introduction

Informal employment constitutes a large fraction of the labour force in developing countries, where more than half of employment is informal (Jütting and de Laiglesia, 2009; ILO, 2012).[1] With regards to income distribution, informal employment is associated with poverty or with lower income in developing countries (Rosenbluth, 1994; Wodon et al., 2001; Jütting and de Laiglesia, 2009; ILO, 2012; Gunther and Launov, 2012). It is also considered as a last-resort strategy in the segmented labour market concept (Fields, 2009). Although it is associated with lower income groups, informal employment has been an alternative to unemployment during crisis periods in developing countries (Booth, 1999; Cunningham and Maloney, 2000; Jutting and De Laiglesia, 2009).

Previous studies provide limited attention to the segmentation of the labour market into formal and informal labour in crisis periods and how earnings mobility changes within the context of the crisis period. In a country with high informal employment and experience with economic reform as the consequence of monetary crisis, understanding how the segmented labour market and earnings mobility change between different monetary crisis periods will give insight into whether or not the reform triggered by the monetary crisis has been beneficial for both segments of the labour market.

This chapter aims to analyse the segmented labour market of formal and informal labour and earnings mobility for both types of labour in a developing country with a persistently high level of informal labour. The analysis is placed in the context of a monetary crisis, with the analysis done before and after the monetary crisis, to understand the difference in the segmented labour market and earnings mobility between the two periods. To discuss the topic, the first step in the analysis is to prove the existence of the segmented labour market, in which formal labourers' earnings are premium. The next step is to estimate earnings mobility at the aggregate level,

[1]Mexico, for example, had 54% informal employment in 2009, and Indonesia had 72%. In 2010, Colombia had 59.6% informal employment, and India had 83.6%. OECD data also shows that informal labour's percentages reached 70-90% in Sub-Saharan Africa, greater than 50 % in Latin America, and around 70% in south and southeast Asia.

i.e., macro-mobility, with decompositions to formal and informal labour. Then the individual-level earnings mobility, i.e., micro-mobility, is estimated in order to understand the earnings convergence for each type of labour. Informal labour in this discussion consists of being self-employed without workers, self-employed with temporary workers, and casual workers.[2] Since self-employed is included in the definition of labour, this chapter uses the term earnings, which, according to Fields (2011a), covers income from wage employment, salaried employment, and self-employment.

The methodology for the analysis of the segmented labour market in this chapter is Mincerian earnings regression with an additional variable, formal labour status. The regression estimates the earnings premium between formal and informal labour as the indication of a segmented labour market. To estimate the earnings premium between the two types of labour, this chapter uses pooled ordinary least squared (pooled OLS, hereafter) and fixed effect with panel data. To estimate macro-mobility, this chapter uses Fields and Ok's (1999) formula, which can be decomposed into earnings mobility per type of labour. For the micro-mobility analysis, earnings convergence is analysed using dynamic panel data. In addition to pooled OLS and fixed effect estimators, Generalized Method of Moments (GMM) estimators are used in this chapter to address issues with OLS and fixed effect estimators for dynamic panel data.

The data used in this chapter is from the Indonesian Family Life Survey that consists of 5 waves from 1993, 1997, 2000, 2007 and 2014. Indonesia is a country with a persistently high proportion of informal employment and a concern about an approaching demographic divide between 2020 and 2030 (Bappenas, Statistics Indonesia and UNFPA, 2013). In late 1997, Indonesia experienced a monetary crisis followed by reform of the political and economic systems.

This chapter consists of 6 sections: Section 4.1 is the introduction; Section 4.2 discusses the literature review and is divided into two subsections, the segmented labour market and earnings mobility; Section 4.3 discusses methodology; Section 4.4

[2]This chapter adopts a broader definition of labour market that includes self-employed workers. This is to accommodate labour market conditions in a developing country which has a large share of informal self-employed workers and follows Fields (2011a). The classification of informal labour follows that of Statistics Indonesia.

explains the data used in this chapter; and Section 4.5 provides empirical results. The last section, Section 4.6, discusses the conclusions for the research.

4.2 Related Literature

4.2.1 Segmented labour market between formal and informal labour

The early development of the concept of the segmented labour market between formal and informal labour considers the dualism in labour market whereby informal labour is a last-resort strategy with lower income and less social protection (Harris and Todaro, 1970; Fields, 1975). Later development in the field came with the concept of the competitive advantage of an informal job. In this concept, labourers choose informal jobs voluntarily for flexible working hours and conditions (Maloney, 1999, 2004). The more recent view of informal labour combines the former two concepts and considers the dualism in informal labour itself, the upper tier and last-resort strategy groups (Fields, 2009).

This chapter adheres to the first concept of the segmented labour market, which refers to informal labour as a last-resort strategy. The focus of the analysis is on the earnings gap between formal and informal labour as the indication of a segmented market (Fields, 2009). Empirical evidence of the segmented labour market has been found in several studies. A cross-countries analysis of the earnings gap between formal and informal labour in a study done by Gindling et al. (2016) finds that formal employees gain an earnings premium compared to informal self-employed and waged employees. Within-countries evidence of the earnings premium for formal labour are also found in the case of Ukraine (Lehmann and Pignatti, 2007), South Africa (Heintz and Posel, 2008), Costa Rica (Gindling, 1991), Vietnam (Nguyen et al., 2013), Russia (Lehmann and Zaiceva, 2013), Egypt (Tansel et al., 2015), and Brazil, South Africa, and Mexico (Bargain and Kwenda, 2011).

With its role as a buffer in a crisis period (Booth, 1999; Cunningham and Maloney,

2000; Jutting and De Laiglesia, 2009), the countercyclical nature of informal employment is found in a study done by Loayza and Rigolini (2011). In the study, they find that, in the short run, informal employment acts as a safety-net, while, in the long run, greater informal employment indicates lower labour productivity, a weak justice system, and rigid business regulation. Another study on the countercyclical nature of the informal sector is that of Elgin (2012), which finds that the ratio of the informal sector to the GDP is bigger in a downturn economic period and smaller in boom periods.

One study which analyses the earnings gap between the formal and informal sector in the context of a financial crisis is that of Blunch (2015), which used Serbian data. Using the OLS Mincerian model, this paper analyses cross-section data for the years 2008 and 2009. A large earnings gap between the formal and informal sectors was found, and it was noted that the gap decreased in the period after a crisis. This study only examines two consecutive years. Since the crisis recovery could take longer than 2 years, this study may not cover the crisis recovery.

Existing studies on the Indonesian formal and informal labour market do not discuss the segmented labour market. Comola and De Mello (2011) found that the minimum wage policy in Indonesia causes decreases in formal jobs and expansion of informal employment. Another study on the impact of minimum wage on the formal and informal sectors was done by Hohberg and Lay (2015). This study found that the minimum wage is associated positively with formal sector wages and that the informal sector is not affected by the spill-over effect of the minimum wage. A study by Marinescu and Triyana (2016) on the impact of tenure on income from formal and informal labour found that, while there are higher returns for employee tenure compared to returns for experience in formal employment, there is no significant association between tenure and income in the informal sector.

4.2.2 Earnings mobility

This chapter follows the definition of earnings mobility of Fields (2008a), which covers the measurements of income dynamic and income convergence. The most common components used in macro-mobility analysis are "change in earnings" and "change in rank" in earnings distributions. For this chapter, change in earnings is used and considering the direction of the change. In micro-mobility analysis, the previous period's earnings are the main focus (Fields, 2010) because this shows which individuals gained more earnings mobility. It also implies opportunities received by individuals to improve earnings in later periods. In addition to the previous period's earnings, socioeconomic variables are used as additional covariates in conditional earnings mobility analysis.

A comprehensive review of approaches for measuring earnings mobility was conducted by Jantti and Jenkins (2015). They constructed categories of approaches based on positional change, individual income growth, reduction of longer-term inequality, and income risk. In terms of choosing an appropriate period for conducting an earnings mobility analysis, Fields (2007) argues that, compared to conducting an analysis over a short time period, a longer-term earnings mobility analysis reflects the distribution of earnings more accurately as a result of equalizing by mobility of earnings.

Woolard and Klasen (2005) studied income mobility with adult equivalent income using South African data, and they found income convergence. Another study on income mobility is the study of Shi et al. (2010), which used Chinese data from 1989-2006; this study also found earnings convergence. Khor and Pencavel's study (2006), which compared Chinese and American earnings mobility using change in income percentiles as the dependent variable, found that those with a lower income percentile in the initial period have a higher increase in income percentile.

One of the studies on income mobility with Latin American data is the study of Fields at al. (2015), which used data from Argentina, Mexico, and Venezuela and used change in earnings as the dependent variable; this study found that those in

the lower income quintiles had a positive change in earnings over time, while those in the highest income quintile had a negative change. Another chapter using Latin American data is a study by Cano (2015). Cano used Ecuadorian data and examined the probability of staying in the top income group. Furthermore, Rowe et al. (2014) used Puerto Rican data to find earnings convergence in the periods they observed.

A study of earnings mobility with Indonesian data is a study by Fields et al. (2003a) which found a weak unconditional convergence of earnings mobility using OLS estimation and instrumental variables for the initial year income's prediction. Another study by Fields et al. (2003b), which used additional covariate variables in the multiple regression model, found strong conditional earnings convergence in Indonesia. Both of the studies used household per capita income as its definition of income, and, in the latter study, the covariates were household characteristics. These studies used only two waves of data, which can potentially capture only a temporary shock in income rather than more permanent income.

An analysis on informal labour earnings mobility that used Indonesian data was done by Martinez et al. (2014), which analysed the association of multiple jobs with earnings mobility. The study found that there is no significant correlation between having multiple jobs and long-term earnings mobility.

Limited attention has been paid to earnings mobility for informal labour and earnings mobility within the context of a crisis period in studies. Most of the studies related to informal employment are on the determinants of informal employment and its relation to poverty and inequality. One study which is related to informal employment and earnings mobility is a study by Chicello et al. (2005) in KwaZulu-Natal. It focuses on the impact of the transition of working status on income difference, but it does not include an analysis which was carried out in the context of a crisis.

The information gained from earnings mobility analysis can also lead to the creation of policies, such as those designed to increase individuals' skills through education and training, provide credit, create fall-back jobs for those who want and need them, and improve labour market information systems (Fields, 2011). Policies should be concerned with how dynamic the informal sector is compared to the formal sector.

If the informal sector is more dynamic, improving the earnings of those working in the informal labour field by improving their skills can be an option for policymaking.

4.3 Methodology

4.3.1 Segmented labour market

To prove the existence of market segmentation between formal and informal labour, Fields's (2007) concept of earnings segmentation is applied to this study:

$$S : (E(Earnings^F(X, \varepsilon) - Earnings^I(X, \varepsilon)|X \in A)) > 0$$

where X is the specific set of characteristics of individual to be included in the analysis such as age and education and A is set of individual's characteristics. $Earnings^F$ and $Earnings^I$ are the earnings of formal and informal labour, respectively.

In terms of its empirical strategy, this chapter follows Mincer's (1974) earning regressions, which was originally used to investigate schooling and work experience as human capital investments. Given the interest on the earnings gap between formal and informal employment in this chapter, the Mincerian model is applied to panel data with the additional variable, formal labour status, as the main variable of interest in the model. To determine whether formal labour provides higher earnings compared to informal labour, this chapter applies pooled OLS and fixed effect estimations:

$$\ln y_{it} = \beta Formal_{it} + \gamma X_{it} + \varepsilon_{it} \tag{4.1}$$

where $\ln y_{it}$ is the logarithm natural of earnings for individual i at time t, $Formal_{it}$ is a dummy variable with one if the individual is formal labourer and 0 otherwise, X_{it} is the characteristics of individual i at time t, and ε_{it} is an idiosyncratic error term.

X_{it} consists of education, age as the proxy for work experience and age squared.

These three variables are included following Mincer's original earning regression model. Another control variable, education, consists of 5 levels: no education, primary school, junior high school, senior high school, and university. Other control variables included in the model are household size and dummy variables for urban, marital status and male.

Previous studies using Mincerian models found that education has a positive association with monthly earnings (Gindling et al., 2016), and hourly earnings/wage (Gindling, 1991; Lehmann and Pignatti, 2007; Heinzt and Posel, 2008; Tansel et al., 2015). Age is also found to have a positive association with earnings (Lehmann and Pignatti, 2007; Heinzt and Posel, 2008; Tansel et al., 2015).

In terms of the additional covariates, previous studies found that the respondents who are male, married, have large household size, and live in urban areas have higher earnings compared to the rest of the respondents (Lehmann and Pignatti, 2007; Heinzt and Posel, 2008; Lehmann and Zaiceva, 2013; Tansel et al., 2015).

4.3.2 Earnings mobility

This study uses a measurement of earnings mobility, which can accommodate the decomposition of groups' earnings mobility (Fields and Ok, 1999) using an earnings movement formula. This formula takes into account the direction of earnings movement. The formula for aggregate earnings mobility is as follows:

$$m_n(y_{t-1}, y_t) = \frac{1}{n} \sum_{i-1}^{n} (\log y_{it} - \log y_{it-1}) \tag{4.2}$$

where m_n is the earnings mobility in aggregate, y_{it} is the earnings of individual i at time t, y_{it-1} is the earnings of individual i at time $t-1$, and n is the number of observations.

To calculate sub-group earnings mobility, the observations are classified based on working status of formal or informal labour in the initial year. Earnings mobility decomposition is then weighted based on the number of persons in the sub-group.

This decomposition formula allows for the measurement of earnings mobility in each group and to understand how each group contributes to aggregate earnings mobility. The decomposition of aggregate earnings mobility is based on employment status (formal or informal).

Let each sub-group J of population, $J\epsilon\{1, ..., n\}$ have n_j persons in the sub-group, for any $j = 1, ...j$ and $y_{it}\ \epsilon R_{++}^{nj}$. The formula for the decomposition of earnings mobility is as follows:

$$m_n((y_{1t-1},..,y_{jt-1}),(y_{1t},...,y_{jt})) = \sum_{j=1}^{J}(\frac{n_j}{n})m_{nj}(y_{it-1}^{j}, y_{it}^{j}) \tag{4.3}$$

where m_n is the earnings mobility of all groups (aggregate), y_{jt-1} is earnings of individual in group j in the initial period and y_{jt} is the earnings of individual in group j in the final period. n is number of all observations and n_j is number of observations in group j. m_{nj} is the earnings mobility index for group j, y_{it-1}^{j} is earnings of individual i in group j at period $t-1$ and y_{it}^{j} is earnings of individual i in group j at period t.

Aggregate earnings mobility is calculated for each period between the two waves of the survey (i.e., 1993-1997 and 1997-2000) to understand the different trends in earnings mobility that occurred during these periods. In addition, earnings mobility before the 1993-1997 wave and after the monetary crisis period (2000-2007 and 2007-2014) are compared. In 1999, Indonesia had positive economic growth after experiencing negative growth in 1998, and the rate of economic growth in 2000 (4.9%) exceeded 1997's rate of growth (4.7%). The context of the monetary crisis is used to define the classification of periods of "before crisis" (1993-1997), "crisis recovery" (1997-2000), and "after crisis" (2000-2014) in the analysis.

For the analysis of micro-mobility, the model is based on the conditional earnings mobility model of Fields et al. (2003b). The difference between this study's regression methodology and that used by Fields et al. (2003b) is that this study analyses earnings mobility of formal and informal labour while Fields et al.'s study did not differentiate the two types of labour. Moreover, this study put into context the

periods of monetary crisis, while Fields et al.'s study did not discuss in the context of crisis periods. This study uses five waves of data compared to only two waves of data were used in Fields et al.'s study, and by using a longer data series than Fields et al., the analysis in this study captures the equalising effect of income more clearly (Fields, 2007). In terms of estimators, this study uses GMM estimators in addition to pooled OLS and fixed effect estimators. This, according to econometrics literature, provides more efficient estimations than pooled OLS and fixed effect estimators alone.

The econometric model of micro-mobility in this study is based on the following equation:

$$\Delta \ln y_{it} = \beta \ln y_{i,t-1} + \gamma X_{it} + \varepsilon_{it} \tag{4.4}$$

where $\Delta \ln y_{it}$ is the difference between the natural logarithm of earnings in the final year for individual i, $\ln y_{it}$ and the natural logarithm natural of earnings for individual i in initial year, $\ln y_{i,t-1}$, X_{it} is the socioeconomic characteristic of individual i at time t, and ε_{it} is the random error term.

X_{it} consists of education, age, age squared, household size, urban location, marital status, and male, following the existing studies on income dynamic (Chicello et al., 2005; Woolard and Klasen, 2005; Khor and Pencavel, 2006; Hernandez, 2007; Rowe et al., 2014). Education consists of five levels: no education, primary school, junior high school, senior high school, and university. Urban location is a dummy variable where urban equals 1 if the respondent lives in an urban area and otherwise equals 0. Marital status is a dummy variable that equals 1 if the respondent is married and 0 otherwise. Male is another dummy variable, having a value of 1 if the individual is male and 0 otherwise.

The main variable used to analyse micro-mobility is the initial year's earnings ($y_{i,t-1}$) with coefficient β. If the value of coefficient β is less than zero ($\beta < 0$) and $y_{i,t-1}$ is in natural logarithm form, this indicates a weak conditional convergence in terms of change of earnings pattern (Fields, 2008). In this case, earnings converge to their conditional mean. Alternatively, if the value of β is greater than zero ($\beta > 0$), this

shows a weak conditional divergence. If $\beta = 0$, or if β is not significantly different from zero, there is a neutral relationship between initial earnings and change in earnings.

Existing studies on earnings mobility commonly use the OLS model for estimation (Woolard and Klasen, 2005; Chicello et al., 2005; Khor and Pencavel, 2006; Hernandez, 2007; Rowe et al., 2014). For dynamic panel data, OLS estimation suffers from omitted variable bias, which can cause upward bias and inconsistency. Furthermore, OLS does not accommodate unobserved individual heterogeneity. Fixed effect estimation does address the unobserved individual heterogeneity. However, OLS and fixed effect estimations have a strong exogeneity assumption that the regressor and errors are not correlated, but this is not always the case in a model with dynamic panel data. The process of fixed effect estimations requires that an individual's mean value for each variable is subtracted from its respective value, which can result in a correlation between the regressor and errors (Nickell, 1981). To address the issues with OLS and fixed effect estimations – particularly for dynamic panel data with small series and large observations – an alternative is to use Difference GMM estimators (Roodman, 2006). This estimator removes individual-specific heterogeneity with unobserved effects using the first difference of the variables in the model. It is assumed that this model does not have serial correlation in its error term and that a lag of two or more periods of earnings($y_{i,t-1}$) is valid for the first difference calculation (Arellano and Bond, 1991).

To adopt GMM estimators, the error term in the in the individual earnings mobility model is divided into individual specific effect and time-varying error terms. Here:

$$\Delta \ln y_{it} = \beta \ln y_{i,t-1} + \gamma X_{it} + \varepsilon_{it} \tag{4.5}$$

$$\varepsilon_{it} = u_i + v_{it} \tag{4.6}$$

where $\Delta \ln y_{it}$ is the difference between natural logarithm of earnings in final year

of individual i, $\ln y_{it}$, and natural logarithm of earnings in initial year, $\ln y_{i,t-1}$. X_{it} is time-varying characteristics individual i at time t, u_i is individual specific effect and v_{it} is time-varying error term.

The GMM estimator which eliminates the individual specific effect of u_i, is the GMM estimator with first difference (Diff-GMM, hereafter). Now we have:

$$\Delta \ln y_{it} - \Delta \ln y_{it-1} = \beta(\ln y_{i,t-1} - \ln y_{i,t-2}) + \gamma(X_{it} - X_{it-1}) + (v_{it} - v_{i,t-1}) \quad (4.7)$$

where $\Delta \ln y_{it}$ is the difference between natural logarithm of earnings at time t of individual i, $\ln y_{it}$ and the natural logarithm of earnings at time $t-1$, $\ln y_{i,t-1}$. $\Delta \ln y_{it-1}$is the difference between natural logarithm of earnings at time $t-1$, $\ln y_{i,t-1}$ and $\ln y_{i,t-2}$, the natural logarithm of individual i's earnings at time $t-2$. X_{it} is characteristics of individual i at time t and X_{it-1} is characteristics of individual i at time $t-1$. v_{it} is error term at time t and v_{it-1} is error term at time $t-1$.

This estimator removes individual-specific heterogeneity with unobserved effect using the first difference of the variables in the model. It is assumed that this model does not have serial correlation in its error term ($E(v_{it}) = E(v_{it}v_{is}) = 0$) and that a lag of two or more periods of y is valid for first difference calculation (Arellano and Bond, 1991). For $T \geqq 3$, the linear model restriction of the model is as follows:

$$E((y_{it} - y_{it-1})(y_{it-j})) = 0 \text{ where } (j = 2, ..., t-1.t = 3, ..., T) \quad (4.8)$$

Using the first difference of dynamic panel data in the regression can reduce the number of observations with zero value in one or several waves of the panel data, which can be a problem if the waves are limited (Roodman, 2006). Another type of GMM, forward orthogonal deviation (FOD-GMM, hereafter), by Arellano-Bover (1995) addresses the issue of losing observations due to missing lagged data. This type of estimator does not use the first different from the previous lag, but, instead, it subtracts the average future value from available data. For example, with the

earnings variable y_{it}, it calculates the average future value as :

$$y_{i,t+1} = \frac{1}{C_{it}}(y_{i,t} - \frac{1}{T_{it}} \sum_{s>t} y_{i,s}) \tag{4.9}$$

where $y_{i,t}$ is the earnings in time t, $y_{i,t+1}$ is the earnings in time $t+1$. T_{it} is the number of such observation and C_{it} is the scale of $\sqrt{\frac{T_{it}}{T_{i,t+1}}}$

In addition to Diff-GMM and FOD-GMM estimators, the System GMM (Sys-GMM, hereafter) estimator (Blundell and Bond, 1998) not only estimates first difference but also differences in levels, which can improve the efficiency of the model. Time-invariant characteristics of an individual can also be included in this type of estimator.

To test the robustness of the GMM estimators, tests are implemented in the regression process. The first test used is the Arellano and Bond serial correlation test. The GMM estimators rely on the assumption of serially uncorrelated residuals for the validity of the regression results. The null hypothesis for this test is that there is a second-order serial correlation test of the error component that has no serial correlation. Another test that is used for the validity of GMM estimators is the Hansen over-identification test for instrumental variable validity or Hansen J test.

The estimation process in this chapter uses five types of estimators in the regressions: pooled OLS, fixed effect, Diff-GMM, FOD-GMM, and Sys-GMM. To understand the earnings mobility of different types of labour, the above regression steps are then replicated for formal and informal labour.

A concern that arises when using GMM estimators for before and after crisis periods is limited lag availability. For the analysis of micro-mobility, with the context of before and after the monetary crisis, since there is limited series of the panel data to perform the regression with GMM estimators, only pooled OLS is employed in the analysis.

4.4 Data

The dataset used for this chapter is from five waves of the Indonesian Family Life Survey (IFLS) for the years 1993, 1997, 2000, 2007, and 2014. The IFLS is a longitudinal survey which collects socioeconomic information from a sample of households in 13 provinces, representing 83% of the Indonesian population. The selection of the sample was random within provinces. It covers individuals, their households, and the communities in which they live. The information collected includes various data such as income, employment, health, and education. For this study, 6,578 samples are included in the analysis.

In order to be consistent with the source of data used in this study, the classification of formal and informal labour in this study is the same that is used by Statistics Indonesia. Table 4.1 shows the classification of formal and informal labourers based on salaried and self-employed groups.

Table 4.1: Classification of formal and informal labour

Status	Salaried/self-employed	Classification
Formal	Salaried	Government employees
		Private employees
	Self-employed	Self-employed with permanent workers
Informal	Salaried	Casual workers
	Self-employed	Self-employed with temporary workers
		Self-employed without workers

To determine formal and informal labour status of each observation in the analysis, this study uses the information on main job working status in the IFLS. For the first three waves, the classification of working status consists of six groups: self-employed with no workers, self-employed with temporary workers, self-employed with permanent workers, government employees, private employees, and unpaid family workers. Unpaid family workers are dropped from the sample since they do not receive earnings. In the last two waves of the survey (2007 and 2014), working status has eight categories: self-employed with no workers, self-employed with temporary workers, self-employed with permanent workers, government employees, private employees, unpaid family workers, casual agricultural workers, and casual

non-agricultural workers. The additional groups of casual workers in agriculture and non-agriculture are included in the informal labour category.

Table 4.2 shows the composition of formal and informal labour based on the sample used in the analysis. The percentage of informal to formal labour has been higher throughout the 4 waves, with year 2000 having the highest percentage of informal employment. The analysis only includes non-atrition respondents who were working in all waves.

If the samples in this analysis are compared with all the samples on the labour force in the IFLS survey (Table 4.3), the comparison shows that there is an increasing number of informal labour in the year of 2000, while the number of unemployed was lower compared to 1997 data. With the difference in the number of respondents in the labour force between 1997 and 2000 at 4,177, there is increasing formal labourers of 2,169 and increasing informal labourers of 2,588, while the number of unemployed decreased. This fact does not indicate the shifting status from formal or informal labourers to unemployed. Compared to national employment data (Table B.1 in Appendix B), although there was an increase in the unemployment rate in 2000, the percentage and absolute number of informal labourers indicates the shift from formal employment.

Table 4.2: Composition of formal and informal labourers 1993-2014

Type of labourer	Number of samples and share				
	1993	1997	2000	2007	2014
Formal labourer	650	679	544	558	554
	49.54%	51.46%	41.25%	42.40%	42.29%
Informal labourer	663	640	774	759	757
	50.46%	48.54%	58.75%	57.60%	57.71%

Earnings data for this study is taken from individual income data from the main job. Since this study uses an extended definition of the labour market that includes self-employed labour, the type of earnings are different for salaried labourers than for self-employed labourers. For salaried labourers, earnings are from a salary or wage, and for self-employed labourers, earnings are defined as yearly profit from their business. In order to make the two types of earnings comparable, annual profit

Table 4.3: Composition of labour force 1993-2014- IFLS samples

Type of labourer	1993	1997	2000	2007	2014
Formal labourer	3,816	5,675	7,844	7,711	10,477
% of total samples	38.61%	41.48%	43.92%	37.32%	42.09%
Informal labourer	5,945	6,901	9,489	12,455	14,007
% of total samples	60.15%	50.44%	53.13%	60.28%	56.27%
Unemployed	123	1,106	526	496	408
% of total samples	1.24%	8.08%	2.95%	2.40%	1.64%
Total	9,884	13,682	17,859	20,662	24,892

for self-employed labourer is converted to monthly earnings. The nominal value is adjusted to a real value with provincial Consumer Price Index (CPI) from Statistics Indonesia based on the year 2002. Then, the real earnings data is converted into natural logarithms for the regression analysis.

Table 4.4: Descriptive statistics

Variables	Mean	Standard deviation
Earnings (in 1,000 Rph)	1,084	11,500
Education	1.77	1.14
Age	44.06	11.19
Male	0.68	0.47
Household size	5.10	2.18
Urban	0.53	0.50
Married	0.91	0.29
Formal labour	0.48	0.50
Government employees	0.16	0.37
Private employees	0.30	0.46
Self-employed formal	0.02	0.13
Self-employed informal	0.48	0.50
Casual workers	0.04	0.20

The education level used in the analysis comes from information on the highest educational level achieved as reported in the survey. Education level is classified into five groups: no education, primary school level, junior high school level, senior high school level, and university level. The average education level of the sample is

junior high school (see Table 4.4). Another variable in the regression model is age as a proxy for work experience; the average age in the sample is 44 years.

Another controlled variable is household size with the average household size is five people. The dummy variable "male" shows that 68% of the sample are males. Another dummy variable, "urban," shows that about 53% of the respondents are living an urban area. Marital status, which is covered by the dummy variable "married," shows that 91% of the respondents are married.

4.5 Results

4.5.1 Segmented labour market

The results from pooled OLS earning regressions (Table 4.5) show a positive association between formal labour status and earnings. This earnings premium of formal labour status implies the segmented labour market between formal and informal labourers. The earnings premium of formal labourers after controlling individual characteristics is about 23% higher compared to informal labourers (Table 4.5 column (1)). According to the results from periods related to monetary crisis, higher earnings premium is found in the after crisis period where formal labourers have almost 26% higher earnings compared to informal labourers. In the period of crisis recovery (1997-2000), earnings gap between formal and informal labourers is the lowest compared to the period before and after the crisis.

Human capital variables in the regression show results in line with existing studies on the segmented labour market. One level higher in education increased earnings by 33% in the analysis using all waves of data; this is in line with studies by Lehmann and Pignatti (2007), Tansel et al. (2015), and Blunch (2015). The after crisis period shows a higher education impact on earnings of 35% compared to the before crisis period, where one level higher in education is associated with 29% higher earnings (Table 4.5).

Table 4.5: Earnings premium regressions, pooled OLS

Dep Var: Ln earnings	All waves	Before crisis	Recovery	After crisis
	1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)	(4)
Formal labour	0.231***	0.187***	0.167***	0.256***
	(0.027)	(0.042)	(0.037)	(0.034)
Education	0.331***	0.292***	0.329***	0.353***
	(0.011)	(0.019)	(0.016)	(0.014)
Age	0.049***	0.038**	0.043**	0.057***
	(0.008)	(0.016)	(0.015)	(0.013)
Age squared	-0.001***	-0.001**	-0.001**	-0.001***
	(0.000)	(0.002)	(0.002)	(0.001)
Observations	6,215	2,529	2,571	3,686
Adjusted R^2	0.290	0.241	0.283	0.310

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Age's coefficient shows that increasing age by one year is associated with 4.8% higher earnings, which is consistent with the studies of earnings mobility by Tansel et al. (2015), Blunch (2015), and Heinzt and Posel (2008). A higher association between age and earnings is found in the period after the monetary crisis, where increasing age one year is associated with 5.7% higher earnings.

The regression results for control variables for individual characteristics (Table B.2 in Appendix B) show that males have 38% higher earnings and the highest coefficient is found in the recovery period when males have 42% higher earnings than females. In the regression with the samples from all the waves of the survey, an increase in one household member is associated with 2.2% higher earnings. However, in the period after the monetary crisis, household size does not show significant association with earnings. In terms of urban or rural location, respondents who live in an urban area have 22.9% higher earnings compared to those who live in a rural area. In the period before the monetary crisis, the effect of an urban location is about 20% higher compared to the period after the monetary crisis. Marital status is positively associated with earnings only in the period after the monetary crisis when married respondents have 11.6% higher earnings than unmarried respondents.

In the more detailed earning regression results with different types of formal labour (Table B.3), formal self-employed labourers have the highest earnings premium among formal labour types. The earnings premium of self-employed labourer is as high as 84% compared to other types of labour. Another type of formal labourer, the government employee, is associated with a 55% earnings premium, and the premium is higher in the after crisis period. Private employees, on the other hand, has the lowest earning premium of 9%.

Although the results from the pooled OLS estimation indicate the existence of a segmented labour market with formal and informal labour, these results can be biased by individual unobserved heterogeneity. To address this issue, fixed effect estimation is applied (see Table B.4 in Appendix B). The regression results for all types of labour show same direction as the results from the pooled OLS estimation. However, the earnings premium of formal labour in fixed effect estimation is lower than that of the pooled OLS result. The difference between a 23% premium in the pooled OLS and a 13% premium in fixed effect estimation can be an indication of the unobserved individual heterogeneity in the regression.

For the control variables with the fixed effect estimation, education, age and urban behave in line with the results in pooled OLS while other control variables do not show significant association with earnings.

In terms of the results from fixed effect estimation of the earnings premium for formal and informal labour within the context of the crisis period, significant association between formal labour status and earnings is found only after the crisis period. This result indicates that a segmented labour market with formal and informal labour exists in the period after the monetary crisis. Detailed formal employment fixed effect estimation also shows the same direction as that of pooled OLS. The earnings premium of a formal self-employed respondent is much lower in fixed effect estimation than that in pooled OLS results (Table B.5). A lower earnings premium in fixed effect estimation is also found for government employees. For private employees, a significant association is found only in the period after the monetary crisis.

4.5.2 Earnings mobility

The results of the macro-mobility analysis show that the highest earnings mobility occurred during the period 1993-1997 or in the period before the monetary crisis (see Table 4.6, column (1)). To compare earnings mobility with national economic growth, the average economic growth was about 7% during this period, except in 1997 when the growth was only 4.7%.[3] The negative earnings mobility that occurred in the period from 1997 to 2000 indicates the effect of the 1998 monetary crisis and its aftermath. Although earnings mobility rates were positive in the periods after the monetary crisis (2000-2007 and 2007-2014), these rates are not as high as those seen during the pre-monetary crisis period.

Table 4.6: Earnings mobility and the decomposition 1993-2014

Type of employment	1993-1997	1997-2000	2000-2007	2007-2014
	(1)	(2)	(3)	(4)
All types of labourers	0.241	-0.020	0.159	0.175
Formal labourers	0.306	-0.089	0.245	0.357
Informal labourers	0.178	0.054	0.099	0.042

From the results regarding decomposition of earnings mobility based on types of labour, it was found that formal labourers have higher mobility than informal labourers in almost all periods, with the 1997-2000 period being the exception. During this recovery period, informal employment appeared to provide a buffer. This finding is in line with the literature on informal employment (e.g., Jutting and de Laiglesia, 2009; William and Lansky, 2012) where informal employment has a function of safety net.

The average of earnings mobility in the 1993-1997 period was higher than those in other periods. Even though formal labourers had higher earnings mobility in 2007-2014, earnings mobility in this period is still lower than that in the period of 1993-1997 when looking at yearly averages. When examining informal labourers' earnings mobility, the average earnings mobility in the period of 2007-2014 was much lower, even when compared with the crisis recovery period of 1997-2000.

[3]https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

In terms of each type of worker's contribution to total earnings mobility, formal labour contributed more than informal labour (see Table B.10 in Appendix B). Although informal labour had a positive earnings change during the recovery period of 1997-2000, the value of that change was still smaller in absolute value than the negative earnings movement of formal labour. Consequently, total earnings mobility is negative for that period.

Table 4.7 shows the results of individual earnings mobility or micro-mobility regression with five different specifications. Column (1) is the regression with pooled OLS estimation, while column (2) is the regression with fixed effect. Column (3) is the regression result using first difference GMM, column (4) is the forward orthogonal GMM, and the last column (5) is the model with a System GMM estimator.

Consistent with the literature on dynamic panel estimators, the results with the GMM estimators of the variable initial year's earnings show more efficient results compared to pooled OLS and fixed-effect estimators. Pooled OLS results for the initial earnings coefficient indicate an upward bias, while the fixed effect estimator implies a downward bias. The difference in the coefficient of earnings in the initial year between the pooled OLS estimator and the Dif-GMM estimator indicates that the upward bias is about 31%. With the fixed effect estimator, the difference in the coefficient of initial year earnings compared to that obtained using Dif-GMM indicates a downward bias of about 21%.

From the estimation results of earnings mobility at the individual level using dynamic panel data with 5 waves for all type of labourers, a weak conditional convergence is indicated. Based on the results using the Dif-GMM estimator, 1% higher earnings in the initial year is associated with 0.92% of the earnings change at the 1% significance level. This can be interpreted as for all types of labour samples, observations with lower earnings in the initial year had a greater earnings difference. If the results are compared with the results for the existing study on Indonesia, the results for OLS in line with the result in Fields et al. (2003b).

The serial correlation test (AR(2)) and Hansen J Test for GMM estimation show that the results are robust and the instruments are valid. This is proven by AR(2),

Table 4.7: Earnings mobility regressions for all type of labour

Dep Var: Ln earnings change Period 1993-2014	Pooled OLS	Fixed-effect	Dif-GMM	FOD-GMM	Sys-GMM
	(1)	(2)	(3)	(4)	(5)
Ln earnings t-1	-0.632***	-1.115***	-0.919***	-0.922***	-0.858***
	(0.024)	(0.022)	(0.027)	(0.027)	(0.029)
Education	0.251***	0.222***	0.196**	0.214***	0.326***
	(0.013)	(0.056)	(0.062)	(0.054)	(0.018)
Age	0.041***	0.092***	0.071***	0.083***	0.057***
	(0.001)	(0.019)	(0.02)	(0.018)	(0.009)
Age squared	-0.001***	-0.001***	-0.001****	-0.001***	-0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	0.277***				0.375***
	(0.029)				(0.038)
Household size	0.004	0.002	0.006	0.003	0.006
	(0.007)	(0.009)	(0.01)	(0.01)	(0.007)
Urban	0.114***	0.188**	0.209**	0.191***	0.178***
	(0.026)	(0.058)	(0.064)	(0.056)	(0.032)
Married	0.112**	0.118	0.149**	0.124*	0.137**
	(0.048)	(0.074)	(0.076)	(0.072)	(0.055)
Year fixed-effect	Yes	Yes	Yes	Yes	Yes
Observations	5,280	5,280	3,960	3,960	5,280
Adjusted R^2	0.325	0.574			
AR(2) p value			0.867	0.881	0.430
Hansen J p value			0.790	0.815	0.123

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

i.e., the Arellano and Bond second-order serial correlation, failing to reject the null hypothesis of serial correlation of the residuals. The validity of the selected instrument is also proven by the Hansen J test, and, across different specifications, the coefficients of the initial year income are stable.

With regard to the control variable results using Dif-GMM estimation, a one level increase in education is associated with 19.56% higher earnings. In terms of age, a one-year age gain is associated with 7% higher earnings. While household size does not show significant association with earnings change, being male is associated with

Table 4.8: Earnings mobility regressions, pooled OLS: before and after monetary crisis

Dep Var: Ln earnings change	Before crisis	Recovery	After crisis
	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)
Ln earnings t-1	-0.744***	-0.66***	-0.561***
	(0.038)	(0.03)	(0.02)
Education	0.26***	0.242***	0.228***
	(0.023)	(0.016)	(0.013)
Age	0.039***	0.029**	0.042***
	(0.02)	(0.014)	(0.013)
Age squared	-0.001**	-0.0004**	-0.001***
	(0.0002)	(0.0002)	(0.0001)
Male	0.38***	0.313***	0.226***
	(0.052)	(0.037)	(0.03)
Household size	0.003	0.004	0.008
	(0.014)	(0.01)	(0.007)
Urban	0.179***	0.145***	0.092**
	(0.047)	(0.033)	(0.029)
Married	0.141	0.077	0.077
	(0.101)	(0.07)	(0.051)
Constant	7.963***	7.219***	5.644***
	(0.51)	(0.406)	(0.367)
Year fixed-effect	Yes	Yes	Yes
Observations	1,312	2,629	3,940
Adjusted R^2	0.496	0.395	0.254

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

37.5% higher earnings than being female (based on the result using the Sys-GMM estimator). Labour located in urban areas is associated with 20.9% higher earnings than that located in rural areas, and married respondents are associated with 14.9% higher earnings.

Because of the short series available in the before and after crisis periods, only the pooled OLS analysis for earnings convergence is provided. The waves were split into before and after the monetary crisis, and, from the three different periods in Table

4.8, the highest earnings convergence is found in the period before the monetary crisis, In this period, a 1% increase in earnings in the initial year decreases the earnings change 0.74% and, after the monetary crisis, 1% higher initial earnings decreases the earnings change 0.56%.

Since the after crisis period encompassed 14 years, when the earnings convergence magnitude is divided over 14 years, the result will be lower compared to the earnings convergence in the period before the monetary crisis. On average, the earnings convergence in the after crisis period is only 0.04%. In the period before the crisis, it is 0.24%.

Table B.6 in the appendix contains the results for the earnings mobility model for formal labour with 5 different estimators. In line with the results for of all sample in Table 4.7, the results from the three GMM estimators are also more efficient for the initial earnings coefficient compared to those from the pooled OLS and fixed-effect estimators. In the regression results for formal labour samples, there is a negative association between earnings in the initial period with change in earnings, which indicates a weak conditional convergence of earnings. Based on Dif-GMM estimation, 1% higher earnings in the initial period decreases the earnings change 0.99%.

The serial correlation test (AR(2)) and Hansen J Test for the GMM estimation results for the formal labour sample show that the results are robust and the instruments are valid.

The results for the control variable education, according to Dif-GMM, indicate that a one level increase in education for formal labour is associated with a 15.4% higher earnings change. In terms of age, the FOD-GMM result indicates that a one year increase in age is associated with a 13.4% increase in earnings change. According to the Sys-GMM result, being male results in a 26.1% earnings change higher over being female. While being married is not associated with earnings change based on GMM estimators, using the pooled OLS estimator associates it with a 12.3% higher earnings change. Household size in formal labour does not show significant association with earnings change using any type of estimator. As to urban location, formal

labourers located in urban areas have a 16.8% higher earnings change compared to formal labourers located in rural areas.

In regression results of the formal labour samples, once again, the earnings convergence before the monetary crisis is higher than after (Table B.7 in the appendix). In the period before the monetary crisis, a 1% increase in initial earnings is associated with a 0.67% lower earnings change. After the crisis period, a 1% increase in initial earnings is associated with a 0.51% lower earnings change.

The results for the control variables in the formal labour sample within the context of the crisis period, show that education has a higher association with the earnings change in the period after than before the monetary crisis. As for the gender control variable, male formal labour has a higher association with the earnings change in the period before the monetary crisis compared to female formal labour. Formal labourers located in urban areas have a higher association with earnings change compared to those in rural areas in the period before the monetary crisis.

Table B.8 in the appendix shows that the earnings mobility for informal labour indicates weak conditional income convergence. The results from the GMM estimators also show more efficient results compared to pooled OLS and fixed-effect estimators. The result based on Dif-GMM estimators shows that a 1% increase in earnings in the initial period is associated with a 0.87% lower earnings change.

With regard to the control variables in the regression model for informal labour and according to the results from Dif-GMM estimation, increasing education one level is associated with a 26.88% increase in earnings change. While age does not have significant association using the Dif-GMM estimator, the FOD-GMM estimator shows that a one year increase in age is associated with a 6.6% earnings change. Males who work as informal labourers, according to the Sys-GMM results, have a 46.5% higher earnings change compared to females. Marital status does not show significant association with earnings change. In terms of location, according to the Dif-GMM results, informal labourers located in an urban area have 18.9% higher income than informal labourers in rural areas.

In the context of the monetary crisis period in informal labourers samples, there is a similar pattern of earnings convergence as in all samples regression, i.e., the earnings convergence after is lower than before the monetary crisis period. In the period before the monetary crisis, a 1% increase in initial earnings is associated with a decrease in earnings change of 0.79%. In the after crisis period, the respondent with 1% higher initial earnings would experience a 0.62% lower earnings change.

For the control variables in the regression results for informal labour within the context of the crisis period, in contrast with the formal labour result, education shows a lower association with earnings change in the period after compared to before the monetary crisis. In terms of gender and urban location, the results are similar to those for formal labour.

Since the after crisis period encompassed 14 years, when the earnings convergence magnitude is divided over 14 years, the result will be much lower compared to the earnings convergence in the period before the monetary crisis. On average, the earnings convergence in the after crisis period is only 0.04%. In the period before the crisis, it is 0.24%.

Comparing the results with different estimators, estimations from Dif-GMM, FOD GMM and Sys-GMM have more efficient results for informal labour, while the pooled OLS estimator shows upward bias, and the fixed effect estimator shows downward bias for initial earnings. A specification test for GMM estimators does not indicate autocorrelation problems for formal and informal labour results, except in the case of Sys-GMM for formal labour. The instrument validity test results do not indicate instrument validity problems in Dif-GMM, FOD GMM and Sys-GMM estimators for all sample results and both formal and informal labour samples.

If the regression results of formal and informal labour samples are compared for all waves, formal labour has higher earnings convergence than informal labour. In regard to the control variables, education has a higher association with earnings change for formal compare to informal labour. On the other hand, male and urban location have a higher association with earnings change for informal labour.

4.6 Conclusions

This chapter contributes to the literature on segmented labour market between formal and informal labour by including the context of a monetary crisis period in the empirical analysis of data from a developing country with persistently high informal employment. Moreover, this chapter provides the analysis of earnings mobility in terms of both macro-mobility and micro-mobility, while focusing on both formal and informal labour. This is rarely highlighted in previous studies of earnings mobility. Another contribution made by this chapter is that it employs GMM estimators in the analysis of earnings mobility, which moves beyond previous studies' use of mostly pooled OLS and fixed-effect estimators.

The results from the segmented labour market analysis show that there is an earnings premium for formal labour over informal labour as an indication of a segmented labour market. The earnings premium between formal and informal labourers is found to be higher in the period after compared to before the monetary crisis. The results show the persistent disadvantage faced by informal labourers in Indonesia in the periods covered by the analysis, and reforms after the monetary crisis did not improve conditions for informal labour.

In the analysis of earnings mobility, the macro-mobility measurement with group decomposition implies that informal labourers have a survival mechanism in the time of crisis which could maintain positive earnings mobility (Cunningham and Maloney, 2000; Jutting and De Laiglesia, 2009; Booth, 1999). This is also in line with the countercyclical nature of the informal sector (Eglin, 2012), in which the sector grows during a crisis or recession period.

In micro-mobility analysis, the results for all types of labour show weak conditional convergence of earnings. Conditional convergence of earnings is found to be lower in the after crisis period compared to the before crisis period. For within worker group analysis, a higher conditional convergence of earnings is found in the formal labour group.

In terms of the different estimators used in the individual earnings mobility regres-

sions, Dif-GMM, FOD GMM and Sys-GMM estimators show more efficient results for the coefficient of the initial year's income for all types of employment samples, formal labour, and informal labour than OLS and fixed-effect results. This is in line with the literature on dynamic panel data analysis using GMM estimators.

Although informal labour indicates a safety net and counter-cyclical nature in a period of crisis, in the long run it indicates lower labour productivity, a weak justice system, and rigid business regulation (Loayza and Rigolini, 2011). This analysis proves that informal labourers have disadvantages compared to formal labourers. To expand formal employment, simplifying regulations for formalising a business entity, particularly for small and medium enterprises, should be considered. A simplified registration procedure and lower tax rate for the self-employed with a certain threshold are alternative mechanisms to support formal employment expansion.

One of the limitations of the study is the different time periods between waves of the survey. A future study which can accommodate this issue will be beneficial in terms of comparing the consistency of the results in this chapter.

Chapter 5

The tunnel effect in a developing country

5.1 Introduction

The impact of comparison income on individual's utility has been discussed in the economic literature for decades.[1] This discussion is based on the hypothesis that individuals are not only concerned about their own income but about other people's incomes as well. Tunnel effect (Hirschman and Rostchild, 1973) is one of the effects of comparison income which has been discussed in the existing literature.

This chapter aims to analyse the tunnel effect in a developing country. It will do so through an estimation of the impact of reference groups' income, where the reference groups are classified based on education level and location. Moreover, this chapter also estimates how income inequality and social capital affect the tunnel effect.

This study is different from previous studies, firstly, because it analyses the impact of reference groups' income on expected future economic level, whereas existing studies largely use the current status of life satisfaction and happiness to analyse reference groups' income, and, secondly, because this chapter analyses the tunnel effect of religious groups in a highly religious society and, as noted above, it considers income inequality and social capital as well.

This chapter uses Indonesian data for an empirical case study. Indonesia is a developing country with a trend of increasing inequality. Hence, the analysis of the data will provide an explanation as to how income inequality affects expected future economic level. Also, the majority of Indonesia's population is religious. A Pew Research Center's survey (2008) found that 99% of Indonesians consider religion to be at least somewhat important in their life (95% ranked it as somewhat important, 4% as very important). Similar results were obtained in a 2009 Gallup survey (Crabtree, 2010).[2] This unique feature of the Indonesian population is the basis for including the analysis per religious group to understand the difference of religious groups in terms of the tunnel effect.

[1] Comparison income's effect on individual's utility has been discussed since Duesenberry (1949) introduced the concept of the effect of other people's consumption on individual's utility.

[2] The Gallup survey used the question, "Is religion an important part of your daily life?" and 99 per cent of the respondents answered 'yes.'

The methodology of this chapter utilises an ordered probit model used to estimate the impact of reference groups‘ incomes on expected future economic level. The model is applied to different types of reference groups based on locations. In addition to that, control variables of income inequality and social capital related variables were applied to the model. The regression is also applied to urban and rural areas to understand the differences in tunnel effect between the two areas. It is also applied to income quintiles to understand if the possibility of the limited choices for the poor in terms of which areas they can choose to live in would influence the tunnel effect. To understand the differences of tunnel effect in each religious group, the regression was also applied to the Muslim, Christian, and Hindu religious groups. The data come from the 2007 and 2014 Indonesian Family Life Surveys (IFLSs).

This chapter consists of six sections. The following section, Section 5.2, discusses the literature review for the tunnel effect, including the literature on the determinants of subjective well-being, the relationship between religiosity and subjective well-being, the relationship between inequality and subjective well-being, and the relationship between social capital and subjective well-being. Section 5.3 explains the methodology used in terms of the conceptual framework and empirical strategy. Section 5.4 describes the data used in the analysis. A discussion of the empirical results is found in Section 5.5. Section 5.6, which is the final section, offers the conclusions.

5.2 Related literature

The tunnel effect (Hirschman and Rostchild, 1973) takes place when other people's increases in income positively affect an individual's utility at the initial stage. However, if, after a period of time, the reference group's income increases without a corresponding improvement in the lives of the disadvantaged people in the reference group's society, this causes negative effects on utility, such as envy and feeling left behind.

In previous empirical studies of the effect of reference group's income on individ-

uals' utility, subjective well-being variables such as life satisfaction and happiness, have been used as proxies for utility. Empirical studies using data from developed countries have mostly found an envy effect or a negative association between the reference group's income and job satisfaction (Clark and Oswald, 1996) and the reference group's income and individual well-being (Berggren, 2004; Lutmerr, 2005). Another study found that individuals with a higher income level than the reference group's income are happier than the reference group (Ferrer-i-Carbonnel, 2005).

A study which discusses the tunnel effect within the context of the pre- and post-reform periods of a society is that done by Welsch and Kuhling (2015). They analyse the tunnel effect by using German data from 1991-2009, by considering pre- and post-reform periods, and by considering both the East and West. The results from the period before the reform show that East Germany had a signalling (tunnel) effect, while West Germany had an envy effect. In the period after the reform, no significant envy or signalling effects were found in the results.

One of the studies on the impact of the reference group's income on subjective well-being which used Russian data is the study of Ravallion and Lhoksin (2000). In this study, the tunnel effect was investigated by measuring the support of respondents for income redistribution by the government. Ravallion and Lhoksin (2002) found that a larger proportion of the poor than the rich supported the redistribution. They then argued that this finding implies the existence of the tunnel effect in Russia.

This chapter uses the concept of comparison income, which is defined as the reference group's income (Clark et al., 2008). Using reference group's income as the comparison is justified since ".....comparisons are most salient if individuals perceive the reference person or group as in some way similar to themselves" (Kahneman and Varey, 1991, p.140). Various types of reference group have been defined in existing studies. Reference groups based on location (Persky and Tam, 1990; Ravallion and Lhoksin, 2002; Luttmer, 2005; Graham and Felton, 2006), being closely related (Clark and Oswald, 1996; Senik, 2009), and age group (McBride, 2001) have been used. Some studies used more than one dimensions to determine reference group. Van de Stadt et al. (1985) used education level, age, and employment status as the

criteria for defining the reference group, while Ferrer-i -Carbonell (2005) defined the reference group as people with similar education level, inside the same age bracket, and living in the same region.

Expected future economic level used in this chapter consists of information on how individuals perceive their future economic level by placing themselves on an economic ladder. This information is relevant in the discussion of the impact of comparison income, as future economic level is highly associated with income (Ravallion and Lhoksin, 2001). Although future economic level has not been used as a variable in prior studies, the concept can be related to the Cantrill ladder of subjective economic welfare. The minimum income necessary for basic needs was first investigated by Kapteyn et al. (1988). Life satisfaction and happiness have become popular choices for the analysis of subjective data for welfare measurement. Using subjective well-being variables like these may be problematic due to adaptive expectation, when the poor may have adjusted to difficult conditions and, thus, report high subjective well-being (Graham, 2016). There is also concern over interpersonal comparisons when using a subjective well-being as a variable, although, according to Ferrer-i-Carbonnel (2004), in a society which uses similar language, there exists similar understandings of subjective well-being.

If the information from the subjective economic ladder is compared with real income information, the two may provide different data. Ravallion and Lhoksin (1999) identified the reasons for these differences, including some which are relevant to this chapter. First, households have different perceptions of real income and subjective economic welfare due to household characteristics. Second, the question that determines one's standing on the subjective economic ladder is specific for individual while aggregate household income does not capture differences in individuals' perceptions. Therefore, it is important to include control variables with individual characteristics in the analysis.

There are currently no studies on the determinants of expected future economic level found so far. The existing studies on subjective economic levels discuss the determinants of current status of self-rated welfare or the subjective economic status.

Subjective economic status has been discussed in the context of its relationships with income and expenditure (Ravallion and Lokhsin, 2002). Their Russian data indicated that household income and expenditure are significantly associated with subjective economic status. Furthermore, a study using Indonesian data was done by Powdthavee (2007). He focused on the determinants of the subjective economic ladder and found that socioeconomic characteristics have a significant association with the subjective economic ladder while expenditure and income have weaker associations with the subjective economic ladder.

Another concept which is related to the discussion of the tunnel effect is religiosity. Religiosity affects interpersonal trust and social cohesion (Norenzayan and Shariff, 2008), altruistic behaviour and empathy (Saroglou et al., 2005), and pro-social activities (Lewis, 2008). Although there is no study on the relationship between religiosity and expected future economic level, there are studies on religiosity's relationship with subjective well-being variables, such as life satisfaction and happiness. Religiosity has been found to have a significant association with happiness (Ellison, 1991; Clark and Lelkes, 2009; Francis et al., 2011; Van Praag et al., 2011) and life satisfaction (Lazar and Bjork, 2008; Abdel-Khalek, 2014). As religiosity's prominence is high in Indonesia, an analysis of every religious group is included in this chapter.

This chapter also includes inequality level in the analysis because inequality level could affect people's perception of the economic status. A negative association between the Gini coefficient and life satisfaction or happiness has been found in previous studies (Diener et al., 1995; Alesina et al., 2004; Fahey and Smyth, 2004; Schwarze and Harpfer, 2007; Berg and Veenhoven, 2010; Delhey and Dragolov, 2014; Verme, 2011). Conversely, some studies found a positive association between the two variables. These include studies by Clark (2003) using British data, Haller and Hadler (2006) using World Value Survey data, as well as studies by Helliwell and Huang (2008) and Rozer and Kraaykamp (2013).

The other control variables to be included in the model are related to social capital[3].

[3]Although there is no specific definition of social capital, Putnam (2000, p.19) said that "social capital refers to connections among individuals— social networks and the norms of reciprocity

In this analysis, trust, reciprocity, and social network are included in the model as variables measuring social capital. Willingness to help will represent reciprocity, asking a neighbour for help will represent trust, and social network will be represented by participation in volunteer work, participation in community meetings, and participation in improving the neighbourhood. The relationship between social capital and subjective well-being has been analysed in previous studies. Most of the studies found a positive association between social capital and subjective well-being. Helliwell and Putnam (2004) used US data and defined several social capital variables: relationship with neighbour, family and friend, and trust, in general. They found that these social capital variables were positively associated with happiness. Winkelmann (2009) used attending cultural events, sporting events, visiting friends or relatives, and engaging volunteer activities as social capital variables when analysing German data. This study also found that the social capital variables had a positive association with happiness. Hooghe and Van Houtte (2010) defined family visits, attending exhibitions or cultural events, inviting friends, organization memberships, and generalized trust as social capital variables for Belgian data. They found that the social capital variables (excluding organization memberships) had a positive association with life satisfaction. Using data from Luxembourg, Klein (2013) assigned five variables to represent social capital: trust in institutions, solidarity, political participation, social and cultural participation, and social relations. He found that his social capital variables were positively related to subjective well-being. In studies on social capital and subjective well-being in Asian countries, Han (2014), used Korean data and found that social capital values (helpfulness, organization memberships, and voluntary activities) were positively associated with happiness. Yip et al. (2007), used rural Chinese data and found that trust is positively associated with happiness while party membership and voluntary activity are not significantly associated with happiness.

A concept which shares some of its features with social capital is altruism. Because

and trustworthiness that arise from them." Another definition of social capital which puts more emphasis on internal linking is provided by Coleman (1990, p. 302), stating that "Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure."

its intention is to increase other individuals' welfare, altruism should be distinguished from helping behaviour and self-sacrifice (Batson, 1991). The source of altruistic behaviour is commonly empathy (Batson, 1991). However, empathic feelings most likely occur in individuals who are very close to the intended recipient and who have an emotional attachment to and share a similar perspective as the recipient. Altruism is also a source of motivation for community involvement (Batson et al., 2002), and, when it is extended to the group to which the targeted individual belongs, altruism is merely an instrumental means and an unintended consequence of community involvement. The reference groups in this analysis vary from the local community to the provincial level, and, because altruism is found mostly at the community level, a tunnel effect in the wider geographical area will indicate whether it exists beyond the context of altruism.

5.3 Methodology

5.3.1 Conceptual framework

The conceptual framework of this chapter is based on the tunnel effect hypothesis of Hirschman and Rostchild (1973). According to this hypothesis, an individual's utility depends on the individual's own income, other people's income, and the individual's expectation of future income. To illustrate, let A and B represent two individuals in a society. According to this hypothesis, the utility of individual A would depend on A's own income, B's income and A's expectation of future income. In this case, B's income is the reference income for A. Then:

$$U_A = f(Y_A, Y_{B,} E_A) \tag{5.1}$$

where U_A is utility level of individual A, Y_A is income of individual A, Y_B is income of individual B and E_A is the expectation of future income of individual A.

According to this hypothesis, marginal utility of individual A in regard to B's income

consists of envy effect and tunnel effect. Now:

$$\frac{\delta U}{\delta Y_B} = \alpha + \frac{\delta E_A}{\delta Y_B} \tag{5.2}$$

$$\frac{\delta U}{\delta Y_B} > 0 \text{ if } \frac{\delta E_A}{\delta Y_B} > -\alpha \tag{5.3}$$

$$\frac{\delta U}{\delta Y_B} < 0 \text{ if } \frac{\delta E_A}{\delta Y_B} < -\alpha \tag{5.4}$$

where α is the impact of individual B's income on individual A's utility and $\frac{\delta E_A}{\delta Y_B}$ is the impact of individual B's income on expectation of future income of individual A.

Because A's expectation for future income is undefined, the utility level of A covers both effects. Following the hypothesis of Hirschman and Rostchild (1973), the analysis on the tunnel effect is divided into two periods. In the first period, if the tunnel effect is more dominant, the impact of B's income on A's income will be positive (Equation 5.3). In the second period, if there is indication of the tunnel effect, the impact of B's income on A's will be negative.

The baseline concept of the comparison income effect on utility can then be adapted to the comparison income definition given by Clark, et al. (2008). According to this definition, the utility of individual i is a function of i's income and comparison income, where comparison income is defined as the reference group's income. When this concept is adapted to the tunnel effect hypothesis, the effects can be divided into two different periods. If the tunnel effect exists, the reference group's income ($\bar{Y}_g^1$) would have a positive association with i's utility during the initial period (Period 1). During Period 2, a higher income for the reference group ($\bar{Y}_g^2$) could affect i's utility negatively. This concept is then used with utility as the proxy for expected future economic level in the initial period and for change in expected future economic level in the second period to give:

In Period 1:

$$FEL_i^1 = f(Y_i^1, \bar{Y}_g^1) \tag{5.5}$$

In Period 2:

$$FEL_i^2 - FEL_i^1 = f(Y_i^2, \bar{Y}_g^2) \tag{5.6}$$

where FEL_i^1 and FEL_i^2 are expected future economic level of individual i in Period 1 and 2 respectively. Y_i^1 is income of individual i in Period 1 and Y_i^2 is income of individual i in Period 2. $\bar{Y}_g^1$ and $\bar{Y}_g^2$ are the average income of reference group g in Period 1 and 2 respectively. Following the tunnel effect's hypothesis, increasing the reference group's average income in the initial period would increase FEL_i^1. In the second period, increases in $\bar{Y}_g^2$ would negatively affect the change of expected future economic level ($FEL_i^2 - FEL_i^1$).

This chapter also considers income inequality, which can have a positive or negative association with expected future economic level. Including this variable into the model will show how inequality affects the tunnel effect. Social capital variables are also included as control variables in the model to gain an understanding as to whether the tunnel effect is affected by social capital variables.

5.3.2 Empirical strategy

The econometric models

Following the hypothesis of tunnel effect, the econometric model used to estimate the association of the reference group's income with expected future economic level consists of two periods. In Period 1, the expected future economic level is regressed on reference group's income, current income, and other control variables in an ordered probit model. Expected future economic level has six possible responses from

the poorest to the richest level. To understand the probability of a response in terms of marginal effect, a level is chosen from the range of levels. In Period 2, the difference of expected future economic level between Period 2 and Period 1 is regressed on the reference group's income, current income, and other control variables in Period 2. This second model is used to understand the change in expectation with regards to other people's income. Then:

In Period 1:

$$FEL_i^{1*} = \alpha \bar{Y}_{ig}^1 + \beta_1 Y_i^1 + \beta_2 X_i^1 + e_i^1 \tag{5.7}$$

In Period 2:

$$FEL_i^{2*} - FEL_i^{1*} = \alpha \bar{Y}_{ig}^2 + \beta_1 Y_i^2 + \beta_2 X_i^2 + e_i^2 \tag{5.8}$$

where FEL_i^{1*} is the latent variable of expected future economic level of individual i in Period 1, with six possible values ranging from level 1 to level 6. $FEL_i^{2*} - FEL_i^{1*}$ is the difference between expected future economic level of individual i in Period 2 and Period 1. $\bar{Y}_{ig}^1$ and $\bar{Y}_{ig}^2$ are the reference group's mean income in Period 1 and Period 2, respectively. Y_i^1 is income per capita of individual i in Period 1, Y_i^2 is income per capita of individual i in Period 2 and X_i^1 is a set of control variables consisting of age, gender, marital status, household size, and working status. Finally, e_i^1 is a random-error term.

According to the tunnel effect hypothesis, a tunnel effect exists if there is a positive coefficient for the reference group's income ($\bar{Y}_{ig}^1$) in Period 1 and a negative coefficient for this value in Period 2 ($\bar{Y}_{ig}^2$). This is because, in the initial period, people are still tolerant of higher levels of incomes relative to their own, as they expect to catch up. If, however, the situation does not improve by Period 2, a higher reference group income would decrease their expectation for future income.

The models are applied to several reference group levels based on education and

geographical location (at the province, district, sub-district and community levels). Because the reference group is also defined by education level, to avoid endogeneity, the model does not use education level as a control variable.

Since there is no existing study that uses expected future economic level in its analysis, the model adopts covariates from studies of the determinants of self-rated welfare, subjective economic ladder, and subjective well-being. Income of individual i in Period 1(Y_i^1) is expected to have a positive association with expected future economic level, as individuals with higher incomes will envision a higher expected future economic level. The impact of age on subjective well-being is also of great relevance according to existing studies. The association of gender with subjective well-being, based on the findings of previous studies, could be positive or negative. Finally, while there is variation across studies, marital status was generally found to have a positive impact on subjective well-being.

To understand how inequality and social capital influence the tunnel effect, inequality and social capital variables are added to the baseline models in Equation 5.7.

In Period 1:

$$FEL_i^{*1} = \alpha \bar{Y}_{ig}^1 + \beta_1 Y_i^1 + \beta_2 X_i^1 + \beta_3 Gini_{ig}^1 + \beta_4 SC_i^1 + e_i^1 \tag{5.9}$$

In Period 2:

$$FEL_i^{*2} - FEL_i^{*1} = \alpha \bar{Y}_{ig}^2 + \beta_1 Y_i^2 + \beta_2 X_i^2 + \beta_3 Gini_{ig}^2 + \beta_4 SC_i^2 + e_i^2 \tag{5.10}$$

where $Gini_{ig}^1$ and $Gini_{ig}^2$ are the Gini coefficient of the reference group g in Period 1 and Period 2 respectively, SC_i^1 is the social capital related variables of individual i in Period 1 , $SC_i^2$is the social capital related variables of individual i in Period 2 and e_i^1 and e_i^2 are random-error terms.

To analyse the tunnel effect for each religious group, the econometric models are

applied to the three largest religions in Indonesia; Muslim, Christian, and Hindu groups.

The model is also applied to urban and rural sample groups. Urbanisation can be an important factor in developing countries, as it can eliminate the community-based risk-sharing and collective action that are more common in rural areas than in urban areas (Ravallion and Lhoksin, 2010).

Another concern that should be addressed in the analysis is the limited freedom of the poor to choose their location (Ravallion and Lhoksin, 2010). Because this model assumes that reference group's income is exogenous, it is possible that poor people cannot choose the place in which they live. However, in a risk-sharing arrangement, it is also possible that poor people have frequent interactions with and trust the people in their neighbourhood. Therefore, to see if the tunnel effect has a different association for the poor and other income groups, the model is also applied to each income quintile.

To check for robustness, the model also considers the reference group's assets and individuals' assets per capita as independent variables. This leads to :

In Period 1:

$$FEL_i^{*1} = \alpha \bar{A}_{ig}^1 + \beta_1 A_i^1 + \beta_2 X_i^1 + \beta_3 Gini_{ig}^1 + \beta_4 SC_i^1 + e_i^1 \tag{5.11}$$

In Period 2:

$$FEL_i^{*2} - FEL_i^{*1} = \alpha \bar{A}_{ig}^2 + \beta_1 A_i^2 + \beta_2 X_i^2 + \beta_3 Gini_{ig}^2 + \beta_5 SC_i^2 + e_i^2 \tag{5.12}$$

where $\bar{A}_{ig}$ is reference group's assets and A_i is assets per capita of individual i.

Another robustness check is done by replacing the dependent variable with 'keeping living standard' in the future in Period 1 and 'change in keeping living standard in the future' for Period 2.This yields:

In Period 1:

$$KLS_i^{*1} = \alpha \bar{Y}_{ig}^1 + \beta_1 Y_i^1 + \beta_2 X_i^1 + \beta_3 Gini_{ig}^1 + \beta_5 SC_i^1 + e_i^1 \tag{5.13}$$

In Period 2:

$$KLS_i^{*2} - KLS_i^{*1} = \alpha \bar{Y}_{ig}^2 + \beta_1 Y_i^2 + \beta_2 X_i^2 + \beta_3 Gini_{ig}^2 + \beta_5 SC_i^2 + e_i^2 \tag{5.14}$$

where KLS_i^* is the latent variable 'keeping living standard in the future' for individual i with four possible values of 'very unlikely,' 'unlikely,' 'likely,' and 'very likely.'

Variables in the model

The main variable in the model, expected future economic level, is part of the subjective well-being measures in the survey data used in this analysis. The IFLSs for the years 2007 and 2014 have a section on subjective well-being in addition to the socioeconomic section. The questions on subjective well-being were answered by respondents aged 15 years or older.

Expected future economic level information is based on the following question in the survey:

"*Please imagine a six-step ladder where on the bottom (the first step), stand the poorest people, and on the highest step (the sixth step), stand the richest people.*

On which step do you expect to find yourself five years from now?

Poorest *Richest*

1 *2* *3* *4* *5* *6"*

The next main variable in the model is the reference group's income. This is defined as the mean income per capita of the reference group. The geographical location in the survey data consists of the province, district, sub-district and community levels.

The data for income in this model is based on household's income per capita from the main job. Additional or extra income is not included in the definition of income in this analysis because it is, by nature, temporary. Income is one of the variables included in studies on self-rated welfare (Ravallion and Lhoksin, 2002) and the subjective economic ladder (Powdthavee, 2007). It has also been explored in empirical studies on the determinants of subjective well-being (Winkelmann and Winkelmann, 1998; Gerdtham and Johannesson, 2001; Frey and Stutzer, 2002; Ferrer-i-Carbonell, 2005; Shields and Wheatley Price, 2005; Gardner and Oswald, 2007).

As mentioned previously, several socioeconomic control variables are included in the model. These consist of age, gender, marital status, household size, and working status following the existing studies on determinants of subjective well-being (Oswald, 1997; Winkelmann and Winkelmann, 1998; Clark, 2003; Frey and Stutzer, 2002; Graham, 2005; Shields and Wheatley Price, 2005; Winkelmann, 2005) and self-rated welfare (Ravallion and Lhoksin, 2002).

To analyse the impact of inequality on the tunnel effect, the Gini coefficient is included in the second part of the analysis. The Gini coefficient is calculated from the income per capita at the provincial level.

In this study, there are five variables which are used to represent social capital from three categories to represent reciprocity, trust, and social network. The five variables are willingness to help, willingness to ask a neighbour for help, participation on community meetings, participation on voluntary labour, and participation in neighbourhood improvement.

Reciprocity is represented by willingness to help, which comes from the following question in the survey:

"*I am willing to help people in this village if they need it. 1.Strongly agree. 2. Agree. 3. Disagree and 4. Strongly disagree.*"

Trust is contained in the following question:

"*I would be willing to ask my neighbours to look after my house if I leave for a few*

days? 1.Strongly agree. 2. Agree. 3. Disagree and 4. Strongly disagree."

The third, fourth and fifth variables represent participatory actions. The third variable is related to participation in community meetings,i.e., community meetings in the neighbourhood, village, or sub district.

"*During the last 12 months did you participate in community meeting? 1. Yes. 2 No."*

Then fourth variable involves participation in voluntary labour, i.e., cleaning up the village.

"*During the last 12 months did you participate in voluntary labor? 1. Yes. 2. No."*

The last variable involves participation neighbourhood improvement, i.e., street or public facility improvement.

"*During the last 12 months did you participate in the program to improve the Village/Neighborhood? 1. Yes. 2. No."*

There are several types of robustness checks included in the analysis. The first type of robustness check is to regress the expected future economic level on reference group's assets per capita. Since people may not aware of the amount of other people's income, assets can represent income, in particular tangible assets that are noticeable by other people. These assets consist of house(s), land, jewellery, furniture and vehicle(s) owned by a household, and total assets are divided by the number of household members to arrive at assets per capita.

The second type of robustness check is to replace the dependent variable with the variable "keeping the standard of living in the future." The data for this variable comes from the following question in the survey:

"*Knowing how prices changed in the recent year, do you think you can keep the standard of living you have today in the next 5 years?" 1. Very unlikely 2. Unlikely. 3.Likely. and 4. Very likely.*

Although the question implicitly considers the effect of inflation, "keeping the stan-

dard of living in the future" could also represent the expectation of economic level in the future.

5.4 Data

As mentioned previously, the data used in this chapter is from the IFLSs for the years 2007 and 2014. The IFLS is a longitudinal survey that collects socioeconomic and health information from a sample of households in 13 provinces, which represent 83% of the Indonesian population. The selection of the sample from each province was random. It covers individuals, their households, and the communities in which they live. The first wave (IFLS1) was administered in 1993 and the 2014 IFLS represents the fifth wave (IFLS5). The 2014 IFLS interviewed 13,535 households and 44,103 individuals.

The main variable in the analysis, expected future economic level, is obtained from the subjective well-being section of the IFLSs. In 2007, most of the respondents placed themselves in level 4 of expected future economic level. Only about 2% of the respondents rated themselves in the lowest level, and 2.38% rated themselves at the highest expected future economic level (Table 5.1). For the change in expected future economic level between 2007 and 2014, the cumulative percentage for respondents who increased their future economic level is higher than that for the respondents who responded a negative change in expected future economic level (Table 5.2).

Table 5.1: Expected future economic level in percentage of observations

Expected future economic level	Percentage of observations
1st	2.05%
2nd	10.38%
3rd	33.29%
4th	40.14%
5th	11.78%
6th	2.38%

Table 5.2: Change in expected future economic level in percentage of observations

Change in expected future economic level	Percentage of observations
<-2	1.42%
-2	5.35%
-1	15.1%
0	29.73%
1	27.02%
2	14.82%
>2	5.75%

The key regression variable in this analysis is the reference group's income, where, again, the reference group is defined as individuals with the same education level and geographical location as the respondent. This study uses the 2007 IFLS's classification of geographical location, which consists of community, sub-district, district, and province levels. Data for geographical location is taken from the identifier of the province, district, sub-district, and community. To determine the number of observations in each reference group for each geographical level, observations are categorized into five groups for education level: no education, primary school level, junior high school level, senior high school level, and university level. Based on

this classification, for each type of reference group, mean income is calculated from income per capita of the reference group's members.

Table 5.3 shows the mean and standard deviation of the observations for each geographical location of the reference group. In 2007, there were 1,896 communities, 1,508 sub-districts, 262 districts, and 23 provinces in the survey data.

Table 5.3: Mean and standard deviation of number of observations of each reference group type

Reference group: education group	Number of observations	
at geographical location	Mean	Std. Dev.
Community	21	18
Sub district	27	22
District	75	62
Province	678	464

There is not much difference between the averages of the reference group's income at the community, sub-district, district, and province levels (Tables C.1 and C.2 in Appendix C). However, the standard deviations for reference group's income reveals a lower dispersion of the reference group's income at the province level and the largest dispersion is at the community level.

The Gini coefficients in this study are derived from the author's own calculation using IFLS data. This study's Gini coefficient is much greater than the national Gini coefficient (Statistics Indonesia) because the national coefficient is based on expenditure per capita and derived from a different survey data from this study. The Gini coefficient of income is lower than the Gini coefficient of assets. However, it should be considered that assets represent accumulated value while income is a flow.

One of the robustness checks in the analysis of this chapter uses the variable 'keeping the standard of living in the future.' In responses to the concept of 'keeping the standard of living in the future,' the proportion of samples expressing optimism

is lower than that expressing pessimism. This contrasts the results for expected future economic level. Here, the proportion of respondents that chose a high level for expected future economic level (levels 4 to 6) was higher than the proportion of respondents who chose a lower level. Therefore, using this variable for a robustness check is important to confirm the consistency of the results.

Table 5.4: Keeping standard of living in percentage of observations

Categories	Percentage of observations
very unlikely	4.28%
unlikely	51.46%
likely	43.35%
very likely	0.92%

When considering the social capital variables in both 2007 and 2014, the majority of respondents stated that they were willing to help other people in the neighbourhood and would ask for help from their neighbour to look after their house when they are away. However, in 2007, only 21% of the respondents participated in a community meeting, about 25% were involved in voluntary labour, and about 19% participated in improving their neighbourhood. In 2014, there were increasing participation rates where 23% of the respondents participated in a community meeting, about 27% were involved in voluntary labour, and about 24% participated in improving their neighbourhood.

To control individual heterogeneity of the observations, age, gender, marital status, household size, and working status are included in the models. In 2007, the respondents had an average age of 36 years, more than half were female, more than half were working, 69% of the respondents were married, and the average household size was 4 individuals (Table C.1 in Appendix C). In 2014, higher percentages were recorded for the married and working categories. Also, more females participated in the 2014 survey, and household size increased.

The model in Equation 5.3 is also regressed on urban and rural groups, and, in both 2007 and 2014, there were more respondents who lived in urban areas than in

rural areas. Finally, the data on religious grouping revealed that about 89% of the respondents were Muslim, 6% were Christian, and 5% were Hindu.

5.5 Results

5.5.1 Regression results

Table 5.5 shows the result for the ordered probit model with four different reference groups in the initial period. The model for expected future economic level at the community level showed a positive, significant association between the reference group's income and expected future economic level (column (1)), and this association is significant at the 1% level. The positive associations between the two variables are also found in the regression results for the reference group of education group at sub-district (column (2)), district (column (3)), and province (column (4)) levels. The effect is found to be higher at province level. In the second period, however, a significant association between reference group's income and change in expected future economic level was found only at the province level (Table 5.6). These results indicate the existence of the tunnel effect, particularly for the reference group at the province level.

Table 5.5: Expected future economic level regressions, ordered probit model

Dep.Variables: Expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln mean income per capita of reference group	0.123***	0.132***	0.198***	0.404***
	(0.012)	(0.012)	(0.013)	(0.017)
Observations	29,000	29,000	29,000	29,000
Pseudo R^2	0.037	0.038	0.040	0.044

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

The association between reference group's income and change in expected future economic level in Period 2 is consistent with the results found by Ravallion and

Table 5.6: Change in expected future economic level regressions, ordered probit model

Dep.Variables: Change in expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln mean income per capita of reference group	-0.023	-0.024	-0.007	-0.068***
	(0.016)	(0.019)	(0.018)	(0.024)
Observations	16,601	16,601	16,601	16,601
Pseudo R^2	0.005	0.005	0.005	0.006

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Lhoksin (2002), i.e., a negative association between self-rated welfare and reference group's income. It is also in line with most of the results of the studies on the association between subjective well-being and reference group's income (Clark and Oswald,1996; Sloane and Williams, 2000; McBride, 2001; Levy-Garboua and Montmarquette, 2004; Luttmer, 2005; Graham and Felton, 2006; Brown and Gray, 2014).

Table C.5 in the appendix shows the marginal effect of outcome 4 of expected future economic level in Period 1. At community level, the marginal effect results show that increasing 10% of reference group's income at the community level would increase the probability of having expected future economic level at level 4 by 0.21%. The highest marginal effect is for the reference group for the province, where a 10% increase in the income of the reference group would increase the probability by 0.68% that the level of expected future economic level rises from 3 to 4. In Period 2, the marginal effect of increasing reference group's income by 10% would decrease the probability of one level of change in expected future economic level by 0.8%.

Referring back to the discussion in the literature review on altruism, where altruism is most likely ascribed to individuals with emotional attachment, the reference group income which is most relevant to the altruism concept is found at the community level. Community level can represent neighbours, relatives, and friends which have a close relationship with the individual. However, since the positive association

between reference group's income and expected future economic level is found to be higher at the province level, it can be inferred that the association between the two variables could be assigned to more than altruism.

Table C.3 in the appendix contains the covariates in the model. In the initial period, income shows positive significant association with expected future economic level. This result is expected since people with higher income would place themselves at a higher economic level. The result is also in line with the results found by Blanchflower and Oswald (2004), Marks and Fleming (1999) Ravallion and Lhoksin (2002), and Winkelmann and Winkelmann (1998). In Period 2, however, income does not show significant association with change of expected future economic level.

Another covariate, age, has a negative, significant association with expected future economic level with a low coefficient in both the first and second period. Considering that the average age of respondents is 36, these results are consistent with studies that report the existing of "U-shaped" relationship between age and overall life satisfaction (Blanchflower and Oswald, 2004, 2008; Frey and Stutzer, 2002; Oswald, 1997; Winkelmann and Winkelmann, 1998).

A negative, significant association is also found between being male and expected future economic level in both periods. This is in line with the study by Alesina et al. (2004), which found higher subjective well-being reported by females. Household size is found to be positively associated with expected future economic level. This is in contrast to Luttmer (2005), which reported that household size is negatively associated with well-being. Marital status has a positive, significant association with expected future economic level, which is consistent with results from Frijters and Beatton (2011), Blanchflower and Oswald (2004), and MacKerron (2012), all of whom reported positive association between marriage and subjective well-being.

Working status does not seem, in general, to have a significant association with expected future economic level. This result is not in line with existing studies, where labour force status has significant association with subjective well-being. Only in the specific case of the reference group at the district level it has significant association with expected future economic level. In this type of reference group, respondents

who work have a higher probability of achieving level 4 of expected future economic level by 0.5 of a percentage point.

Tables 5.7 and 5.8 show different specifications of the model. The first specification is the baseline model (column (1)), the second includes the Gini coefficient (column (2)), and the third specification includes the fixed-effect of province and social capital variables in addition to the Gini coefficient (column (3)).

Table 5.7: Expected future economic level on reference group's income with inequality and social capital variables

Dep.Var: expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	0.404***	0.514***	0.511***
	(0.017)	(0.02)	(0.02)
Controlling for Gini coefficient	No	Yes	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	29,000	28,815	28,815
Pseudo R^2	0.044	0.055	0.056

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table 5.8: Change in expected future economic level on reference group's income with inequality and social capital variables

Dep.Var: Change in expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	-0.068***	-0.116***	-0.111***
	(0.024)	(0.026)	(0.027)
Controlling for Gini coefficient	No	Yes	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	16,601	16,601	16,500
Pseudo R^2	0.006	0.011	0.011

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

In the initial period (Table 5.7), controlling for income inequality increase the coeffi-

cient of the reference group's income. The Gini coefficient is significantly associated with expected future economic level when higher income inequality affects higher expected future economic level (Table C.7 in Appendix C). The results are consistent with those found in studies by Clark (2003), Haller and Hadler (2006), and Rozer and Kraaykamp (2013). Conversely, in Period 2, including the Gini coefficient decreased the coefficient of the reference group income, while the Gini coefficient, itself, has negative association with the change of expected future economic level. The initial period results indicate the tolerance for inequality, while, in Period 2, the higher Gini coefficient is found to lower the change in expectation of future economic level.

Column (3) in Table 5.7 shows that, in the initial period that included the five variables representing social capital and the fixed effect of province, is found to have a modest effect on reference group's incomes. In the initial period, it is also found that respondents who agree to ask for help from their neighbours have a lower probability of choosing higher expected economic level compared to the respondents that don't agree to ask for help from their neighbours. On the other hand, respondents who are willing to help their neighbour do not show a significant association between willing to help and the higher expected future economic level (Table C.7 in Appendix C). All three of the variables related to social network in terms of participation in the community show a positive association with the expected future economic level. This shows that respondents who participate in community activities have a higher probability of assigning themselves to a higher economic level. In Period 2 only the variable of asking for help is found to have a negative association with the change of expected future economic level.

Table C.15 shows the urban-rural specific regression results for Period 1. The positive association between the reference group's income and expected future economic level is found to be lower in the rural area compared to the urban area. The relationship of the Gini coefficient and expected future economic level shows that higher inequality in the rural area affects the expected future economic level more than inequality does in the urban area. In the second period, the negative association between the reference group's income and change in expected future economic level

is only found in the rural area. However, in the urban area, the Gini coefficient shows a negative association with the change in expected future economic level. This result also implies that the concerns of people in rural areas are more concentrated on higher reference group's income, while, in the urban area, concerns are more concentrated on inequality of income.

In terms of social capital variables in the regression results for urban and rural samples, asking help from neighbours behaves in a similar direction in both rural and urban areas. In terms of social network variables, all three types of participation are positively associated with expected future economic level in urban areas, while, in rural areas, only participation in community meetings has a positive association with expected future economic level.

Tables C.11 and C.12 in Appendix C show the results for each income quintile. Positive associations between the reference group's income and expected future economic level in Period 1 coupled with negative associations in Period 2 are found in Quintiles 2, 4 and 5 at the significant level of 1%. The highest coefficient for the reference group's income is found in Quintile 2. Endogeneity of the poor group due to the inability to choose a place to live is not shown in the results since the positive association between reference group's income and expected future economic level in Period 1 is found in both poorest and richest group with higher coefficient is shown in richest group.

Tables C.13 and C.14 n Appendix C provide the results of regressions for each religious group. While in Period 1 all Muslim, Christian and Hindu show a positive association with expected future economic level, in Period 2 only Muslims show a negative significant association with the change in expected future economic level. Although the results indicate the tunnel effect is found only in Muslim samples, one should be bear in mind that almost 90% of the respondents were Muslim. In the first period, all the religious groups show higher Gini coefficients being associated with higher expected future economic level, but the highest coefficient is found for Hindu respondents. In the second period, the Gini coefficient has negative association with the change in expected future economic level in all of the religious groups. These

results imply that all religious groups concern about inequality level.

5.5.2 Robustness checks

The potential bias in using the income of the reference group in the model comes from the fact that people are not always aware of other people's income. Therefore, another estimation was added that used assets instead of income to check for robustness. In this specification, the reference group's assets replaced reference group's income in the baseline model (Equation 5.11). Table 5.9 shows the results of the model using assets. In line with the results from the baseline model, which used the reference group's income, the coefficient of the reference group's assets per capita is positively associated with expected future economic level in the first period and negatively associated with change in expected future economic level in the second period.

Table 5.9: Expected future economic level on reference group's asset regressions

Dep.Var: expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean assets per capita of reference group	0.386*** (0.017)	0.543*** (0.021)	0.537*** (0.021)
Controlling for Gini coefficient	No	Yes	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	23,627	23,499	23,499
Pseudo R^2	0.047	0.059	0.060

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Controlling inequality of assets shows a higher coefficient for the tunnel effect compared to the baseline model's result(Table 5.9, column (1)). Social capital variables in the assets model behave similarly to the social capital variables the income model. In Period 1, willing to help is found to have no significant association with expected future economic level while asking for help from neighbours is found to have a negative association with expected future economic level. The three variables for

Table 5.10: Change in expected future economic level on reference group's asset regressions

Dep.Var: change in expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean assets per capita of reference group	-0.014 (0.019)	-0.07*** (0.022)	-0.067** (0.022)
Controlling for Gini coefficient	No	Yes	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	16,601	16,601	16,500
Pseudo R^2	0.006	0.011	0.011

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

participation have positive associations with expected future economic level. Also, in line with the income model, including the social capital variables changed the coefficient of the reference group's assets only modestly. In Period 2 both variables of willing to help and asking for help show negative association with change in expected future economic level. The social capital variables in Period 2 do not reveal significant association with change in expected future economic level.

Table 5.11 shows the results of the other robustness check. Here, the dependent variable becomes 'keeping the standard of living in the future' (Equation 5.13). The reference group's income behaves similarly in both this and the baseline model (Table 5.7). In the first period, the positive association between the reference group's income and 'keeping standard of living in the future' is found. This indicates that a higher reference group's income will produce a higher probability of 'keeping standard of living in the future.' In the second period, on the other hand, a higher reference group's income lowers the probability of reporting a positive change in 'keeping standard of living in the future.'

The covariates in the model with the dependent variable 'keeping standard the living in the future' show similar signs and associations with the covariates in the model of expected future economic level (Table C.19 in the appendix). In Period 1, the

Table 5.11: Keeping standard of living in the future regressions

Dep.Var: keeping standard of living in the future	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	0.169*** (0.019)	0.281*** (0.023)	0.278*** (0.023)
Controlling for Gini coefficient	No	Yes	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	28,793	28,619	28,619
Pseudo R^2	0.019	0.042	0.042

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table 5.12: Change in keeping standard of living in the future regressions

Dep.Var: Change in keeping standard of living in the future	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	-0.065*** (0.025)	-0.117*** (0.028)	-0.114*** (0.028)
Controlling for Gini coefficient	No	No	Yes
Controlling for social capital related variables	No	No	Yes
Fixed-effect province	No	No	Yes
Observations	16,601	16,601	16,500
Pseudo R^2	0.005	0.011	0.011

Standard errors in parentheses, *p<0.10 **p<0.05, ***p<0.01

Gini coefficient was found to have a significant positive association with the dependent variable, and negative association is found in Period 2. When considering the results of the control variables related to social capital in the model, only participation in community meetings and participation in improving the neighbourhood has significant positive associations with 'keeping the standard of living in the future.' in Period 1 and there is no siginificant associations between social capital variables and 'keeping the standard of living in the future.' in Period 2.

Table C.21 in Appendix C shows the regression results of Equations 5.9 and 5.10,

with the reference group's income defined as the median income per capita. Although the coefficients are different, the signs and significances of coefficients of the reference group's income are consistent with the results in Tables 5.9 and 5.6. This implies that using the mean income per capita would reach the same conclusions as using the median income per capita.

5.6 Conclusions

This chapter contributes to the limited studies on the tunnel effect using data from a developing country. Moreover, the analysis in this study takes inequality, social capital and religiosity into account. In terms of the variables used in the regression analysis, this chapter utilises expected future economic level, which represents expected future income, in the tunnel effect analysis.

The results show an indication of the tunnel effect. In the initial period, a higher reference group's income increased the probability of respondents having a higher expected future economic level, and, in period two, a higher reference group's income decreased the probability of respondents reporting a higher change in expected future economic level. The fact that the tunnel effect is found at the province level and not at the community level serves as further evidence that the expectation of future economic level in Period 1 is based on more than altruism. The results are found to be robust after using the reference group's assets to replace the reference group's income and when using 'keeping standard of living in the future' as a dependent variable to replace expected future economic level.

Including the inequality level in the model increases the coefficient of the reference group's income, suggesting that the inequality level strengthens the tunnel effect. Further, adding more variables related to social capital does not seem to affect the tunnel effect.

When the model is used on different religious groups, only the Muslim group shows an indication of the tunnel effect. When looking at Christians and Hindus, the

inequality affects on a greater change in expected future economic level than in the Muslim group. However, it should be noted that the Muslim group comprises 90% of the respondents.

The presence of the tunnel effect is also indicated in rural areas. An interesting finding is that, even though the reference group's income does not seem to have an impact on change in expected future economic level in Period 2 for urban samples, inequality level has a negative impact. This implies that people in urban areas are more concerned with the discrepancy between incomes than people in rural areas.

The econometric analysis in this chapter also regressed different income quintiles, and the tunnel effect was found in Quintiles 2, 4 and 5. There is no indication that the poorest group has an adaptive expectation concerning expected future economic level, nor is there endogeneity in choosing a place to live.

Further research, which can augment the results this chapter, could include investigating the tunnel effect over time with a longer series of data. However, the survey data is limited by having only six levels for expected future economic level. This may cause potential problems in panel data analysis since there is the possibility of no change in an individual's preference of economic level over time.

Chapter 6

General conclusions

This thesis presents empirical evidence on the topics in economic welfare with data from a developing country. Chapter 2 provides general information regarding the context of Indonesian data used in this thesis and also presents the estimation of results of the Gini coefficients of expenditure, health, and education. It is found that inequality of expenditure in urban areas have always been higher compared to that of rural areas. This indicates that urbanisation contributes to increase the number of low-income individuals in cities, causing high inequality in urban areas. On the other hand, decreasing trend of inequality of health and education in rural area indicates the improvement of health and education facilities in rural areas.

Chapter 3 analyses multidimensional inequality with an expenditure groups weighting scheme. The key finding of this chapter suggests that incorporating different values of weights into multidimensional inequality according to expenditure groups could accommodate the variation in each group. Other weighting schemes used in this chapter for comparison, equal weighting, and all-samples weighting schemes, have almost similar weights, which indicates that the results from an all-samples weighting scheme are from the average outcome of all dimensions.

Another finding of Chapter 3 is the indication of the diminishing marginal return of happiness for the richest group. It is shown by the coefficient of expenditure from the regression results in the richest group is lower than that of the poorer group in Quintile 2. For adaptive preference indication, the regression results of the poorest group do not suggest the existence of adaptive preference.

In addition to the notion that expenditure group weighting scheme could incorporate the variation in each group, this chapter also contributes in terms of the methodology to determine weights. This chapter uses regression-based approach to determine the dimensional weights, a method which has been very limited employed in multidimensional welfare studies, particularly in multidimensional inequality studies.

The implication of the findings from this chapter could be linked to a tax policy in which the current trend of tax policy in Indonesia moves toward decreasing income tax rates. With the indication of diminishing marginal return of the richest group in the regression result, the possible policy recommendation is to increase the personal

income tax rate for the richest group with the consideration that higher income for the richest group correlates with lower marginal subjective well-being.

The limitation of using regression results for determining dimensional weights is the possibility of insignificant results of the main variables in the regression, which can cause zero weights for some dimensions. Another caution that should be emphasised is the choice of the approach in determining weights for multidimensional inequality, since different approaches may lead to opposite results (Esposito and Chiappero-Martinetti, 2017).

Future research that could enrich this chapter is by applying different types of groups in the society – for example based on region or gender – in determining dimensional weights for multidimensional inequality. Comparative studies of multidimensional inequality with expenditure group weighting schemes of other developing countries would also enhance the understanding on how this method of dimensional weights works. Future research could also use the dimensional weighting based on expenditure group for another multidimensional welfare evaluation, such as multidimensional poverty.

Chapter 4 is motivated by the limited studies on informal labour during crisis periods with the data of a developing country which has higher proportion of informal labourers than of formal labourers. The main findings suggest the persistent segmentation between formal and informal labour, including in the period after a monetary crisis and the existence of the safety net function of informal labour in a monetary crisis period. The findings also confirm that the disadvantageous position of informal labourers. Even after the reform, informal labourers earnings mobility did not show improvement and the earnings gap between the formal and informal labourers increased.

Following the dualism concept the of labour market where formal labour has more advantages than informal labour (Harris and Todaro, 1970; Fields, 1975), the first part of this chapter analyses earnings premiums of formal labourers. The second part of the chapter analyses the earnings mobility of both formal and informal labourers through the analysis of earnings convergence at the macro and micro levels.

This chapter contributes to the literature in several ways. First, it analyses the segmented labour market between formal and informal labour in a developing country, which has persistently high informal employment, and take into account the context of monetary crisis period. Second, it provides an analysis on earnings mobility at the aggregate level and individual level, which including formal and informal labour analyses of earnings mobility related to crisis periods. Another contribution in terms of methodology is related to the estimators used in the micro-mobility analysis. In line with the recommendations in the econometrics literature, GMM estimators have shown more efficient results compared to pooled OLS which indicates upward bias, and fixed effect estimator which indicates downward bias.

Future research which can improve this chapter could include an analysis on the characteristics of informal labourers who have a lower earnings gap with formal labourers and higher earnings mobility compared to other informal labourers. Future research could also analyse how the universal social security policy affects informal labourers, focusing on how there is no available policy to improve informal labourers' welfare.

Chapter 5 analyses the tunnel effect in the developing country by incorporating specific features of society. The main findings of this chapter suggest the indication of a tunnel effect in Indonesia, where the level of inequality strengthens the effect. The result of tunnel effect is also proven to be robust when the regression is applied to different types of variables of reference groups' assets and 'keeping standard of living in the future.'

The results also indicate the tolerance for inequality in the initial period, while, in Period 2, the higher Gini coefficient is found to lower the change in expectation of future economic level. In terms of the social capital related variables, the results show that respondents who participate in community activities have a higher probability of assigning themselves to a higher economic level.

Another specific feature of Indonesia, religiosity of the society, encourages the analysis of the tunnel effect in religious groups. Only the Muslim group is found to show a tunnel effect, while Christian and Hindu groups are not.

An additional finding from the analysis is that there is no indication of adaptive expectation or endogeneity aspect in the poorest group, as the tunnel effects are found in both poor and rich groups.

The contribution of this chapter to the literature of the tunnel effect is that it uses different types of reference groups, based on different locations. Moreover, this chapter uses expected future economic level in the model, which can be considered as the reflection of the expectation of future income, while the previous studies mostly use current status of subjective well-being. It also contributes to the literature of the tunnel effect by including inequality and social capital related variables which have not been explored very much in the previous studies of the tunnel effect.

Future research could enhance this analysis is by including cultural-related variables to gain a better understanding of this matter. With the experience of the ethnic and religion conflicts in the early 2000s in Indonesia, the tunnel effect analysis based on ethnic group minority for each region, for example, would provide more insight to strengthen the tunnel effect results.

Appendix A

Appendix to Chapter 3

Table A.1: Subjective well-being regressions, ordered probit model: complete results

Dep. variable:	All-samples	Q1	Q2	Q3	Q4	Q5
Happiness	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	0.867***	0.919**	2.044*	1.041	1.305	1.157***
	(0.081)	(0.404)	(1.130)	(1.172)	(0.969)	(0.285)
Health	0.829***	1.023***	0.629***	0.908***	0.706***	0.853***
	(0.05)	(0.113)	(0.112)	(0.114)	(0.112)	(0.109)
Education	0.751***	0.559***	0.641***	0.637***	0.815***	0.917***
	(0.055)	(0.157)	(0.139)	(0.126)	(0.116)	(0.102)
Age	-0.008***	-0.008***	-0.008***	-0.01***	-0.008***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.081***	0.109***	0.036	0.087**	0.119***	0.052
	(0.018)	(0.041)	(0.04)	(0.042)	(0.041)	(0.039)
Married	0.291***	0.204***	0.270***	0.361***	0.334***	0.294***
	(0.019)	(0.043)	(0.043)	(0.044)	(0.044)	(0.042)
Religious	0.167***	0.143***	0.150***	0.198***	0.169***	0.185***
	(0.015)	(0.032)	(0.033)	(0.034)	(0.034)	(0.033)
Working	-0.031*	0.045	0.004	-0.038	-0.063	-0.105***
	(0.019)	(0.042)	(0.043)	(0.043)	(0.043)	(0.04)
Observations	28,120	5,636	5,632	5,616	5,617	5,619
Pseudo R^2	0.051	0.044	0.032	0.052	0.046	0.053

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01
Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table A.2: Marginal effects of outcome (3) of subjective well-being regressions

Dep. variable:	All-samples	Q1	Q2	Q3	Q4	Q5
Happiness	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	0.102***	0.084**	0.209*	0.113	0.156	0.191***
	(0.01)	(0.037)	(0.116)	(0.128)	(0.116)	(0.047)
Health	0.098***	0.093***	0.064***	0.099***	0.084***	0.141***
	(0.006)	(0.011)	(0.012)	(0.013)	(0.014)	(0.018)
Education	0.088***	0.051***	0.066***	0.069***	0.097***	0.151***
	(0.007)	(0.015)	(0.015)	(0.014)	(0.014)	(0.017)
Age	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
Female	0.01***	0.01***	0.004	0.01**	0.014***	0.01
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Married	0.034***	0.019***	0.028***	0.039***	0.04***	0.049***
	(0.002)	(0.004)	(0.005)	(0.005)	(0.005)	(0.007)
Religious	0.02***	0.013***	0.015***	0.022***	0.02***	0.03***
	(0.002	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)
Working	-0.004*	0.004	0.0003	-0.004	-0.008	-0.017***
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.007)

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01
Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table A.3: Living standard regressions, ordered probit model: complete results

Dep variable:	All samples	Q1	Q2	Q3	Q4	Q5
Living standard	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	1.652***	1.830***	3.635***	0.795	2.054**	1.132***
	(0.07)	(0.351)	(0.974)	(0.976)	(0.817)	(0.249)
Health	0.688***	0.819***	0.736***	0.606***	0.650***	0.642***
	(0.043)	(0.098)	(0.098)	(0.097)	(0.095)	(0.095)
Education	1.135***	0.852***	1.137***	1.236***	1.092***	1.251***
	(0.047)	(0.133)	(0.120)	(0.105)	(0.097)	(0.089)
Age	-0.002***	-0.003***	-0.003**	-0.002	-0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.084***	0.073**	0.088**	0.092***	0.088**	0.073**
	(0.016)	(0.035)	(0.035)	(0.035)	(0.035)	(0.034)
Married	0.004	-0.039	-0.002	0.02	0.032	0.006
	(0.016)	(0.037)	(0.037)	(0.036)	(0.037)	(0.036)
Religious	0.104***	0.216***	0.136***	0.09***	0.037	0.031
	(0.013)	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)
Working	0.064***	0.137***	0.076**	0.061*	0.024	0.02
	(0.016)	(0.036)	(0.036)	(0.036)	(0.036)	(0.035)
Observations	28,123	5,636	5,632	5,616	56,18	5,621
Pseudo R^2	0.055	0.033	0.030	0.030	0.028	0.038

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01
Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table A.4: Marginal effects of outcome (3) of living standard regressions

Dep variable:	All-samples	Q1	Q2	Q3	Q4	Q5
Living standard	(1)	(2)	(3)	(4)	(5)	(6)
Ln expenditure	0.319***	0.233***	0.562***	0.151	0.444**	0.318***
	(0.014)	(0.045)	(0.151)	(0.185)	(0.177)	(0.07)
Health	0.133***	0.104***	0.114***	0.115***	0.141***	0.180***
	(0.008)	(0.013)	(0.016)	(0.019)	(0.021)	(0.027)
Education	0.219***	0.108***	0.176***	0.234***	0.236***	0.351***
	(0.009)	(0.017)	(0.019)	(0.02)	(0.021)	(0.024)
Age	-0.0003***	-0.0004***	-0.0004**	-0.0004	-0.0003	0.0003
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Female	0.0162***	0.009**	0.014**	0.018***	0.019**	0.0**
	(0.003)	(0.005)	(0.005)	(0.007)	(0.008)	(0.01)
Married	0.001	-0.005	-0.0004	0.004	0.007	0.002
	(0.003)	(0.005)	(0.006)	(0.007)	(0.008)	(0.01)
Religious	0.02***	0.028***	0.021***	0.017***	0.008	0.009
	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)	(0.008)
Working	0.012***	0.017***	0.012**	0.012*	0.005	0.006
	(0.003)	(0.005)	(0.006)	(0.007)	(0.008)	(0.001)

Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01

Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table A.5: Theil decomposition with various weighting schemes

Weigthing scheme	GE(-1)		GE(0)	
	within	between	within	between
Equal weights	0.07	0.004	0.039	0.004
All-samples weights	0.067	0.004	0.038	0.004
Expenditure group weights	0.064	0.026	0.037	0.023

Table A.6: Theil decomposition per expenditure quintile: Equal weighting scheme

Expenditure groups	well-being		GE(-1)	GE(0)
	share	mean		
Quintile 1	0.178	0.292	0.144	0.043
Quintile 2	0.188	0.308	0.048	0.037
Quintile 3	0.196	0.321	0.056	0.041
Quintile 4	0.207	0.338	0.048	0.039
Quintile 5	0.231	0.379	0.042	0.036

Table A.7: Theil decomposition per income quintile: All-samples weighting scheme

Expenditure groups	well-being		GE(-1)	GE(0)
	share	mean		
Quintile 1	0.179	0.290	0.136	0.042
Quintile 2	0.189	0.305	0.046	0.036
Quintile 3	0.196	0.318	0.054	0.039
Quintile 4	0.206	0.334	0.046	0.038
Quintile 5	0.231	0.374	0.040	0.035

Table A.8: Theil decomposition per expenditure quintile: Expenditure group weighting scheme

Expenditure groups	well-being		GE(-1)	GE(0)
	share	mean		
Quintile 1	0.223	0.319	0.141	0.040
Quintile 2	0.128	0.184	0.040	0.034
Quintile 3	0.215	0.309	0.050	0.037
Quintile 4	0.191	0.275	0.046	0.039
Quintile 5	0.243	0.348	0.041	0.036

Table A.9: Descriptive statistics by expenditure quintile

		Q1	Q2	Q3	Q4	Q5
		(1)	(2)	(3)	(4)	(5)
Expenditure	Mean	436.38	706.81	998.35	1,448.91	3,132.42
(in 1,000 Rp)	Std Dev	104.45	70.07	99.08	174.38	1,927.08
Health	Mean	2.979	2.977	2.953	2.939	2.957
	Std Dev	0.5	0.494	0.503	0.514	0.514
Education	Mean	2.429	2.727	3.009	3.319	3.798
	Std Dev	0.971	1.079	1.209	1.293	1.403
Age	Mean	37.42	36.64	36.48	36.98	37.2
	Std Dev	16.51	15.65	15.26	15.54	15.21
Female	Mean	0.53	0.522	0.52	0.518	0.532
	Std Dev	0.499	0.5	0.5	0.5	0.499
Married	Mean	0.734	0.723	0.689	0.675	0.655
	Std Dev	0.442	0.448	0.463	0.468	0.476
Religious	Mean	2.806	2.822	2.809	2.818	2.83
	Std Dev	0.579	0.566	0.567	0.565	0.573
Working	Mean	0.599	0.604	0.614	0.601	0.596
	Std Dev	0.49	0.489	0.487	0.49	0.491
Happiness	Mean	1.934	1.950	1.974	1.989	2.034
	Std Dev	0.389	0.387	0.371	0.371	0.401
Living standard	Mean	1.801	1.870	1.942	2.005	2.122
	Std Dev	0.544	0.538	0.536	0.524	0.543

Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3, Q4=expenditure quintile 4, Q5=expenditure quintile 5

Table A.10: Correlations between dimensions

Dimension	Expenditure	Health	Education
Expenditure	1		
Health	-0.0035	1	
Education	0.3079	0.0959	1

Table A.11: Eigenvalue of each dimension by expenditure quintile group

	All-samples	Q1	Q2	Q3	Q4	Q5
Factor 1	1.321	1.19	1.114	1.132	1.143	1.193
Factor 2	1.002	0.973	0.983	1.012	0.984	0.982
Factor 3	0.677	0.836	0.903	0.85	0.873	0.825

Table A.12: Weights of dimensions based on Principal Component Analysis

	All-samples	Q1	Q2	Q3	Q4	Q5
Component 1	0.28.			0.30		
Component 2	0.40	N/A*	N/A*	0.43	N/A*	N/A*
Component 3	0.32			0.27		

*The weights cannot be calculated because the eigenvalue of other components apart from the first component is less than one and the first component does not cover all three variables.

Table A.13: Weights of dimensions based on Factor Analysis

	All-samples	Q1	Q2	Q3	Q4	Q5
Factor 1	0.32			0.35		
Factor 2	0.38	N/A*	N/A*	0.34	N/A*	N/A*
Factor 3	0.30			0.31		

*The weights cannot be calculated because the eigenvalue of other factors apart from the first factor is less than one and the first factor does not cover all three variables.

Q1=expenditure quintile 1, Q2=expenditure quintile 2, Q3=expenditure quintile 3,

Q4=expenditure quintile 4, Q5=expenditure quintile 5

Appendix B

Appendix to Chapter 4

Table B.1: Composition of formal and informal labour: 1993-2014-National data

National Data*)	1993	1997	2000	2007	2014
Formal labourer	24,843,580	31,670,088	31,530,566	30,926,222	46,558,877
% of total labour force	30.99%	35.494%	32.96%	27.93%	38.10%
Informal labourer	51,874,685	53,376,919	58,307,164	69,003,995	68,069,149
% of total labour force	64.71%	59.81%	60.96%	62.32%	55.70%
Unemploymed	3,447,111	4,194,343	5,815,730	10,795,785	7,576,693
% of total labour force	4.30%	4.70%	6.08%	9.75%	6.20%
Total	80,165,376	89,241,350	95,653,460	110,726,002	122,204,719

*) Source: Statistics Indonesia

Table B.2: Earnings premium regressions, pooled OLS: complete results

Dep Var: Ln earnings	All waves	Before crisis	Recovery	After crisis
	1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)	(4)
Formal labour	0.231***	0.187***	0.167***	0.256***
	(0.027)	(0.042)	(0.037)	(0.034)
Education	0.331***	0.292***	0.329***	0.353***
	(0.011)	(0.019)	(0.016)	(0.014)
Age	0.049***	0.038**	0.043**	0.057***
	(0.008)	(0.016)	(0.015)	(0.013)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)
Male	0.38***	0.403***	0.422***	0.369***
	(0.026)	(0.039)	(0.037)	(0.033)
Household size	0.022***	0.046***	0.02***	0.012
	(0.006)	(0.012)	(0.01)	(0.008)
Urban	0.229***	0.349***	0.234***	0.15***
	(0.024)	(0.039)	(0.033)	(0.03)
Married	0.088*	0.024	0.082	0.116**
	(0.049)	(0.094)	(0.072)	(0.057)
Constant	10.449***	10.656***	10.741***	10.360***
	(0.176)	(0.287)	(0.304)	(0.317)
Year fixed-effect	Yes	Yes	Yes	Yes
Observations	6,578	2,632	2,637	3,946
Adjusted R^2	0.290	0.241	0.283	0.310

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.3: Earnings premium regressions, pooled OLS: detail formal employment,complete results

Dep Var: Ln earnings	All waves	Before crisis	Recovery	After crisis
	1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)	(4)
Government employee	0.557***	0.406***	0.423***	0.667***
	(0.04)	(0.065)	(0.057)	(0.049)
Private employee	0.094***	0.078*	0.074*	0.089
	(0.027)	(0.042)	(0.038)	(0.034)
Self-employed formal	0.84***	0.373	0.89***	0.946***
	(0.095)	(0.2339)	(0.153)	(0.103)
Education	0.265***	0.249***	0.277***	0.268***
	(0.014)	(0.023)	(0.02)	(0.017)
Age	0.049***	0.042**	0.042**	0.054***
	(0.008)	(0.016)	(0.015)	(0.012)
Age squared	-0.001***	-0.001**	-0.001**	-0.001***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)
Male	0.458***	0.463***	0.482***	0.46***
	(0.025)	(0.04)	(0.037)	(0.033)
Household size	0.02***	0.041***	0.018*	0.012
	(0.006)	(0.012)	(0.01)	(0.007)
Urban	0.261***	0.384***	0.263***	0.186***
	(0.024)	(0.04)	(0.034)	(0.03)
Married	0.06	-0.003	0.046	0.087
	(0.047)	(0.091)	(0.071)	(0.054)
Constant	10.514***	10.641***	10.862***	10.56***
	(0.171)	(0.2856)	(0.305)	(0.304)
Year fixed-effect	Yes	Yes	Yes	Yes
Observations	6,578	2,632	2,637	3,946
Adjusted R^2	0.303	0.249	0.299	0.331

Standard errors in parentheses *p<0.10, **p<0.05,***p<0.01

Table B.4: Earnings premium regressions, fixed effect

Dep Var: Ln earnings	All waves	Before crisis	Recovery	After crisis
	1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)	(4)
Formal labour	0.128**	0.227	-0.083	0.149**
	(0.039)	(0.206)	(0.054)	(0.05)
Education	0.131**	-0.049	0.088	0.24**
	(0.05)	(0.125)	(0.073)	(0.075)
Age	0.07***	0.074	-0.007	0.084***
	(0.016)	(0.049)	(0.048)	(0.025)
Age squared	-0.001***	-0.001	0.0001	-0.001***
	(0.0001)	(0.0005)	(0.0005)	(0.0002)
Household size	0.006	-0.023	-0.004	0.007
	(0.009)	(0.03)	(0.017)	(0.01)
Urban	0.165***	0.282**	0.129	0.21**
	(0.048)	(0.134)	(0.102)	(0.064)
Married	-0.004	-0.178	-0.038	0.076
	(0.059)	(0.141)	(0.14)	(0.079)
Constant	10.681***	11.164***	12.86***	10.418***
	(0.495)	(1.264)	(1.239)	(0.879)
Observations	6,215	2,529	2,571	3,686
Adjusted R^2	0.087	0.051	0.001	0.087

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.5: Earnings premium regressions, fixed effect: detail formal employment

Dep Var: Ln earnings	All waves	Before crisis	Recovery	After crisis
	1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)	(4)
Government employee	0.334***	0.156	0.097	0.392***
	(0.0947)	(0.2278)	(0.1596)	(0.1059)
Private employee	0.061	-0.07	-0.078	0.093*
	(0.041)	(0.101)	(0.069)	(0.052)
Self-employed formal	0.3985***	-0.093	0.498**	0.401***
	(0.1)	(0.258)	(0.186)	(0.114)
Education	0.127**	-0.033	0.119	0.211**
	(0.05)	(0.121)	(0.076)	(0.073)
Age	0.07***	0.085*	-0.02	0.076**
	(0.016)	(0.047)	(0.048)	(0.024)
Age squared	-0.001***	-0.001*	0.0001	-0.001***
	(0.0001)	(0.0005)	(0.0005)	(0.0001)
Household size	0.007	-0.023	-0.001	0.003
	(0.008)	(0.029)	(0.017)	(0.01)
Urban	0.165***	0.221*	0.047	0.243***
	(0.049)	(0.128)	(0.103)	(0.064)
Married	0.019	-0.143	-0.0002	0.105
	(0.06)	(0.135)	(0.129)	(0.075)
Constant	10.6828***	11.0158***	13.2733***	10.7224***
	(0.4991)	(1.1938)	(1.2701)	(0.8681)
Observations	6,578	2,632	2,637	3,946
Adjusted R^2	0.082	0.049	0.008	0.085

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.6: Earnings mobility regressions of formal labourers

Dep Var: Ln earnings change	pooled OLS	Fixed-effect	Dif-GMM	FOD-GMM	Sys-GMM
Period 1993-2014	(1)	(2)	(3)	(4)	(5)
Ln income t-1	-0.557***	-1.084***	-0.988***	-0.92***	-0.9***
	(0.038)	(0.034)	(0.038)	(0.048)	(0.069)
Education	0.245***	0.217***	0.151**	0.279***	0.363***
	(0.018)	(0.053)	(0.051)	(0.056)	(0.029)
Age	0.036**	0.068**	0.062	0.134***	0.058***
	(0.015)	(0.032)	(0.039)	(0.032)	(0.017)
Age squared	-0.0004**	-0.002***	-0.001**	-0.001***	-0.001***
	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
Male	0.15***				0.261***
	(0.032)				(0.048)
Household size	0.004	0.007	0.009	-0.01	0.007
	(0.008)	(0.009)	(0.011)	(0.011)	(0.008)
Urban	0.074**	0.081	0.162**	0.148**	0.153***
	(0.027)	(0.055)	(0.07)	(0.07)	(0.036)
Married	0.123**	0.098	0.044	0.075	0.111
	(0.06)	(0.102)	(0.094)	(0.092)	(0.071)
Year fixed-effect	Yes	Yes	Yes	Yes	Yes
Observations	2,303	2,303	1,663	1,812	2,303
Adjusted R^2	0.342	0.647			
AR(2) p value			0.157	0.678	0.068
Hansen J p value			0.746	0.721	0.596

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.7: Earnings mobility before and after crisis of formal labourers, pooled OLS

Dep Var: Ln earnings change	Before crisis	Recovery	After crisis
Period 1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)
Ln earnings t-1	-0.665***	-0.604***	-0.511***
	(0.068)	(0.05)	(0.038)
Education	0.197***	0.235***	0.249***
	(0.034)	(0.023)	(0.02)
Age	0.012	0.027	0.061**
	(0.025)	(0.02)	(0.02)
Age squared	-0.0002	-0.0003	-0.001**
	(0.0003)	(0.0002)	(0.0002)
Male	0.199***	0.154***	0.13***
	(0.059)	(0.044)	(0.036)
Household size	-0.016	-0.003	0.012
	(0.014)	(0.011)	(0.007)
Urban	0.141**	0.102**	0.059*
	(0.052)	(0.035)	(0.031)
Married	0.172	0.138	0.116*
	(0.123)	(0.094)	(0.068)
Constant	7.992***	6.706***	4.449***
	(0.804)	(0.615)	(0.559)
Year fixed-effect	Yes	Yes	Yes
Observations	640	1,294	1,661
Adjusted R^2	0.439	0.397	0.314

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.8: Earnings mobility regressions of informal labourers

Dep Var: Ln earnings change	Pooled OLS	Fixed-effect	Dif-GMM	FOD-GMM	Sys-GMM
Period 1993-2014	(1)	(2)	(3)	(4)	(5)
Ln earnings t-1	-0.702***	-1.188***	-0.873***	-0.934***	-0.888***
	(0.03)	(0.032)	(0.042)	(0.032)	(0.047)
Education	0.14***	0.16	0.269*	0.115	0.187***
	(0.024)	(0.145)	(0.147)	(0.112)	(0.031)
Age	0.028**	0.064**	0.043	0.066**	0.043***
	(0.013)	(0.027)	(0.026)	(0.022)	(0.012)
Age squared	-0.0004**	-0.001**	-0.001***	-0.001***	-0.001***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Male	0.38***				0.465***
	(0.044)				(0.055)
Household size	0.015	0.012	0.02	0.018	0.018*
	(0.009)	(0.015)	(0.016)	(0.014)	(0.01)
Urban	0.142***	0.205**	0.181*	0.1796**	0.189***
	(0.04)	(0.095)	(0.104)	(0.086)	(0.049)
Married	0.097	0.067	0.145	0.155	0.116
	(0.07)	(0.111)	(0.108)	(0.101)	(0.078)
Year fixed-effect	Yes	Yes	Yes	Yes	Yes
Observations	2,693	2,693	2,033	2,018	2,693
Adjusted R^2	0.370	0.626			
AR(2) p value			0.951	0.706	0.978
Hansen J p value			0.296	0.892	0.445

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.9: Earnings mobility before and after crisis of informal labourers, pooled OLS

Dep Var: Ln earnings change	Before crisis	Recovery	After crisis
Period 1993-2014	1993-1997	1997-2000	2000-2014
	(1)	(2)	(3)
Ln earnings t-1	-0.797***	-0.717***	-0.623***
	(0.0446)	(0.0368)	(0.0248)
Education	0.230***	0.168***	0.098***
	(0.045)	(0.033)	(0.026)
Age	0.055*	0.023	0.01
	(0.028)	(0.02)	(0.018)
Age squared	-0.0007**	-0.0003	-0.0002
	(0.0003)	(0.0002)	(0.0002)
Male	0.485***	0.429***	0.322***
	(0.083)	(0.059)	(0.047)
Household size	0.027	0.017	0.014
	(0.023)	(0.015)	(0.01)
Urban	0.147*	0.177**	0.126**
	(0.079)	(0.056)	(0.044)
Married	0.081	0.01	0.033
	(0.147)	(0.096)	(0.073)
Constant	8.047***	7.985***	7.403***
	(0.696)	(0.569)	(0.506)
Year fixed-effect	Yes	Yes	Yes
Observations	652	1,269	2,019
Adjusted R^2	0.541	0.424	0.285

Standard errors in parentheses, *p<0.10, **p<0.05,***p<0.01

Table B.10: Aggregate earnings mobility 1993-2014: detail of decomposition per type of labour

Type of employment	Earnings movement	Weight	Decomposition
2007-2014			
All types	0.175		
Formal labour	0.357	0.424	0.151
Informal labour	0.042	0.576	0.024
Sum (=all types)			0.175
2000-2007			
All types	0.159		
Formal labour	0.245	0.412	0.101
Informal labour	0.099	0.587	0.058
Sum (=all types)			0.159
1997-2000			
All types	-0.020		
Formal labour	-0.089	0.515	-0.046
Informal labour	0.054	0.485	0.026
Sum (=all types)			-0.020
1993-1997			
All types	0.241		
Formal labour	0.306	0.495	0.152
Informal labour	0.178	0.504	0.090
Sum (=all types)			0.241

Appendix C

Appendix to Chapter 5

Table C.1: Descriptive statistics of 2007 data

Variables	Mean	Standar deviation
Income per capita (in 1,000 Rupiah)	257.45	1,184.83
Assets per capita (in 1,000 Rupiah)	15,500	30,500
Religiosity	2.82	0.56
Gini coefficient of income at provincial level	0.57	0.07
Gini coefficient of assets at provincial level	0.65	0.05
Male	0.48	0.50
Age	36.88	15.64
Working	0.60	0.49
Married	0.69	0.46
Education	2.00	1.15
Household size	4.39	2.01
Urban location	0.53	0.50
Ask help from neighbour	0.83	0.37
Willing to help	0.99	0.09
Participation in community meeting	0.21	0.41
Participation in voluntary labour	0.25	0.43
Participation in improving neighborhood	0.19	0.39
Mean income per capita Province (in 1,000 Rupiah)	257.45	92.56
Mean income per capita District (in 1,000 Rupiah)	257.42	194.48
Mean income per capita Sub district (in 1,000 Rupiah)	257.40	320.01
Mean income per capita Community (in 1,000 Rupiah)	257.39	361.87
Mean assets per capita Province (in 1,000 Rupiah)	15,700	9,923
Mean assets per capita District (in 1,000 Rupiah)	15,700	14,100
Mean assets per capita Sub district (in 1,000 Rupiah)	15,500	19,000
Mean assets per capita Community (in 1,000 Rupiah)	15,500	20,000

Table C.2: Descriptive statistics of 2014 data

Variables	Mean	Standar deviation
Income per capita (in 1,000 Rupiah)	249,72	596.01
Assets per capita (in 1,000 Rupiah)	13,000	21,900
Religiosity	2.95	0.67
Gini coefficient of income at provincial level	0.54	0.05
Gini coefficient of assets at provincial level	0.64	0.03
Male	0.45	0.50
Age	42.42	13.69
Working	0.67	0.47
Married	0.79	0.41
Education	2.10	1.18
Household size	6.56	3.39
Urban location	0.56	0.50
Ask help from neighbour	0.78	0.41
Willing to help	0.99	0.11
Participation in community meeting	0.23	0.42
Participation in voluntary labour	0.27	0.44
Participation in improving neighborhood	0.24	0.43
Mean income per capita Province (in 1,000 Rupiah)	249.53	118.05
Mean income per capita District (in 1,000 Rupiah)	249.74	204.03
Mean income per capita Sub district (in 1,000 Rupiah)	249,72	431.46
Mean income per capita Community (in 1,000 Rupiah)	249.72	344.53
Mean assets per capita Province (in 1,000 Rupiah)	12,900	8,312
Mean assets per capita District (in 1,000 Rupiah)	13,100	10,800
Mean assets per capita Sub district (in 1,000 Rupiah)	13,100	14,100
Mean assets per capita Community (in 1,000 Rupiah)	13,100	14,900

Table C.3: Expected future economic level regressions by geographical area: complete results

Dep.Variables: Expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln mean income per capita of reference group	0.123***	0.132***	0.198***	0.404***
	(0.012)	(0.012)	(0.013)	(0.017)
Ln income per capita	0.141***	0.142***	0.141***	0.151***
	(0.008)	(0.008)	(0.007)	(0.006)
Age	-0.014***	-0.014***	-0.014***	-0.013***
	(0.0004)	(0.0005)	(0.0005)	(0.0005)
Male	-0.043**	-0.044**	-0.048**	-0.054***
	(0.015)	(0.015)	(0.015)	(0.015)
Married	0.125***	0.124***	0.125***	0.136***
	(0.016)	(0.016)	(0.016)	(0.016)
HHsize	0.039***	0.039***	0.038***	0.038***
	(0.004)	(0.004)	(0.004)	(0.004)
Working	0.023	0.024	0.03*	0.026
	(0.016)	(0.016)	(0.016)	(0.016)
Observations	29,000	29,000	29,000	29,000
Pseudo R^2	0.037	0.038	0.040	0.044

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.4: Change in expected future economic level regressions by geographical area: complete results

Dep.Variables: Change in expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln mean income per capita of reference group	-0.023	-0.024	-0.007	-0.068***
	(0.016)	(0.019)	(0.018)	(0.024)
Ln income per capita	0.014	0.01	0.007	0.013
	(0.01)	(0.009)	(0.009)	(0.009)
Age	-0.01***	-0.01***	-0.01***	-0.011***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Male	-0.074***	-0.074***	-0.074***	-0.072***
	(0.019)	(0.019)	(0.019)	(0.019)
Married	-0.082***	-0.081***	-0.081***	-0.083***
	(0.024)	(0.024)	(0.024)	(0.024)
HHsize	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Working	-0.002	-0.002	-0.003	-0.001
	(0.025)	(0.025)	(0.025)	(0.025)
Observations	16,601	16,601	16,601	16,601
Pseudo R^2	0.005	0.005	0.005	0.006

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.5: Marginal effect of level= 4 of expected future economic level regressions by geographical area

Dep.Variables: Expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln income per capita of reference group	0.024***	0.024***	0.024***	0.025***
	(0.001)	(0.001)	(0.001)	(0.001)
Ln income per capita	0.021***	0.022***	0.033***	0.068***
	(0.002)	(0.002)	(0.002)	(0.003)
Age	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	-0.007***	-0.007***	-0.008***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
Married	0.021***	0.021***	0.021***	0.0239***
	(0.003)	(0.003)	(0.003)	(0.003)
HHsize	0.007***	0.007***	0.007***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Working	0.004	0.004	0.005*	0.004
	(0.003)	(0.003)	(0.003)	(0.003)

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.6: Marginal effect of change=1 of change in expected future economic level regressions by geographical area

Dep.Var: Change in expected future economic level	Reference group : education group at geographical level			
	Community	Sub-district	District	Province
	(1)	(2)	(3)	(4)
Ln income per capita of reference group	-0.003	-0.003	-0.001	-0.008***
	(0.002)	(0.002)	(0.002)	(0.003)
Ln income per capita	0.002	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	-0.009***	-0.009***	-0.009***	-0.008***
	(0.00221)	(0.00221)	(0.00221)	(0.00221)
Married	-0.01**	-0.009***	-0.009***	-0.01***
	(0.003)	(0.003)	(0.003)	(0.003)
HHsize	0.0001	0.0001	0.0001	0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Working	-0.0003	-0.0003	-0.0003	-0.0001
	(0.003)	(0.003)	(0.003)	(0.003)

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.7: Expected future economic level regressions with different specifications: complete results

Dep.Var: Expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	0.404***	0.514***	0.511***
	(0.017)	(0.02)	(0.02)
Ln income per capita	0.151***	0.162***	0.161***
	(0.006)	(0.007)	(0.007)
Age	-0.013***	-0.013***	-0.013***
	(0.001)	(0.001)	(0.001)
Male	-0.054***	-0.049***	-0.09***
	(0.015)	(0.015)	(0.016)
Married	0.136***	0.143***	0.125***
	(0.016)	(0.016)	(0.016)
Household size	0.038***	0.036***	0.036***
	(0.004)	(0.004)	(0.004)
Working	0.026	0.004	-0.005
	(0.016)	(0.016)	(0.016)
Gini		2.265***	2.284***
		(0.302)	(0.302)
Ask help from neighbour			-0.066***
			(0.02)
Willing to help			-0.027
			(0.085)
Participation in community meeting			0.086***
			(0.019)
Participation in voluntary labour			0.051***
			(0.019)
Participation in improving neighborhood			0.057***
			(0.021)
Fixed-effect Province	No	No	Yes
Observations	29,000	28,815	28,815
Pseudo R^2	0.044	0.055	0.056

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.8: Change in expected future economic level regressions with different specifications: complete results

Dep.Var: Change in expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	-0.068***	-0.116***	-0.111***
	(0.024)	(0.026)	(0.027)
Ln income per capita	0.013	0.013	0.013
	(0.009)	(0.009)	(0.009)
Age	-0.011***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)
Male	-0.072***	-0.076***	-0.065***
	(0.019)	(0.019)	(0.02)
Married	-0.083***	-0.086***	-0.082***
	(0.024)	(0.025)	(0.025)
Household size	0.001	0.003	0.004
	(0.003)	(0.003)	(0.003)
Working	-0.001	-0.006	-0.004
	(0.025)	(0.025)	(0.025)
Gini		-7.082***	-7.051***
		(2.615)	(2.68)
Ask help from neighbour			-0.041*
			(0.023)
Willing to help			-0.158
			(0.098)
Participation in community meeting			-0.026
			(0.022)
Participation in voluntary labour			-0.014
			(0.022)
Participation in improving neighborhood			0.011
			(0.023)
Fixed-effect Province	No	No	Yes
Observations	16,601	16,601	16,500
Pseudo R^2	0.006	0.011	0.011

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.9: Marginal effect of level=2 until level=6 of expected future economic level regressions

Dep.Var: Expected future economic level	Reference group : education group at province				
	level=2	level=3	level=4	level=5	level=6
	(1)	(2)	(3)	(4)	(5)
Ln mean income per capita of reference group	0.007***	0.022***	0.012***	-0.032***	-0.01***
	(0.002)	(0.005)	(0.003)	(0.008)	(0.002)
Ln income per capita	-0.002***	-0.005***	-0.002***	0.006***	0.002***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Age	0.0003***	0.001***	0.001***	-0.001***	-0.0004***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Male	0.005***	0.016***	0.008***	-0.022***	-0.007***
	(0.001)	(0.004)	(0.002)	(0.006)	(0.002)
Married	-0.003*	-0.009*	-0.005*	0.013*	0.004*
	(0.002)	(0.005)	(0.003)	(0.00679)	(0.002)
Household size	0.0001	0.0002	0.0001	-0.0003	-0.0001
	(0.0002)	(0.0005)	(0.0003)	(0.0008	(0.0002)
Working	-0.002	-0.006	-0.003	0.009	0.003
	(0.002)	(0.005)	(0.003)	(0.007)	(0.002)
Gini	0.290*	0.864*	0.457*	-1.227*	-0.371*
	(0.158)	(0.469)	(0.250)	(0.666)	(0.202)
Ask help from neighbour	-0.003	-0.008	-0.004	0.011	0.003
	(0.002)	(0.005)	(0.002)	(0.007)	(0.002)
Willing to help	-0.004	-0.013	-0.007	0.0185	0.006
	(0.006)	(0.019)	(0.01)	(0.027)	(0.008)
Participation in community meeting	0.001	0.003	0.002	-0.005	-0.001
	(0.002)	(0.005)	(0.002)	(0.007)	(0.002)
Participation in voluntary labour	0.002	0.006	0.003	-0.009	-0.003
	(0.0021)	(0.004)	(0.002)	(0.006)	(0.002)
Participation in improving neighborhood	0.002	0.007	0.003	-0.009	-0.003
	(0.002)	(0.005)	(0.002)	(0.007)	(0.002)

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.10: Marginal effect of change=-2 to change=2 of change in expected future economic level regressions

Dep.Var: Change in expected future economic level	Reference group : education group at province				
	change=-2	change=-1	change=0	change=1	change=2
	(1)	(2)	(3)	(4)	(5)
Ln mean income per capita of reference group	0.01***	0.019***	0.01***	-0.013***	-0.018***
	(0.003)	(0.005)	(0.003)	(0.003)	(0.004)
Ln income per capita	-0.001	-0.002	-0.001	0.001	0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Age	0.001***	0.002***	0.001***	-0.001***	-0.002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	0.006***	0.011***	0.006***	-0.008***	-0.011***
	(0.002)	(0.003)	(0.009)	(0.002)	(0.003)
Married	0.008***	0.014***	0.008***	-0.009***	-0.013***
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Household size	-0.0003	-0.0006	-0.0003	0.0004	0.0006
	(0.0003)	(0.0005)	(0.0003)	(0.0003)	(0.0005)
Working	0.0003	0.0006	0.0003	-0.0004	-0.0006
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Gini	0.657***	1.204***	0.652***	-0.810***	-1.155***
	(0.250)	(0.458)	(0.249)	(0.308)	(0.439)
Ask help from neighbour	0.004*	0.007*	0.004*	-0.005*	-0.007*
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Willing to help	0.015	0.027	0.015	-0.018	-0.026
	(0.009)	(0.017)	(0.009	(0.011)	(0.016)
Participation in community meeting	0.002	0.004	0.002	-0.003	-0.004
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Participation in voluntary labour	0.001	0.002	0.001	-0.002	-0.002
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)
Participation in improving neighborhood	-0.001	-0.002	-0.001	0.0013	0.002
	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.11: Expected future economic level regressions by income quintile

Dep.Var: Expected future economic level	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Ln mean income per capita of reference group	0.43***	0.623***	0.486***	0.531***	0.437***
	(0.057)	(0.051)	(0.046)	(0.047)	(0.041)
Ln income per capita	0.097***	0.234**	0.192*	0.134	0.136***
	(0.017)	(0.086)	(0.107)	(0.098)	(0.035)
Age	-0.013***	-0.011***	-0.016***	-0.013***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.008	-0.09**	-0.077**	-0.157***	-0.147***
	(0.036)	(0.036)	(0.037)	(0.036)	(0.036)
Married	0.122***	0.079**	0.204***	0.077**	0.121**
	(0.035)	(0.036)	(0.035)	(0.038)	(0.039)
Household size	0.018**	0.031***	0.033***	0.055***	0.069***
	(0.008)	(0.009)	(0.008)	(0.009)	(0.009)
Working	-0.008	-0.062*	0.009	-0.016	0.058
	(0.035)	(0.035)	(0.036)	(0.035)	(0.038)
Gini	3.344***	1.260*	3.254***	1.515**	1.641**
	(0.601)	(0.718)	(0.772)	(0.670)	(0.817)
Ask help from neighbour	-0.154**	-0.007	-0.107**	-0.04	-0.026
	(0.052)	(0.043)	(0.044)	(0.042)	(0.04)
Willing to help	0.310*	-0.319	-0.098	0.134	-0.373**
	(0.175)	(0.238)	(0.159)	(0.199)	(0.170)
Participation in community meeting	0.084*	0.202***	0.021	0.057	0.025
	(0.046)	(0.044)	(0.043)	(0.042)	(0.0429)
Participation in voluntary labour	0.008	-0.0157	0.121**	0.142***	0.02
	(0.042)	(0.042)	(0.042)	(0.042)	(0.043)
Participation in improving neighborhood	0.022	0.041	-0.009	0.082*	0.164***
	(0.045)	(0.047)	(0.045)	(0.048)	(0.048)
Fixed-effect Province	Yes	Yes	Yes	Yes	Yes
Observations	5,769	5,775	5,786	5,768	5,717
Pseudo R^2	0.046	0.046	0.047	0.044	0.042

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.12: Change in expected future economic level regressions by income quintile

Dep.Var: Change in expected future economic level	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Ln mean income per capita of reference group	-0.104	-0.173**	-0.0145	-0.101*	-0.133**
	(0.07)	(0.067)	(0.061)	(0.057)	(0.056)
Ln income per capita	0.009	0.047	-0.143	-0.109	-0.024
	(0.027)	(0.110)	(0.143)	(0.126)	(0.039)
Age	-0.01***	-0.011***	-0.008***	-0.010***	-0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Male	-0.089*	-0.004	-0.118***	-0.03	-0.095**
	(0.047)	(0.045)	(0.044)	(0.047)	(0.044)
Married	0.002	-0.079	-0.146***	-0.131**	-0.049
	(0.053)	(0.053)	(0.057)	(0.058)	(0.057)
Household size	0.001	0.008	0.005	0.006	-0.0043
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Working	0.008	-0.013	-0.062	0.004	0.049
	(0.051)	(0.052)	(0.053)	(0.058)	(0.066)
Gini	-1.459	-7.453**	-17.10*	-13.37***	0.152
	(4.289)	(3.644)	(9.149)	(4.830)	(1.745)
Ask help from neighbour	-0.01	-0.062	0.009	-0.023	-0.136**
	(0.053)	(0.051)	(0.049)	(0.05)	(0.053)
Willing to help	-0.057	-0.128	-0.288	-0.04	-0.240
	(0.206)	(0.159)	(0.230)	(0.281)	(0.213)
Participation in community meeting	-0.086*	-0.018	0.039	-0.015	-0.053
	(0.051)	(0.049)	(0.048)	(0.05)	(0.05)
Participation in voluntary labour	-0.055	0.012	0.033	-0.00523	-0.052
	(0.05)	(0.05)	(0.048)	(0.05)	(0.049)
Participation in improving neighborhood	0.120**	-0.127***	-0.045	0.031	0.095*
	(0.05)	(0.048)	(0.045)	(0.052)	(0.054)
Fixed-effect Province	Yes	Yes	Yes	Yes	Yes
Observations	3,305	3,263	3,282	3,299	3,352
Pseudo R^2	0.012	0.014	0.012	0.014	0.016

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.13: Expected future economic level regressions by religious group

Dep.Var: Expected future economic level	Muslim (1)	Christian (2)	Hindu (3)
Ln mean income per capita of reference group	0.508*** (0.021)	0.594*** (0.09)	0.520*** (0.084)
Ln income per capita	0.158*** (0.007)	0.159*** (0.027)	0.183*** (0.032)
Age	-0.013*** (0.001)	-0.012*** (0.002)	-0.008*** (0.002)
Male	-0.09*** (0.017)	-0.09 (0.061)	-0.217*** (0.071)
Married	0.131*** (0.017)	0.028 (0.069)	0.0183 (0.075)
Household size	0.039*** (0.004)	-0.017 (0.015)	0.024 (0.017)
Working	0.003 (0.017)	-0.097 (0.063)	0.047 (0.069)
Gini	1.966*** (0.368)	1.825*** (0.699)	6.267*** (1.023)
Ask help from neighbour	-0.062*** (0.021)	-0.08 (0.077)	-0.197** (0.081)
Willing to help	-0.017 (0.094)	-0.214 (0.276)	0.201 (0.184)
Participation in community meeting	0.093*** (0.02)	0.148* (0.081)	-0.041 (0.078)
Participation in voluntary labour	0.046** (0.02)	0.112 (0.078)	0.145* (0.075)
Participation in improving neighborhood	0.062*** (0.022)	-0.026 (0.089)	-0.005 (0.09)
Fixed-effect Province	Yes	Yes	Yes
Observations	25,735	1,637	1,340
Pseudo R^2	0.055	0.081	0.072

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.14: Change in expected future economic level regressions by religious group

Dep.Var: Change in expected future economic level	Muslim (1)	Christian (2)	Hindu (3)
Ln mean income per capita of reference group	-0.112***	-0.169	-0.061
	(0.023)	(0.121)	(0.102)
Ln income per capita	0.016*	-0.042	0.005
	(0.009)	(0.034)	(0.037)
Age	-0.010***	-0.004	-0.007**
	(0.001)	(0.003)	(0.003)
Male	-0.067***	-0.067	-0.079
	(0.021)	(0.082)	(0.082)
Married	-0.081***	-0.160*	0.0098
	(0.026)	(0.097)	(0.107)
Household size	0.004	-0.001	0.001
	(0.003)	(0.013)	(0.011)
Working	0.012	-0.225*	-0.143
	(0.026)	(0.117)	(0.1)
Gini	-5.539**	-33.05***	-20.43***
	(2.566)	(2.759)	(3.952)
Ask help from neighbour	-0.044*	-0.051	0.163*
	(0.024)	(0.112)	(0.089)
Willing to help	-0.203**	0.088	0.397
	(0.102)	(0.278)	(0.715)
Participation in community meeting	-0.013	-0.133	-0.225**
	(0.024)	(0.093)	(0.089)
Participation in voluntary labour	-0.009	-0.192**	0.083
	(0.023)	(0.096)	(0.081)
Participation in improving neighborhood	0.014	-0.029	0.046
	(0.024)	(0.096)	(0.096)
Fixed-effect Province	Yes	Yes	Yes
Observations	14,736	842	900
Pseudo R^2	0.012	0.023	0.013

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.15: Expected future economic level regressions by urban/rural area

Dep.Var: Expected future economic level	Urban (1)	Rural (2)
Ln mean income per capita of reference group	0.565*** (0.028)	0.424*** (0.033)
Ln income per capita	0.174*** (0.0113)	0.146*** (0.008)
Age	-0.013*** (0.001)	-0.013*** (0.001)
Male	-0.115*** (0.022)	-0.072*** (0.024)
Married	0.094*** (0.022)	0.152*** (0.024)
Household size	0.029*** (0.005)	0.037*** (0.006)
Working	-0.032 (0.021)	0.026 (0.023)
Gini	1.715*** (0.438)	2.572*** (0.413)
Ask help from neighbour	-0.087*** (0.025)	-0.039 (0.03)
Willing to help	-0.079 (0.103)	0.022 (0.138)
Participation in community meeting	0.059** (0.026)	0.114*** (0.028)
Participation in voluntary labour	0.066** (0.026)	0.04 (0.027)
Participation in improving neighborhood	0.054* (0.03)	0.058** (0.029)
Fixed-effect Province	Yes	Yes
Observations	15,116	13,699
Pseudo R^2	0.059	0.054

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.16: Change in expected future economic level regressions by urban/rural area

Dep.Var: Change in expected future economic level	Urban (1)	Rural (2)
Ln mean income per capita of reference group	-0.036	-0.170***
	(0.035)	(0.044)
Ln income per capita	-0.001	0.023*
	(0.013)	(0.012)
Age	-0.012***	-0.011***
	(0.001)	(0.001)
Male	-0.092***	-0.041
	(0.023)	(0.031)
Married	-0.073**	-0.097**
	(0.032)	(0.038)
Household size	0.001	0.007
	(0.004)	(0.004)
Working	0.005	-0.008
	(0.032)	(0.037)
Gini	-6.179**	-13.58
	(2.679)	(10.73)
Ask help from neighbour	-0.064**	-0.016
	(0.029)	(0.036)
Willing to help	-0.013	-0.276**
	(0.136)	(0.136)
Participation in community meeting	-0.013	-0.033
	(0.029)	(0.034)
Participation in voluntary labour	0.01	-0.039
	(0.029)	(0.033)
Participation in improving neighborhood	0.026	0.006
	(0.031)	(0.033)
Fixed-effect Province	Yes	Yes
Observations	9,253	7,247
Pseudo R^2	0.011	0.013

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.17: Expected future economic level regressions on reference group's asset: complete results

Dep.Var: Expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean asset per capita of reference group	0.386***	0.543***	0.537***
	(0.017)	(0.021)	(0.021)
Ln asset per capita	0.141***	0.137***	0.136***
	(0.005)	(0.006)	(0.006)
Age	-0.014***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)
Male	-0.059***	-0.068***	-0.104***
	(0.017)	(0.017)	(0.018)
Married	0.106***	0.099***	0.085***
	(0.021)	(0.021)	(0.021)
Household size	0.017***	0.011***	0.011**
	(0.004)	(0.004)	(0.004)
Working	0.049***	0.042**	0.035*
	(0.018)	(0.018)	(0.018)
Gini		-1.853***	-1.863***
		(0.406)	(0.406)
Ask help from neighbour			-0.058***
			(0.022)
Willing to help			-0.053
			(0.0925)
Participation in community meeting			0.054**
			(0.021)
Participation in voluntary labour			0.05**
			(0.02)
Participation in improving neighborhood			0.051**
			(0.023)
Fixed-effect Province	No	No	Yes
Observations	23,627	23,499	23,499
Pseudo R^2	0.047	0.059	0.060

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.18: Change in expected future economic level regressions on reference group's asset: complete results

Dep.Var: Change in expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean asset per capita of reference group	-0.014	-0.07***	-0.067***
	(0.019)	(0.022)	(0.022)
Ln asset per capita	0.004	0.008	0.009
	(0.006)	(0.006)	(0.006)
Age	-0.01***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)
Male	-0.071***	-0.075***	-0.064***
	(0.019)	(0.019)	(0.02)
Married	-0.081***	-0.086***	-0.082***
	(0.024)	(0.024)	(0.025)
Household size	0.001	0.004	0.004
	(0.003)	(0.003)	(0.003)
Working	0.002	-0.002	-0.002
	(0.025)	(0.025)	(0.025)
Gini		43.57**	43.67**
		(18.89)	(18.94)
Ask help from neighbour			-0.043*
			(0.023)
Willing to help			-0.163*
			(0.099)
Participation in community meeting			-0.031
			(0.022)
Participation in voluntary labour			-0.015
			(0.022)
Participation in improving neighborhood			0.013
			(0.023)
Fixed-effect Province	No	No	Yes
Observations	16,498	16,498	1,498
Pseudo R^2	0.005	0.011	0.011

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.19: Keeping standard of living in the future regressions: complete results

Dep.Var: Keeping standard of living in the future	Reference group : education group at province		
	(1)	(2)	(3)
Ln mean income per capita of reference group	0.169***	0.281***	0.278***
	(0.019)	(0.023)	(0.023)
Ln income per capita	0.138***	0.162***	0.161***
	(0.008)	(0.008)	(0.008)
Age	-0.004***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)
Male	-0.05***	-0.052***	-0.084***
	(0.016)	(0.017)	(0.018)
Married	0.04**	0.042**	0.027
	(0.017)	(0.018)	(0.018)
Household size	0.008**	0.011***	0.011***
	(0.004)	(0.004)	(0.004)
Working	0.02	0.005	-0.003
	(0.017)	(0.017)	(0.018)
Gini		5.553***	5.584***
		(0.309)	(0.310)
Ask help from neighbour			-0.02
			(0.021)
Willing to help			-0.045
			(0.093)
Participation in community meeting			0.072***
			(0.022)
Participation in voluntary labour			0.009
			(0.021)
Participation in improving neighborhood			0.073***
			(0.023)
Fixed-effect Province	No	No	Yes
Observations	28,793	28,619	28,619
Pseudo R^2	0.019	0.042	0.042

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.20: Change in keeping standard of living in the future regressions: complete results

Dep.Var: Change in keeping standard of living	Reference group : education group at province		
in the future	(1)	(2)	(3)
Ln mean income per capita	-0.065***	-0.117***	-0.114***
of reference group	(0.025)	(0.028)	(0.028)
Ln income per capita	0.02**	0.023**	0.024***
	(0.009)	(0.009)	(0.009)
Age	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)
Male	-0.099***	-0.095***	-0.081***
	(0.02)	(0.02)	(0.021)
Married	0.046*	0.043*	0.046*
	(0.024)	(0.024)	(0.025)
Household size	-0.003	-0.001	-0.001
	(0.003)	(0.003)	(0.003)
Working	0.036	0.031	0.033
	(0.026)	(0.026)	(0.026)
Gini		-4.312*	-4.456*
		(2.377)	(2.421)
Ask help from neighbour			0.039
			(0.024)
Willing to help			0.067
			(0.098)
Participation in			-0.017
community meeting			(0.024)
Participation in			-0.033
voluntary labour			(0.023)
Participation in			-0.034
improving neighborhood			(0.024)
Fixed-effect Province	No	No	Yes
Observations	16,603	16,603	16,502
Pseudo R^2	0.002	0.005	0.006

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.21: Expected future economic level regressions on reference group's median income

Dep.Var: Expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln median income per capita of reference group	0.433***	0.716***	0.710***
	(0.017)	(0.022)	(0.022)
Ln income per capita	0.133***	0.134***	0.134***
	(0.007)	(0.007)	(0.007)
Age	-0.012***	-0.01***	-0.011***
	(0.0005)	(0.0005)	(0.0005)
Male	-0.064***	-0.069***	-0.105***
	(0.015)	(0.015)	(0.016)
Married	0.131***	0.134***	0.121***
	(0.016)	(0.016)	(0.016)
Household size	0.036***	0.034***	0.034***
	(0.004)	(0.004)	(0.004)
Working	0.03*	0.011	0.004
	(0.016)	(0.016)	(0.016)
Gini		4.679***	4.674***
		(0.316)	(0.317)
Ask help from neighbour			-0.054***
			(0.02)
Willing to help			-0.032
			(0.085)
Participation in community meeting			0.048**
			(0.02)
Participation in voluntary labour			0.052***
			(0.019)
Participation in improving neighborhood			0.064***
			(0.021)
Fixed-effect Province	No	No	Yes
Observations	29,000	28,815	2,815
Pseudo R^2	0.044	0.061	0.062

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

Table C.22: Change in expected future economic level regressions on reference group's median income

Dep.Var: Change in expected future economic level	Reference group : education group at province		
	(1)	(2)	(3)
Ln median income per capita of reference group	-0.037	-0.099***	-0.094***
	(0.025)	(0.029)	(0.03)
Ln income per capita	0.009	0.01	0.011
	(0.009)	(0.009)	(0.009)
Age	-0.01***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)
Male	-0.073***	-0.077***	-0.066***
	(0.019)	(0.019)	(0.02)
Married	-0.082***	-0.085***	-0.081***
	(0.024)	(0.025)	(0.025)
Household size	0.001	0.003	0.004
	(0.003)	(0.003)	(0.003)
Working	-0.002	-0.006	-0.004
	(0.025)	(0.025)	(0.025)
Gini		-6.416**	-6.401**
		(2.611)	(2.677)
Ask help from neighbour			-0.042*
			(0.023)
Willing to help			-0.162*
			(0.098)
Participation in community meeting			-0.029
			(0.022)
Participation in voluntary labour			-0.014
			(0.022)
Participation in improving neighborhood			0.012
			(0.023)
Fixed-effect Province	No	No	Yes
Observations	16,601	16,601	16,500
Pseudo R^2	0.005	0.011	0.011

Standard errors in parentheses, *p<0.10, **p<0.05, ***p<0.01

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