

# **Corporate diversification, firm value and financial management**

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## **Abstract**

The objective of this thesis is to investigate the influence of corporate diversification on firm value and financial management. The first study in the thesis examines whether and how organisational learning from diversification experience affects the cross-sectional variation of the value of diversified firms. Three main findings are reported: first, a U-shaped relationship between diversification value and diversification experience is identified; second, greater similarity in industries between diversifications results in a higher diversification value. Finally, the relationship between the value of diversification and the temporal interval between diversifications forms an inverted U-shaped curve. In an extended analysis, external learning from the experience of others is shown to affect diversification value in a cubic pattern.

While investigating cross-sectional distribution of diversification value is an increasingly common approach to the topic, research on the average value effect of diversification remain important in the literature. The second study directly investigates the effect of diversification on investor wealth. By adopting a novel portfolio simulation approach, the study shows that investing in portfolios of diversified firms provides a higher return and lower risk than investing in portfolios of specialised firms. Further analysis, however, shows that these benefits from corporate diversification can be better achieved by shareholders' self-diversified portfolios. This finding implies that corporate diversification may not be necessary for shareholders' benefit. The final analysis in the study provides evidence that firm diversification is more likely motivated by the managerial risk preferences.

## ABSTRACT

The relationship between diversification and firm value may be explained by the diversification effects on firm operations. Researchers often relate diversification discount to wasteful spending by diversified firms. The third study examines financial management in diversified firms by looking at how these firms adjust their cash flows. More specifically, following the findings of Duchin (2010) and Subramaniam, Tang, Yue and Zhou (2011) that diversified firms hold significantly less cash than specialised firms, the study investigates how diversified firms manage their cash flows to achieve this lower cash balance. The study finds that diversified firms have a higher free cash flow (as a result of having similar operating cash flow but lower investing cash flow), and a lower financing cash flow compared to specialised firms. More particularly, it shows that diversified firms issue less debt and pay out more dividends, relative to specialised firms. The study also provides evidence of the active role of internal capital markets in a firm's financial management.

Collectively, three major conclusions can be withdrawn. First, learning from both internal and external diversification experience has a significant effect on the value of diversification. Second, investing in portfolios of diversified firms generates better results than does investing in portfolios of specialised firms. Thus, the conventional wisdom in the literature that diversification destroys shareholder wealth may not be wholly correct. Third, the findings that diversified firms have similar operating cash flow, lower investing cash flow, higher dividends and lower cash holdings do not indicate that such firms have overinvestment problems.

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## 1. Introduction

### 1.1. Introduction

For a long time, diversified firms have played a dominant role in the United States (US) economy. Over the period 1990-1996, diversified firms accounted for 50% of employment and owned about 60% of the total assets of publicly-traded US firms (Martin and Sayrak, 2003). Montgomery (1994) found that by 1992, two-thirds of the Fortune 500 companies operated in at least five distinct lines of business. Maksimovic and Phillips (2007) recently reported that more than 50% of US production is carried out by conglomerate firms.

As a topic of research, corporate diversification has a long and rich tradition. Studies of corporate diversification are at the centre of a wide range of research areas, such as corporate finance, financial economics, economics, strategic management and industrial organisation. Financial studies have focused on two main research issues: investigating the influence of diversification on firm value and on financial management. The present thesis is built on and contributes to these two research domains. This study follows Subramaniam et al., (2011) to define diversified firms as firms operate in more than one segment with different SIC code at the 2-digit level. Specialised firms are firms with one or more segments that are all operating in the same 2-digit SIC code industry.

The first study of this thesis examines how organisational learning from diversification experience affects the cross-sectional variation of value of diversified

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firms. The influence of diversification on firm value is perhaps the most researched, and also the most controversial, topic in the literature. Theoretical studies have not been able to generate a clear-cut prediction of whether diversification is a good or bad strategy. At the same time, the results of numerous empirical studies on the average value of diversification are also mixed and inconclusive<sup>1</sup>. Recent development of the topic has been marked by the discovery, by Lang and Stulz (1994) and Berger and Ofek (1995), that diversified firms are traded at a discount to comparable specialised firms. While many studies (Servaes, 1996; Lins and Servaes, 1999, 2002; Lamont and Polk, 2002, Billet and Mauer, 2003; Ozbas and Scharfstein, 2010, among others) have replicated and extended this finding, several others (Villalonga, 2000; Whited, 2001; Chevalier, 2000; Mansi and Reeb, 2002; Campa and Kedia, 2002; Mitton and Vorkink, 2010, among others) have seriously challenged the validity of the finding, on different grounds. The question of the value effect of diversification remains a puzzle in the literature.

An important suggestion that has arisen in the debate is that the value of diversification is conditional on various factors. Stein (2003) has suggested that researchers should pay more attention to the cross-sectional variation of diversification value: i.e., they should identify those specific circumstances in which diversification is either a value-creating or value-destroying strategy.

Prior studies in the literature have provided evidence of the relation between diversification value and the efficiency of internal capital markets, the level of diversification and corporate governance. This study adopts the arguments from organisational literature to investigate whether and how firms can learn from previous diversifications to enhance the value of subsequent diversification. The study directly

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<sup>1</sup> The literature review section of the thesis provides a comprehensive review of theoretical arguments and empirical studies on the topic.

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contributes to a large body of research (Rajan et al., 2000; Datta, D'Mello and Iskandar-Datta, 2009; Sautner and Villalonga, 2010; Ozbas and Scharfstein, 2010, among others) on the cross-sectional variation of diversified firms, by showing that diversification value varies with organisational learning from different types of experience.

While the first study in this thesis investigates the variation of diversification value among diversified firms, the second study provides a direct comparison between diversified and specialised firms by looking at the effects of corporate diversification on investor wealth. The influential findings about diversification discount by Lang and Stulz (1994) and Berger and Ofek (1995), tend to imply that diversification typically destroys shareholder wealth. However, some researchers (Lamont and Polk, 2001; Mitton and Vorkink, 2010) have argued that shares of discounted diversified firms may provide higher returns for investors.

The second study in the research examines whether investing in stocks of diversified firms provides comparable returns for investors, relative to investing in stocks of specialised firms. Whereas previous studies have mostly focused on returns on stocks of individual firms, this study adopts a novel and unique research design to compare performances of portfolios of randomly selected diversified and specialised firms. A major contribution to the literature is the evidence in this study which shows that portfolios of diversified firms generate better risk-adjusted returns than portfolios of specialised firms. Therefore, the conventional wisdom in the literature that diversification destroys investor wealth may not be wholly correct.

Perhaps one of the most fundamental questions in the debate about diversification value is why there should be a diversification discount; or, more generally, why there should be a value effects from diversification. Researchers frequently relate the discount to inefficient financial management at diversified firms. Managers of

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diversified firms tend to overinvest (Jensen, 1986; Inderst and Muller, 2003) and to allocate funds inefficiently among segments (Scharfstein, 1998; Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000, among others).

The third empirical study that forms part of this thesis, therefore, is an in-depth investigation of financial management at diversified firms. More particularly, following recent findings that diversified firms have lower cash holdings (Duchin, 2010; Subramaniam et al., 2011), the study investigates how diversified firms manage their cash flows to achieve this cash balance. The main finding is that diversified firms maintain their lower cash balance by regularly saving less cash and by raising less external finance. The contribution to the literature is significant: the study highlights the differences in cash flow management between diversified and specialised firms. Importantly, the finding that diversified firms has similar operating cash flow, lower investing cash flow and higher cash dividends compared to specialised firms suggests that diversified firms do not have overinvestment problems.

The three empirical studies have been conducted in a US context for several reasons. First, the size of the economy and the number of diversified firms that operate in it means that the US is able to provide the largest sample for the study. Second, the availability of segmental data is a primary requirement for research into corporate diversification. Under Statement of Financial Standards (SFAS) No. 14 and SEC regulation S-K (1977), US firms are required to report audited information on segments whose assets, sales or profits exceed 10% of the firms' consolidated totals for each of these items. Segmental data is, therefore, most readily available for US firms.

The following subsections outline in greater detail the motivations, research questions, findings and contributions of the three empirical studies that form part of this thesis.

## **1.2. Motivations, research questions, findings and contributions**

This section provides a summary of the motivations, research questions, findings and contributions of each of the three empirical chapters in this thesis.

### **1.2.1. Diversification experience, organisation learning and value of diversified firms**

The first empirical study of this thesis aims to investigate how cross-sectional variation of the value of diversified firms is influenced by organisational learning gained from diversification experience<sup>2</sup>. Study of the value effect of diversification is perhaps the most important topic in the literature. While theoretical work has been unable to generate a strong foundation for determining whether diversification is a good or bad strategy, the results of empirical studies are also rather inconsistent. Indeed, since the earliest studies in the literature, when diversified firms were still widely lauded as “the financial concept of the future”, “merger magic” or “instruments for the creative deployment of men, machines and money” (Smith and Weston, 1977), the results of comparisons of the value of conglomerates and non-conglomerates have been mixed<sup>3</sup>. Recent research, which has been marked by the identification of a diversification discount (Lang and Stulz, 1994; Berger and Ofek, 1995), and the subsequent debate surrounding the discount, is also unable to generate a conclusive answer about whether diversification is a good or bad strategy<sup>4</sup>. This indicates that the value of diversification may be affected by several factors. Stein (2003) suggests that researchers should pay more attention to cross-sectional variation: i.e., they should identify the specific

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<sup>2</sup> In this study, following Argote and Miron-Specktor (2011) and Huber (1991) organisational learning is narrowly defined as a change in an organisation’s knowledge that occurs as a result of experience.

<sup>3</sup> Several studies (Westen and Mansingha, 1971; Beattie, 1980; Smith and Weston, 1977) report better performance for diversified firms. Some find insignificant difference between value of diversified and specialised firm (Melicher and Rush, 1973; Joenk and Nielsen, 1974). Meanwhile, Mason and Goudzwaard (1976) and Holzmann, Copeland and Haya (1975) document conglomerates that have a lower value compared to non-conglomerates.

<sup>4</sup> The literature review chapter of this thesis provides a comprehensive review of the discussion.



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circumstances in which diversification may be a value-creating or value-destroying strategy<sup>5</sup>.

A large number of empirical studies have examined the cross-sectional variance in the value of diversified firms. More specifically, Rajan et al. (2000), Lamont and Polk (2002), Berger and Ofek (1995), among others, have found a negative relationship between diversification value and the degree of diversification. The value of diversification is also influenced by the efficiency of internal capital markets (Rajan et al., 2000; Datta, D'Mello and Iskandar-Datta, 2009; Sautner and Villalonga, 2010; Ozbas and Scharfstein, 2010) or corporate governance (Hoechle, Schmid, Walter and Yermak, 2012; Scharfstein, 1998; Palia, 1999, among others).

This empirical study draws on arguments from organisational learning literature to investigate the effects learning from experience of diversification have on the cross-section of the value of diversified firms. Studies in organisational learning literature provide a wide range of theoretical arguments and empirical evidence illustrating the impact learning from prior experience has on the performance of strategic activities (e.g. acquisition, strategic alliance, diversification, etc.)<sup>6</sup>. In particular, as noted by Bapuji and Crossan (2004), an important development in the literature is the emergence of a learning perspective, i.e. the use of the organisational learning concept to explain various organisational phenomena, such as performance, innovation or market orientation. Taken together, this suggests that the organisational learning perspective is an appropriate one for explaining the cross-section of diversification value.

Adopting the theoretical arguments developed in organisational learning literature, this study investigates three main hypotheses relating to the relationship

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<sup>5</sup> Henceforth the terms “value of diversified firms” and “value of diversification” are used interchangeably because when diversification is a value-creating strategy the firm value is higher, and vice versa.

<sup>6</sup> Please refer to Barkema and Schijven (2008) and Argote and Miron-Specktor (2011) for comprehensive reviews of the literature.

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between diversification value and the level, similarity and timing of the diversification experience. Firstly, following the arguments proposed by Haleblan and Finkelstein (1999), it is expected that diversification value varies with the level of diversification experience, in a U-shaped pattern. In more detail, the value of a second diversification tends to be lower than the first because when firms are still novices in terms of diversification they tend to inappropriately generalise their experience. As firms gain more diversification experience and gradually become experts, the tendency to inappropriately generalise experience will reverse to appropriate generalisation<sup>7</sup>. The initial negative effect of experience on the value of diversification may reverse, to become a positive effect, following a point where firms become expert enough to correctly learn from experience. This results in a U-shaped curve. Secondly, as argued in Haleblan and Finkelstein (1999) and Finkelstein and Haleblan (2002), it is more likely that firms will successfully learn from their experience when a new diversification is in the same industry as the previous diversification. Finally, several studies (Brown and Eisenhardt, 1999; Gersick, 1994; Hayward, 2002) have argued that the process of learning from experience may be derailed when there is too long or too short a temporal interval between acquisitions. This research, therefore, hypothesises that the relationship between the value of diversification and the temporal interval between diversifications forms an inverted U-shaped pattern.

Using a sample of US firms in the 1990 to 2009 period, this study finds a U-shaped relationship between the value of diversification and the level of experience, in which learning from experience may reduce (improve) the value of diversification before (after) the point where firms have conducted about three diversifications. The value of diversification is higher when the focal diversification is in a similar industry as

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<sup>7</sup> Further discussions on the differences between novices and experts are documented in Novick (1988), Chi, Feltovich and Glaser (1981) and Haleblan and Finkelstein (1999).

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the previous diversification. Finally, the timing of diversification affects the value of diversification in an inverted U-shaped curve with a reflection point at seven years. This therefore suggests that diversification value increases (decreases) with the temporal interval between diversifications when that interval is less (more) than seven years.

The effects of learning from experience are also sizable in economics term. As is shown in this thesis, diversification similarity may increase the value of diversified firms (measured by industry-adjusted Q) by 30% of the average value of the sample. The effect of experience level and timing shows marginal variation along a non-linear curve. The value of diversification in firms with two (four) preceding diversifications marginally decreases (increases) by 0.097 (0.143): equal to 17% (25%) of the mean value of the sample. In respect of the timing of experience, on the raising side of the inverted U-shaped curve, if firms increase the temporal interval between diversifications from two to three years, the value of diversification may increase by 17.7% of the mean value of the sample. On the downward side, a one year delay between diversifications, from nine to ten years, will reduce the value by 10.3% of the average industry-adjusted Q of the sample.

While the main analysis of this study presents the effect of internal learning from a firm's own experience on the firm value, an extension of the study investigates whether and how external learning from the experience of other firms in the same industry (i.e., industry experience) may affect the firm value. This study hypothesises that experience in the industry may affect the value of diversification in a cubic pattern, with three phases. In the first phase, when industry experience is rare, firms may not be able to identify appropriate lessons to learn from. Therefore, industry experience may have a negative effect on value. When experience is more abundant in the second phase, it may be beneficial to value. In the third phase, when industry experience is too

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heterogeneous and complicated, it may become detrimental to learning and value. Consistent with the hypothesis, this study empirically shows a cubic relationship between industry experience and the value of diversification.

This research contributes to both organisational learning and diversification literature. From my research into diversification literature, this study is the first to adopt an organisational learning perspective to investigate the cross-sectional variation of diversification value. Complementing a large body of research (Rajan et al., 2000; Datta, D'Mello and Iskandar-Datta, 2009; Sautner and Villalonga, 2010; Ozbas and Scharfstein, 2010, among others) investigating the cross-sectional variation of diversified firms, this study shows that learning from a firm's own experience as well as industry experience plays a significant role in determining the value of diversification. More specifically, it shows a U-shaped relationship between the level of experience and diversification value, a higher value of diversification when diversifications are in a similar industry, and an inverted U-shaped relationship between diversification value and the temporal interval between diversifications. The industry experience also significantly affects the value of diversification, in a cubic pattern.

This study also directly complements a line of research in diversification literature (Lang and Stulz, 1994; Berger and Ofek, 1995; Rajan et al., 2000; Lamont and Polk, 2002; among others) which documents a negative relationship between diversification value and number of segments. The relationship is commonly interpreted as evidence of the effect of the level of diversification on value. This study provides a different interpretation, in which the relationship may represent the effect of the level of experience (measured by number of segments) on value. Taken together, by adopting the perspective of organisational literature, the research is able to significantly extend the current understanding on the value of diversified firms.

In organisational learning literature, the reported cubic relationship between the value of diversification and industry experience is a unique and original discovery. Indeed, previous studies (Baum and Ingram, 1998; Sarkar, Echambadi and Ford, 2003; Beckman and Haunschild, 2002) in the literature only document a linear relationship between external learning and value.

While previous empirical evidence of the value impact of experience is mostly found in the context of acquisitions, this study documents the relationship between experience and value in the context of diversification. This is significant as diversification is considered by Pennings, Barkema and Douma (1994) to be among the most important strategic decisions a firm's managers make. Importantly, evidence from the research also suggests that future research on the effect of experience on diversification value can directly use a firm's number of segments as a measure of the level of their diversification experience.

Although examining the cross-sectional variation of diversification value (as in the first study in this thesis) has become a more common approach to the topic, the question of whether diversification creates or destroys value remains important. The second study of the thesis adopts a novel research design to investigate the direct effects of diversification on investor wealth.

### **1.2.2. Value of diversified firms, investor self-diversification and managerial motivation for diversification**

Since the identification of a diversification discount by Lang and Stulz (1994) and Berger and Ofek (1995), it has been said "Conventional wisdom among finance scholars suggests that corporate diversification, especially conglomerate diversification, destroys shareholder wealth such that the shares of diversified firms sell at a discount" (Martin and Sayrack, 2003, p.38).

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This conventional notion in the literature motivated the first question in the second empirical study in this thesis: what specific characteristics or potential of stocks of diversified firms will attract investors? Perhaps the most prominent reason for investing in diversified firms is the reduced level of risk associated with these firms (see e.g., Gort, 1966; Smith and Schreiner, 1969; Lewellen, 1971; Amihud and Lev, 1981; Mansi and Reeb, 2002; Duchin, 2010; among others). Specifically, a combination of operations in different industries may stabilise the income streams of diversified firms (Gort, 1966). Smith and Schreiner (1969, p.414) have stated that “by engaging in different types of activity, the conglomerate firm is able to reduce its overall exposure to risk”.

Another reason may also be the higher expected stock return generated from the investments in diversified firms (Lamont and Polk, 2001; Mitton and Vorkink, 2010). Indeed, Lamont and Polk (2001) argue that investors in firms with a diversification discount will receive a higher expected stock return. Thus, diversification discount may simply reflect the difference in future returns between diversified and specialised firms. Mitton and Vorkink (2010) extend the arguments of Lamont and Polk (2001) to show that discounted diversified firms offer a higher return in order to compensate investors for a lack of upside potential (or skewness exposure) compared to specialised firms.

To address the first question, the study adopts a portfolio approach: comparing the performances of the portfolios of diversified and specialised firms. Using a random sampling procedure, the study compares performances of 1,000 portfolios of randomly selected diversified and specialised firms. The results clearly show that, generally, portfolios of diversified firms are characterised by a higher level of returns and a lower level of risk compared to the portfolios of specialised firms. Consequently, this suggests

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that investments in the portfolios of diversified firms will, on average, result in better risk-adjusted returns than investments in the portfolios of specialised firms.

While a number of studies document a negative relationship between the value of diversified firms and the degree of diversification (Lang and Stulz, 1994; Berger and Ofek, 1995; Rajan et al. 2000), the main analysis in the first question is also extended to investigate the link between the performance of the portfolios of diversified firms and their level of diversification. The results of this investigation show that performance of the portfolios of diversified firms relates to the firms' degree of diversification in an inverted U-shape. More specifically, performance is improved in investment in portfolios of three-segment firms compared to investment in portfolios of single-segment firms and portfolios of two-segment firms. Investing in portfolios of firms with four or more segments, however, provides a lower rate of returns and a higher level of risk compared to investments in portfolios of three-segment diversified firms.

While the results from the first question suggest that investing in (portfolios of) diversified firms provides investors with a higher risk-adjusted rate of return compared to investments in specialised firms, studies (Gort, 1966; Levy and Sarnat, 1970; Amihud and Lev, 1981) in the literature widely argue that "diversification is easier and cheaper for the stockholder than for the corporation" (Brealey and Myers, 2000, p.946). The implication is that investors have the option of self-diversifying their investment portfolio, rather than directly holding the stocks of diversified firms. The second question of the study is therefore whether investments in self-diversified portfolios can provide a level of return and risk comparable to direct investment in diversified firms.

Adopting the empirical method developed in Smith and Schreiner (1969), Mason and Goudzwaard (1976) and Armstrong and Vashishtha (2012), a self-diversified portfolio is simulated, following the asset structure embedded in each diversified firm.

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The self-diversified portfolio is, therefore, termed a simulated diversified firm. Comparing the returns and risks measurements of 1,000 portfolios of randomly selected diversified firms and simulated diversified firms reveals that the portfolio of simulated firms has, on average, lower risks and lower returns than the portfolio of diversified firms. Results from different risk-adjusted returns measures are rather mixed. Sharpe and Treynor ratio indicate that simulated portfolios can provide better risk-adjusted returns while it shows from Jensen alpha that portfolios of diversified firms have higher abnormal returns. This suggests that in a perfect capital market, shareholders can invest in their own self-diversified portfolios and attain lower risks than by investing in diversified firms.

The results from the second question lead to the third question of the study which attempts to explain why firms continue to diversify if self-diversified portfolios can provide lower risks and better risk-adjusted returns for investors<sup>8</sup>. An agency-related explanation in the literature is that managers may pursue diversification strategies for their private benefit, even if these strategies do not increase, or they even reduce, shareholder wealth (Amihud and Lev, 1981; Jensen, 1986, 1993; Stulz, 1990; Shleifer and Vishny, 1989; among others). More specifically, managers may engage in firm diversification to reduce the firm's risk and, as a consequence, their non-diversifiable employment risk (Amihud and Lev, 1981); or they may do so to lower idiosyncratic risk associated with their equity ownership of the firm (May, 1995). A recent line of studies (Duan and Wei, 2005; Tian, 2004; Armstrong and Vashishtha, 2012) suggests, alternatively, that managers will have an incentive to increase the proportion of systematic risk in firms' total risk as systematic risk can more easily be hedged by trading

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<sup>8</sup> From the point of view of a private investor who may not be able to invest in a well-diversified portfolio, Sharpe ratio which takes into account of both systematic and idiosyncratic risk is more appropriate to measure risk-adjusted returns. Treynor ratio and Jensen alpha which are calculated based only on market risk are more appropriate to measure performance of well-diversified portfolios. The arguments and analysis of the study are developed mostly from the base of private investors who may need to invest in diversified firms to improve level of diversification of their portfolio.



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market portfolio. Therefore, diversification may also be used as a means to alter the composition of a firm's total risk, particularly to increase the percentage of systematic risk in the firm's total risk.

I investigate two possibilities that diversification strategy is used by managers as a means of lowering and/or altering the composition of a firm's risk. The results from the chapter support both the hypotheses. They show that the key motivations for managers' diversification are to lower total risk and to increase the proportion of systematic risk in a firm's stock return. There is no evidence to suggest that managers diversify in order to achieve a higher level of stock return.

This study makes several important contributions to the literature. Firstly, the finding that portfolios of diversified firms have higher returns and lower risks compared to the portfolios of specialised firms suggests that investors can gain more while bearing less risk by investing in portfolios of diversified firms. It, therefore, directly complements to the line of research (Mansi and Reeb, 2002; Lamont and Polk, 2001; Mitton and Vorkink, 2010; Hund, Monk and Tice, 2010) that has challenged the conventional position in the literature that diversification destroys shareholder value.

The study also provides evidence of the "value effect" on stock returns in diversified firms. More specifically, while the inverted U-shaped relationship between returns from portfolios of firms and the degree of diversification is documented in this chapter, the previous chapter shows a U-shape link between firm value and degree of diversification. Thus, combining the results from these studies necessarily implies an inverse relationship between firm value and stock returns. Taken together, this indicates that investing in firms with a larger diversification discount will provide higher subsequent returns. Thus, the notion that a diversification discount implies wealth destruction for investors may not be wholly correct.

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The findings in the study also provide several important suggestions for practitioners in respect of selecting investment vehicles in order to form a portfolio. For instance, it demonstrates that investing in three-segment diversified firms will, on average, result in the best risk-adjusted return for investors.

Another special contribution of the study is the unique and novel empirical design it uses to compare the performances of portfolios of firms - instead of individual firms normally studied in previous literature. Analysing portfolios of firms is highly relevant as the main interest of stock investors may be the performance of portfolios of firms rather than the performance of average firms (Kopp, 1968).

Secondly, the study also makes a significant contribution by extending the research contained in early studies in diversification literature (e.g., Smith and Schreiner, 1969; Levy and Sarnat, 1970; Melicher and Rush, 1973; Joehnk and Nielsen, 1974; among others) by investigating the market-based performance of conglomerates. The generalisation and credibility of the results are significantly improved as the random sampling procedure applied in this study can substantially enlarge the sample size. Also, a number of recently affine market models (e.g., Fama and French, 1993; Carhart, 1997; Pastor and Stambaugh, 2003) are used in this study to improve the estimations of returns and risks.

Thirdly, the study provides evidence to support the argument made in the literature that diversification can be better achieved by way of the “homemade” portfolio of a firm’s shareholders (Gort, 1966; Levy and Sarnat, 1970; Amihud and Lev, 1981). The research adopts a unique method to simulate diversified firms and compares the performance of portfolios of diversified firms with those of simulated diversified firms.

Finally, the study finds evidence that corporate diversification is motivated by managerial risk preferences. One important contribution here is the study's usage of return and risk of a simulated diversified firm as imputed measures of the (actual) firm's return and risk, to capture the expectations of managers following the firm's diversification.

In the first two empirical studies in the thesis, evidence about the value effect of diversification is provided by comparing firm value. A large literature has attempted to explain the value effects of diversification by exploring the ways that diversification may affect firm operations. Typically, diversification discount is tied to inefficient financial management at diversified firms. More particularly, managers of diversified firms tend to overinvest and to allocate too much capital to poorly performing segments. The third study of this thesis focuses on cash flow management at diversified firms.

### **1.2.3. Corporate diversification, liquidity and financial management**

This study investigates financial management at diversified firms by looking at their cash flow management. The study is motivated by the recent findings of Duchin (2010) and Subramaniam, Tang, Yue and Zhou (2011) that diversified firms can hold less cash than specialised firms. This study aims to investigate several cash flow components, to explain how the outcome of a lower cash balance in diversified firms is achieved. Two hypotheses are constructed. The first one is consistent with the smarter-money effect of diversification and the arguments in Duchin (2010) and Subramaniam et al. (2011). Duchin (2010) argues that the optimal amount of cash reserves in diversified firms is reduced because "investment can be financed using internally generated cash flows without the need to resort to costly cash holdings" (p.960). It is expected that diversified firms will have a larger free cash flow (defined as the difference between operating and investing cash flow) so that they can distribute most of it through

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financing cash flow and only use a small amount of it to accumulate cash. The first hypothesis is that a lower net cash flow in diversified firms is the outcome of a larger free cash flow and a lower financing cash flow comparing to specialised firms.

The alternative hypothesis is consistent with the more-money effect of diversification by way of which cash holdings in diversified firms are reduced as such firms have greater access to external finance (Lewellen, 1971; Stulz, 1990). Accordingly, operating cash flow in diversified firms may not be sufficient to cover investments and thus diversified firms have to rely on external sources to meet their financing demand and to save cash. The hypothesis is that lower net cash flow in diversified firms is the outcome of a lower free cash flow and a higher financing cash flow compared to specialised firms.

Using a large sample of US firms from 1990 to 2009, this study finds a lower net cash flow in diversified firms, indicating that the firms regularly save less cash than specialised firms. More importantly, this lower level of net cash flow comes from a higher free cash flow and lower financing cash flow of diversified firms compared to those of specialised firms. The results further indicate that diversified firms can, on average, fully cover their investment spending with operating cash flow. For specialised firms, free cash flow is negative, suggesting that the firms cannot support their investment demand with operating cash flow and need to rely on external finance for the deficit. The average (median) ratio of financing cash flow to total assets in specialised firms is 6%(0.3%), compared to 0.8%(-1.2%) in diversified firms. Overall, the results support the first hypothesis that diversified firms maintain their lower cash balance by keeping lower net cash flows, which are the outcome of relatively larger free cash flows and lower financing cash flows.

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The research goes further, to investigate several components of financing cash flow (i.e., net debts financing, net equity issuance and dividends) considered by Dittmar and Duchin (2010) to be the main channels firms use to adjust cash balance. The study finds that diversified firms maintain the lower cash balance by issuing less net debt and by distributing more cash dividends than specialised firms. The difference in net debt (dividends) between firms is statistically significant at 1%, equivalent to 0.4% (0.12%) of total assets and 57% (13.3%) of average net borrowings (dividends) of specialised firms. Specialised firms both issue more and buy back more shares, leading to a less significant difference in respect of net equity issuances between these firms.

The research extends the analysis of financial management at diversified firms by investigating the role of internal capital markets. Stein (1997) argues that managers of diversified firms may ease credit constraints by efficiently allocating a given amount of funding across segments. Duchin (2010) empirically shows that lower cash holdings in diversified firms are associated with efficient internal capital market allocation. The study is extended by examining whether activities of the internal capital market are influenced by the level of free cash flow. Arguably, workings of internal capital markets may be less important for firms with a higher level of free cash flow and for firms with easy access to external capital markets.

Using the measure of internal transfers proposed by Rajan et al. (2000), the study shows a negative relationship between the activities of internal capital markets and the level of free cash flow in the sample of diversified firms and the sub-sample of financially unconstrained diversified firms. This suggests lower activities in respect of internal capital transfers in firms with larger free cash flow, particularly in firms with better access to external capital markets. The insignificant relation in the sub-sample of financially constrained firms implies that constrained firms will not reduce the activities

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of internal capital markets even when they have larger free cash flow. Altogether, the findings suggest the active role of internal capital markets in the financial management of diversified firms.

The contributions to the diversification literature made by this study are significant. Firstly, this is the first study that I am aware of to look at how diversified firms manage their cash flows. Importantly, the study suggests that diversified firms maintain their lower cash balance by regularly retaining less cash and by raising less external finance.

The study also sheds further light on recent studies of the connection between diversification, the advantage of using low-cost operating cash flow to finance investment, and liquidity demand (Duchin, 2010; Subramaniam et al., 2011). These studies show that diversified firms hold less precautionary cash as diversification facilitates better coordination of cash flows and investment opportunities within these firms. Underlying this argument is a very important assumption that diversified firms should generate sufficient operating cash flow to cover investment. This assumption is not, however, explicitly investigated in these papers. The present study corroborates the assumption by showing that diversified firms can fully cover their investment with internally generated operating cash flow.

This study extends the understanding of the motivations of cash holding by diversified firms, by demonstrating that lower investment demand is a factor which contributes to reduced demand of precautionary cash in such firms.

Secondly, the study provides evidence inconsistent with a large body of studies that argue that there is an overinvestment problem in diversified firms. It is commonly argued that, due to agency conflicts between headquarter managers and segment managers, (or among segment managers), managers of diversified firms tend to

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inefficiently allocate too much capital to segments with low potential (see e.g., Lamont, 1997; Scharfstein, 1998; Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000, among others). Overinvestment problems are also more severe in diversified firms because of their larger free cash flow and ability to pool cash (Jensen, 1986; Inderst and Muller, 2003).

The evidence presented in the main analysis (of similar operating cash flow, lower investing cash flow, lower cash holdings and higher dividends in diversified firms\_ does not, however, support the hypothesis of overinvestment problems at the firm level. Furthermore, the reported negative relation between the activities of internal capital markets and the level of free cash flow, particularly in the sub-sample of financially unconstrained firms, does not support the thesis that diversified firms have an overinvestment problem at the segment level.

### **1.2.4. Structure of the thesis**

The thesis is organised as follows: the literature is reviewed in Chapter 2. This is followed by a brief description of the data and methodology, in Chapter 3. The first empirical study forms Chapter 4, which investigates the effects of organisation learning from experience of diversification on the cross-sectional variation of value of diversified firms. Chapter 5 presents the second empirical study, which examines the value of diversified firms using a portfolio approach. Chapter 6 presents the final empirical study, in which the link between diversification and financial management is addressed. Chapter 7 provides conclusions, discusses the limitations of the research and suggests some future areas of research.

## **2. Literature review**

### **2.1. Introduction**

As assessed by Martin and Sayrak (2003) the literature on corporate diversification is “voluminous, diverse and quite old”. Hence, to keep this review manageable and concise, it is important to define a reasonable scope for the literature to be covered. This review will include the most influential theories which are relevant to forming the conceptual foundation for my empirical analysis. Particularly, the influence of diversification on firm value and on financial management is discussed.

The organisation of the present chapter is as follows: the following section will provide an overview outlining the development of theoretical arguments and empirical studies, and the recent trends in research into corporate diversification. Following the overview, several main theories that are relevant to this thesis will be discussed. Then, two important lines of empirical studies will be reviewed in the two subsequent sections.

The first strand of empirical research focuses on the influence of diversification on firm value. Given the importance of this line of study in the literature, and particularly for my research, an exhaustive search has been conducted to ensure that most important papers can be covered. The review will, therefore, be able to provide an in-depth insight into the results and methods, from the earliest studies in this area (e.g., Smith and Schreiner, 1969; Melicher and Rush, 1973; Weston and Mansinghka, 1971; among others) to the most influential findings related to diversification discount (Lang



and Stulz, 1994; Berger and Ofek, 1995) and the current intense debate on the value effect of diversification (Campa and Kedia, 2002; Villalonga, 2003; Obzas and Scharfstein, 2010, among others).

In respect of the second strand of empirical studies relating to the link between diversification and financial management, the review will be organised around two financial effects of diversification: (1) the “more-money” effect by which diversification may, by reducing risks, enhance access to an external capital market (Lewellen, 1971; Stulz, 1990; Berger and Ofek, 1995; Dimitrov and Tice, 2006, among others); and (2) the “smarter-money” effect by which diversification facilitates capital allocations within firms (Lamont, 1997; Shin and Stulz, 1998; Scharfstein, 1998; Duchin, 2010; Subramaniam, Tang, Yue and Zhou, 2011, among others)<sup>9</sup>. This line of study has recently been put back into the centre of the literature with the important finding of Duchin (2010) and Subramaniam et al. (2011) relating to the lower liquidity demand of diversified firms (2011). The finding that diversification may lower liquidity demand becomes more important in practical term “when the world became a much riskier place for business” (Henriques, 2008, p.1).

The last section summarises the main theoretical arguments and these two main lines of empirical study in the literature. More importantly, it highlights the gaps in the present literature which my empirical chapters will address.

## **2.2. An overview of studies of corporate diversification**

Corporate diversification became an important topic of academic research in the seminal works of Ansoff (1957), Gort (1962) and Chandler (1962), following the

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<sup>9</sup> These terms (i.e. “more-money” and “smarter-money” effects) follow Stein (2003).

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evolution of US conglomerates after World War II<sup>10</sup>. Before then, US firms mostly specialised in their principal activity, limiting expansion to the same or similar industries<sup>11</sup>. By 1969, 45% of the largest US industrial/manufacturing companies were diversified (Rumelt, 1974), leading Smith and Schreiner (1969, p.413) to comment that “...one of the more remarkable developments within finance during the current decade [i.e. the 1960s] has been the emergence of the conglomerate type of firm.” The popularity of conglomerate diversification among US firms during the 1960s and 1970s was subsequently replaced by a trend towards refocusing, since the 1980s. Nevertheless, conglomerate type of firms still plays a significant role in the US economy. Montgomery (1994) has shown that by 1992 two-thirds of Fortune 500 companies were active in at least five distinct lines of business (defined by the four-digit SIC code). Maksimovic and Phillips (2007) have also documented that, very recently, more than 50% of US production has been represented by conglomerate firms.

The growing significance of diversified firms quickly attracted the attentions of scholars from different areas of business studies (e.g. financial economics, strategic management, industrial organisation, etc...) (Ramanujam and Varadarajan, 1989). Maksimovic and Phillips (2007, p.424) note that “Given the size of production by conglomerate firms, understanding the cost and benefits of this form of organisation has important implications.”

The literature on diversification currently represents a great variety of theoretical perspectives and disciplinary paradigms, as well as a wide range of empirical research questions and issues. Wan, Hoskisson, Short and Yiu (2011, p.1338) follow Hoskisson and Hitt (1990) in summarising that “To date, various disciplines have contributed to

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<sup>10</sup> For a discussion of positive environmental, regulatory and management factors which have created ideal conditions for the development and growth of conglomerate firms, refer to Simmonds (2009).

<sup>11</sup> The specialisation of a sample of 111 large manufacturing US companies in their main activity declined markedly: the principal activity accounted for 69 per cent of company payrolls in 1947 and only 64 per cent in 1954 (Gort, 1962).

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our knowledge of diversification, but such knowledge has been accompanied by each discipline's own theoretical paradigms and corresponding research agendas" In line with the purpose of my thesis, the summary of conceptual development and of the empirical issues given below is limited to studies in financial economics and strategic management literature.

The development of theoretical arguments in the literature can be broadly divided into two main phases which, interestingly, correspond to the life-cycle of diversified firms: the first phase evolved along with the emergence on a broad scale of diversified firms in the 1960s and early 1970s, during which conglomerate diversification was widely viewed as an optimal and value-maximising strategy. For instance, Gort (1966) identified the motives for corporate diversification as: (1) to effect economies of scale; (2) to reduce risks by increasing the range and variety of activities; (3) to utilise a firm's spare resources; and (4) to grow and to enter new profitable industries. Similarly, Beattie (1980) provides an overview of various motivations for corporate diversification; namely: pursuit of monopoly power, exploitation of synergy and reduction of risk.

The decline of diversified firms in the late 1970s and in the 1980s led to somewhat opposite theoretical arguments: arguments about the inefficiency of diversification, mostly based on the perspectives of agency theory. Within this line of argument, diversification is viewed as an unnecessary and suboptimal strategy decision induced by a manager's self-interested motives (Wan et al., 2011).

Two lines of empirical studies dominate the research on corporate diversification in financial economics literature. The first focuses on the relationship between diversification and firm value, which is not only central in financial studies but also attracts the special attention of scholars from a number of business disciplines.

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Despite the intensive research into this topic over the past 50 years, each individual discipline continues to show inconsistency in findings and lack of consensus among researchers. Markides and Williamson (1994, p.149) have stated that “there is still considerable disagreement about precisely how and when diversification can be used to build long-run competitive advantage”. Stein (2003) suggests that without strong support from theoretical work (i.e., clear-cut theoretical arguments on whether diversification is good or bad) researchers should not make further attempts to find the mean value of diversified firms. Within the financial economics literature, the most important finding is the identification of a “diversification discount” by Lang and Stulz (1994) and Berger and Ofek (1995) which clearly shows that diversified firms have a lower value than specialised firms. The finding, which initially seemed to provide more precise results with respect to the value of diversified firms, has been subsequently challenged in respect of a number of different aspects. The intensive debate on the “diversification discount” marks the most recent development of the topic in the financial economics literature.

The second stream, which is more “financial” in nature, investigates the link between diversification and a firm’s financial management. This stream of empirical studies is conducted on a stronger theoretical foundation than the first stream. The relevant theory suggests that diversified firms have greater access to external capital sources (Lewellen, 1971; Stulz, 1990) and have an advantage in shifting capital among segments within their internal capital markets (Alchian, 1969; Weston, 1970; Williamson, 1975). These effects of diversification will theoretically result in a greater flexibility in financial management, on the part of diversified firms. Nevertheless, empirical evidence from several studies in this stream does not clearly show that diversified firms take advantage of these benefits (Comment and Jarrell, 1995; Berger and Ofek, 1995, among others). The latest development of this stream has been studies by Duchin (2010) and

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Subramaniam et al. (2011) which report that corporate diversification may significantly reduce liquidity demand in firms. This evidence drew attention to the importance of the topic in the context of an increasingly risky business environment (Bates et al., 2009) in which financial flexibility is a top priority for financial managers (Graham and Harvey, 2001) and in which financial management has become a key issue in corporate policy (Almeida, Campello and Weisbach, 2004).

In the next section, a number of theories that form the conceptual foundation in the literature will be reviewed. Upon providing this foundation, the two streams of empirical research will be reviewed.

### **2.3. The theoretical framework**

The review of the theoretical work in the literature is organised in a chronological order, which is deemed to be the best way to reflect the changing perceptions of corporate diversification on the part of researchers. During the 1960s and 1970s when "...conglomerates were seen as the financial concept of the future" (Smith and Weston, 1977, p.5), the theoretical arguments generally supported corporate diversification. Corporate diversification is conceptually regarded as a strategy to reduce a firm's overall risk, to reduce transaction cost and to optimally use spare resources.

In later years (i.e. from the 1980s), since "...American corporations back to greater specialisation" (Shleifer and Vishny, 1991, p.51), theoretical papers tend to focus more on the negative side of corporate diversification. Mostly based on the perspective of agency theory, a general argument in this research is that diversification is driven by the self-interest of managers and results in loss in shareholder wealth.

The theoretical framework of research into corporate diversification has been developed out of different theories including portfolio theory, theory of transaction cost

economies, resource-based and resource-dependence theory, and agency theory. The theoretical arguments will be reviewed in the following subsections which bear the titles of the theories on which they are grounded.

### **2.3.1. Portfolio theory**

Motivated by Markowitz's (1952, 1959) concepts of efficient diversification and portfolio selection, early financial studies in the literature (e.g., Smith and Shreiner, 1969; Westerfield, 1970; Joehnk and Nielsen, 1974) argue that corporate diversification can yield portfolio effects which reduce a firm's overall risk by combining business with imperfectly correlated financial flows. Firms, therefore, expand into industries unrelated to their present main business as a means of stabilising income and managing risks.

This seemingly apparent effect of corporate diversification is, nevertheless, challenged on two grounds. First, although it is perfectly rational in the terms of the theory that segments with a negative correlation of cash flows will stabilise a firm's total earning streams, choosing real countercyclical businesses in which to invest is not easy in practice (Bettis and Hall, 1982). Gort (1966, p.39) notes that "For a firm based in a cyclically stable industry, entry into an unstable industry may actually increase fluctuation in earnings." Furthermore, there is also a higher level of risk when a firm's new ventures are in completely different industries to the principal industry. Second, it is widely argued that, in a perfect capital market, shareholders can achieve any desired level of risks at a lower cost through their individual portfolio (Levy and Sarnat, 1970; Montgomery and Sigh, 1984). Brealey and Myers (2000, p.946) clearly point out that "Diversification is easier and cheaper for stockholders than for the corporation". Thus, Levy and Sarnat (1970) suggest that no economic advantage is created from the risk-reduction effect of conglomerate diversification.

Nevertheless, an indirect true economic gain from corporate diversification is identified: greater access to external capital market for diversified firms. In the view of financial providers, diversified firms are generally assessed as a more stable and safer investment opportunity than are specialised firms. More specifically, the lower possibility of a sharp decline in total firms' earning (Smith and Shreiner, 1969; Gort, 1966; and others) and ability to allocate capital from good projects to failing projects (Stein, 1997; Inderst and Muller, 2003; among others) reduce the risk of diversified firms. Consequently, diversified firms should have greater debt capacity (Lewellen, 1971) and lower cost of capital (Levy and Sarnat, 1970; Stulz, 1990)<sup>12</sup>.

### **2.3.2. Theories of transaction cost economies**

The economic rationale for corporate diversification is also identified under the framework of the theory of transaction cost economies. Coase (1937) fundamentally established that boundaries of firms are set at the point where the costs of carrying out transactions within firms are equal to those of carrying them out in the market, or in other firms. As such, corporate diversification becomes important when costs of carrying out transactions at firms with more than one industry within their boundaries are affected. Alchian (1969), Weston (1970), Williamson (1975) and Donaldson (1984) theoretically argue that corporate diversification creates value as capital allocations within the internal capital market in diversified firms are more efficient (involve a lower transaction cost) than those in external capital markets. Indeed, Williamson (1986, p.65) notes that "... the costs of communicating internally are normally lower than would be incurred in making an investment proposal to the external capital market,...". Also, headquarters of diversified firms are widely described as reliable and appropriate people to efficiently allocate capital across segments within firms. More specifically,

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<sup>12</sup> This line of argument will be further discussed in the section which reviews studies investigating the relationship between diversification and financial management.

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headquarters of diversified firms are not only better informed (than external financial providers) about the investment opportunities of the firms' segments (Stein, 2002; Williamson, 1986; Shleifer and Vishny, 1991) but also have the right incentives to allocate funds to the segments with most potential, based on this higher quality of information (Stein, 2003). Donaldson (1984) summarises that "The most critical choices top management makes are those that allocate resources among competing strategic investment opportunities" (p.95).

Following this line of argument, recent theoretical analysis (e.g., Gertner, Scharfstein and Stein, 1994; Li and Li, 1996; Stein, 1997; Matsusaka and Nanda, 2002) explicitly focuses on the differences in respect of incentives, between managers of diversified firms and external financial providers. As argued by Gertner et al. (1994), managers of diversified firms own or have control rights over the segments to which they allocate capital, while in external capital market the financial providers (e.g., banks or debtors) normally do not own the firms to which they lend money. The managers will, therefore, choose to monitor the segments more intensely as they can gain more from these monitoring efforts (than can external financial providers). Furthermore, as the owner of the assets, a manager of a diversified firm can redeploy assets from poorly performing segments to more profitable ones. Outside capital providers do not normally have this ability and so will have less incentive to obtain information about the borrowers. Stein (1997), describes the internal capital allocation as a "winner-picking" process, in which headquarters are motivated to choose the best segment to which to allocate funds as their private benefit is a proportion of the sum of the segments' benefit. Headquarters can reallocate funds cheaply and efficiently from slow-growing, cash-generating segments to rapidly growing segments with greater potential. This is truly beneficial in the case of relatively new ventures for which limited information is available for external financial providers (Grant, 1998). Altogether, the theoretical



studies suggest a smarter-money effect (Stein, 2003) from corporate diversification, in which an internal capital market may do a better job of allocating funds across projects than can an external market.

### **2.3.3. Resource-based and resource-dependence theories**

Resource-based theory (Penrose, 1959) shares the assumption of an imperfect market which is advanced by the transaction cost theory. Resource-based theory has emerged “...as the key theoretical foundation that fuelled a thriving development of the diversification literature in strategic management” (Wan, Hoskisson, Short and Yiu, 2011, p.1336)<sup>13</sup>. The resource-based perspective fundamentally argues that, as the market is imperfect and firms’ resources may be unique, firms may find it difficult to sell their excess resources. Diversification is seen as an optimal strategy for making internal use of these resources. Whittington and Mayer (2000, p.56) note that “...it is the existence of surplus resources that stimulates diversification, and it is the nature of these resources that determine the direction in which this diversification goes.” Based on this theoretical argument, studies in strategy management (e.g., Rumelt, 1974, 1982; Wernerfelt, 1984; Hoskisson, 1987) are able to empirically investigate the link between firms’ resources, choice of diversification (i.e. related and unrelated diversification) and the value of firms. Typically, these studies find that related diversification can increase firm performance, compared to unrelated diversification, as firms can better maximise their resources among related businesses.

Another important theory in strategy-related research which offers an externally focused perspective of diversification is resource-dependence theory, developed by Pfeffer and Salancik (1978). From a resource-dependence perspective, diversification is

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<sup>13</sup> The review by Wan, Hoskisson, Short and Yiu (2011) highlights the key role of resource-based theory in studying corporate diversification in strategic management.

an optimal strategy action for reducing a firm's environmental interdependence and uncertainty (Hillman, Withers and Collins, 2009)<sup>14</sup>.

#### **2.3.4. Agency theory**

While the theories outlined above all suggest that diversification is an optimal strategy and internal capital allocations are efficient, a line of argument based mainly on the perspective of agency theory provides a contrasting view on the motivations for diversification and the operations of diversified firms. Within the framework of agency theory, managers may not act efficiently to maximise long-term value of firms because of the divergence in interests between the principal (the shareholders) and the agent (the managers). Agency conflicts within firms are shown to be detrimental to the efficiency of corporate diversification in respect of two processes: (1) a firm's decision to diversify and (2) a firm's operation of internal capital markets.

Firstly, diversification can be viewed as a largely unnecessary and suboptimal decision induced by managers' self-interested motives. Managers may engage in diversifying their firm because, as Jensen (1986, 1993), Stulz (1990) and Jensen and Murphy (1990) have argued, they receive private benefits from running a large, diversified firm. The benefits may arise from prestige or better career prospects (Gibbons and Murphy, 1992), increase in compensation or entrenchment (Shleifer and Vishny, 1989). Managers may also diversify their firm to reduce the firm's risk and as a consequence their non-diversifiable employment risk (Amihud and Lev, 1981) or the idiosyncratic risk associated with their equity ownership of the firm (May, 1995). Aggarwal and Samwick (2003) integrate these two views (i.e., the private benefits and risk-reduction benefits) in a theoretical model and empirically find that the decision made by managers to diversify is mainly motivated by perceptions of private benefits.

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<sup>14</sup> For a comprehensive review of the studies which adopt the resource-dependence theory, refer to Hillman et al. (2009).

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Agency conflicts may also distort internal capital allocations such that internal capital markets may not always be efficient, as argued by Alchian (1969), Williamson (1975) and Donaldson (1984). Brealey et al. (2008) point out that an internal capital market is not really a market but a combination of central planning and intra-company bargaining. Hence, capital budgets are not allocated as a result of pure economics criteria: political struggles within firms also play a role (Bernando, Cai and Luo, 2001, 2004, 2006). This line of argument is typically built on papers relating to influence activities by Milgrom (1988), Milgrom and Robert (1988) and Meyer, Milgrom and Robert (1992) which incorporate another layer of agency between the CEO and segments' managers (in addition to the one between the CEO and shareholders) in their models. Generally, the models predict socialism in internal capital markets, in which weaker segments are cross-subsidised by stronger ones.

More specifically, Scharfstein and Stein (2000) argue that managers of a weak segment will have a lower opportunity cost in engaging in wasteful rent-seeking activities to increase their bargaining power in negotiating compensation with the headquarters. The agency problems that exist between headquarters and shareholders may result in distortions in capital allocation, with more investments made in a weak segment rather than increasing cash payments to the segment's managers as the latter derives from discretionary funds of the headquarters while the former comes from investment funds under the control of shareholders<sup>15</sup>.

Wulf (2009) argues differently, with respect to the influence activities of managers of large and established segments. In Wulf's model, managers who are more influential with headquarters can engage in costly influence activities to distort private signals from managers of small and developing segments, in order to skew capital in

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<sup>15</sup> In the somewhat similar model of Meyer, Milgrom and Robert (1992), headquarters can rationally infer the true value of investment opportunities by observing costly lobbying, hence these activities lead only to a waste of the time and effort of division managers and not to capital misallocation.

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their favour. Thus, the model predicts that capital allocation inefficiency is more pronounced in firms with more influential managers. Xuan (2009) argues that specialist CEOs<sup>16</sup> use capital allocation as a bridge-building tool, to induce cooperation from powerful segmental managers in previously unaffiliated segments.

In the model of Rajan et al. (2000), the headquarters is not an agent of shareholders but nevertheless has limited power in distributing a firm's surplus. Self-interested segment managers (particularly in segments with better resources and opportunities) will choose to invest in "defensive" and safe projects rather than in "efficient" but risky projects, as the surplus created by "efficient" investment will be transferred to other segments. Headquarters acting as a principal will inefficiently allocate more capital to segments with fewer resources and poor investment opportunities, to reduce the differences between segments and hence induce more "efficient" investment. With similar predictions, Rajan et al. (2000), Bernardo, Luo and Wang (2006) argue that firms allocate more capital to "weak" segments as managerial effort is lower in "strong" segments.

Taken together, this section critically reviews a number of theories that are influential in the literature and are relevant to the forming of the conceptual foundation of my thesis. Two major points can be highlighted. First, these theoretical arguments suggest several motivations for corporate diversification; however, they are not able to generate a clear-cut prediction of whether diversification is a good or bad strategy. Thus, investigating the cross-sectional distribution of the value of diversified firms is an approach that may be used to gain further understanding of diversification value. Second, the theoretical work indicates the benefits of internal capital markets and greater access to external capital market in diversified firms which forms the necessary

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<sup>16</sup> Xuan (2009) defines a specialist CEO as a CEO who has advanced through ranks from certain, but not all, divisions in the firm, prior to being appointed as the CEO.

conceptual foundation for studies of the influence of diversification on financial management.

## **2.4. Diversification and firm value**

The link between diversification and firm value is, perhaps, the most researched topic in the literature relating to corporate diversification. Palepu (1985, p.249) notes that “...the relationship between a firm’s diversification and its economic performance is an issue of considerable interest to both academics and managers.”

However, the conceptual work in the literature, as reviewed above, is not able to form a strong theoretical foundation for this line of empirical studies on the diversification-value nexus. For instance, the conceptual arguments (Smith and Shreiner, 1969; Westerfield, 1970; Joehnk and Nielsen, 1974) which adopt the portfolio theory suggest that corporate diversification increases firm value as it reduces risk, whereas studies (Amihud and Lev, 1981; Jensen, 1986, 1993) which adopt the agency theory see diversification as an inefficient strategy solely motivated by managers’ own goals.

Consequently, the results of this line of empirical studies are rather inconsistent. The lack of consensus exists from the earliest studies in the subject and across different disciplines (Palich, Cardinal and Miller, 2000).

Contemporary research on the link between diversification and value in financial economics literature regained momentum with the discovery of a so-called “diversification discount” by Lang and Stulz (1994) and Berger and Ofek (1995), in which diversified firms are clearly shown to be undervalued and to sell at a discount compared to a portfolio of equivalent specialised firms. The focus of this review will, therefore, be these influential papers and the subsequent intensive debate on this

important finding. Earlier studies will also be reviewed, to provide a comprehensive view of the development of the literature.

### **2.4.1. Studies prior to the identification of a diversification discount**

The link between diversification and firm value has been the subject of empirical research from the first studies in the literature (Gort, 1962; Reid, 1968; Arnould, 1969; Smith and Schreiner, 1969; Weston and Mansingha, 1971). With a wide range of measurements of value and diversification, the results have, unfortunately, been inconsistent, from these pioneering researches to the present day.

A study by Weston and Mansingha (1971) focuses on operating performance characteristics of diversified firms and shows that earning performance measured by the ratio of net income to net worth is higher for conglomerate firms than for non-conglomerates, although the difference is not statistically significant. The authors, however, recognise that “an important economic function of conglomerate firms has been raising the profitability of firms with depressed earnings to the average for the industry generally” (p.934). The finding is somewhat consistent with Reid (1968) who finds that firms that pursue diversification are “size-maximisers”, producing only “serendipitous profitability performance”, and Gort (1962), and Arnould (1969) who do not find a significant cross-sectional correlation between profitability and diversification.

In line with these papers, Melicher and Rush (1973) compare a group of 45 conglomerates with a matched group of 45 non-conglomerates and report that the groups are “...highly comparable in terms of their operating profitability characteristics” (p.387). Using a novel method to mirror the asset structure of diversified firms, Mason and Goudzwaard (1976) report superior earnings performance and shareholder returns from the simulated portfolios than from the diversified firms. A subsequent study by

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Holzmann, Copeland and Haya (1975) documents somewhat similar results, in which asset-based and equity-based return performances of diversified firms are lower yet less variable than those of non-diversifiers. Consistent with Holzmann et al. (1975) and Hoskisson (1987) find a higher rate of return (measured by return on asset (ROA)) for related diversified firms but lower risk (measured by standard deviation of ROA) for unrelated diversified firms. Bettis and Mahajan (1985), nevertheless, show no significant difference in respect of return and risk (measured by ROA and ROA standard deviation) between diversified and undiversified firms.

Another group of studies using market-based measurements has been conducted within the framework of a capital asset-pricing model, to compare the performance of diversified firms with (1) specialised firms, or (2) closed-end investment companies (and particularly mutual funds). These studies are largely based on theoretical arguments that follow the general theory of portfolio selection (Markowitz, 1959) and focus more on the risk-reduction aspect of diversification.

Melicher and Rush (1973) calculate monthly rates of return over the period 1965-1971 for a sample of 45 diversified and specialised firms. The paper reports higher levels of systematic risk for diversified firms but rates of return and other performance measures (i.e., Jensen alpha, Sharpe and Treynor ratio) that show an insignificant difference. The results of the insignificant difference in performance between diversified and undiversified firms, as found by Melicher and Rush (1973), are generally confirmed by Beattie (1980), with the exception that Beattie reports that diversified firms have a higher level of diversification efficiency than specialised firms. Consistent with Beattie (1980), Smith and Weston (1977, p.5) find that "... conglomerates provide investors with less variability from market movement than do non-conglomerate firms". Amit and Livnat (1988) find lower exposure to business cycles in diversified firms

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which translates into greater performance stability for the firms. Joenk and Nielsen (1974) do not report significant effects of diversifying activity on firms' systematic risk (Beta) in a long-term analysis. Montgomery and Singh (1984) and Barton (1988), however, document higher systematic risk in diversified firms.

The other group of studies employs market-based measurements to assess the diversification efficiency of diversified firms, in comparison with investment companies (particularly, mutual funds) which are, presumably, organised just for such a purpose (diversification). Applying the measure of portfolio diversification efficiency, Smith and Schreiner (1969, p.424) show that "...mutual funds have attained more efficient diversification than the conglomerates. And they have done so at a relatively lower level of risk as measured by the standard deviation of portfolio return". A number of subsequent studies (Westerfield, 1970; Weston, Smith and Shrieves, 1972; Smith and Weston, 1977) find results that are consistent with Smith and Schreiner. Specifically, Smith and Weston (1977) find lower risk-adjusted performance for diversified firms and conclude that diversified firms provide "...less diversification than close-end investment companies and mutual funds" (p.5).

A large body of research from strategic management literature pioneered by Rumelt (1974) also focuses on the link between diversification and the value of firms<sup>17</sup>. Using different measures of diversification to those conventionally used in financial literature, Rumelt (1974, 1982) finds that firms with related diversified portfolio outperform other types of diversification, owing to benefits from economies of scope<sup>18</sup>. This result was replicated in a great number of subsequent papers (Christensen and Montgomery, 1981; Fryxell and Barton, 1990; Hill and Snell, 1989; Hitt and Ireland, 1986; Lecraw, 1984, among others). Several other studies (Bettis and Hall, 1982; Bettis

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<sup>17</sup> Ramanujam and Varadarajan (1989), Palich, Cardinal and Miller (2000) and Purkayastha, Manolova and Edelman (2012) provide intensive review of this line of literature.

<sup>18</sup> For a further discussion on measures of diversification, please refer to the Data chapter of this thesis.



and Mahajan, 1985; Hill, 1983, McDougall and Roud, 1984; Johnson and Thomas, 1987; Hill and Snell, 1988, among others), however, do not find significant differences in profitability among categories of diversification, suggesting that Rumelt's results are affected by industry. In contrast to Rumelt, a great deal of research shows a positive relationship between diversification and value (Michel and Shakhed, 1984; Jose, Nichols and Stevens, 1986; Galbraith, Samuelson, Stiles and Merrill, 1986).

Altogether, the results from these early studies in the literature are rather inconclusive about the value of diversification. A conclusion that can be drawn with caution is that the performance of diversified firms is not, by any measurements, outstanding compared to that of specialised firms and other types of firms. The influential finding of Lang and Stulz (1994) and Berger and Ofek (1995) that diversified firms are clearly shown to be discounted compared to specialised firms will be discussed in the next section.

### **2.4.2. The diversification discount**

The studies of Lang and Stulz (1994), and Berger and Ofek (1995) are seminal in the line of contemporary research which insists that diversification causes value destruction. A (or perhaps the most) significant contribution from the seminal work of Lang and Stulz (1994) and Berger and Ofek (1995) is the particular measure used to value the effect of diversification; this valuing method has been used in almost all subsequent studies (Servaes, 1996; Lins and Servaes, 1999, 2002; Mitton and Vorkink, 2010; Hund, Monk and Tice, 2010).

These studies fundamentally share a similar approach: decomposing diversified firms into their constituent segments and valuing each segment by imputing its value as a value of a comparable specialised firm in the same industry. Lang and Stulz (1994) use Tobin's Q as the proxy for firm value, arguing that Q incorporates the capitalised value

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of the benefits arising from diversification. The firm's segment value is imputed as the average Q of specialised firms operating in the same industry. The comparable value of diversified firms is then measured as the assets-weighted average of the firm's segment Q. Subsequently, the value effect of diversification is defined as the difference between firm Q and its comparable value.

Berger and Ofek (1995) identify a proxy value of diversified firms in three ways: as the ratio of the firm's total value (estimated as the market value of equity and the book value of debt) to its assets, sales or earnings. Using a approach similar to that of Lang and Stulz (1994), the comparable value of a firm's segment is estimated by multiplying the segment's assets, sales or earnings by median-matching specialised firms' valuation multiples. The valuation multiples are the ratios of the specialised firms' total value to its assets, sales or earnings. The imputed value of diversified firms is the sum of its segments' comparable values. The natural log of ratio of the actual value of the firms to the imputed value represents the gain or loss in value arising from diversification.

The methods used by Lang and Stulz (1994) and Berger and Ofek (1995) have since become the standard ones in the literature for measuring the value effect of diversification. More importantly, using these methods, both studies find a "diversification discount": that is, diversified firms have lower value than their comparable specialised firms. Specifically, Berger and Ofek (1995) document a 13-15% discount with respect to diversified firms compared to their non-diversified equivalents, over 1986-1991. Lang and Stulz (1994) show that during 1978 to 1990 diversified firms' Q were, on average, 0.27 to 0.54 lower than specialised firms' Q (which was approximately 1.5).

### 2.4.3. Debate on the diversification discount

The studies of Lang and Stulz and Berger and Ofek have stimulated an intensive debate among financial scholars about the value of diversified firms. Diversification discount has become the biggest puzzle in the literature<sup>19</sup>. This subsection will review the key studies on both sides of the debate.

On the side supporting the existence of a diversification discount, using methods similar to those of Lang and Stulz, and Berger and Ofek, subsequent studies (see e.g., Servaes, 1996; Lins and Servaes, 1999, 2002; Lamont and Polk, 2002) have been able to replicate and extend their results. Servaes (1996) documents the diversification discount during the 1960s but not the 1970s. The results have also been extended to other contexts, particularly Europe and Japan (Lins and Servaes, 1999) and to emerging markets in Asia (Lins and Servaes, 2002). Other studies (Shin and Stulz, 1998; Scharfstein, 1998; Rajan, Servaes and Zingales, 2000; Billet and Mauer, 2003; Ozbas and Scharfstein, 2010) provide further evidence showing that internal capital markets within diversified firms are inefficient, allocating too much (too few) funds to low (high) Q segments. Stein (2003, p.146) broadly states that “...the diversification discount is a pervasive phenomenon.”

Notably, the finding that diversified firms have a lower value is not only pervasive among financial researchers. A large body of studies (Rumelt, 1974, 1982; Bettis, 1981; Palepu, 1985; Varadarajan and Ramanujam, 1987; Palich, Cardinal and Miller, 2000, among others) within strategic management literature also document lower value among diversified firms. Scharfstein (1998, p.1) notes that “The consensus among academic researchers, consultant and investment bankers is that diversified firms destroy value.”

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<sup>19</sup> Refer to Villalonga (2003) for a synthesis of research on the diversification discount.

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On the other side, the validity of the results has been challenged in regard to several issues. The first issue is methodological. The methods of Lang and Stulz (1994) and Berger and Ofek (1995) to impute diversified firms' segment value (for instance, Tobin's Q) by value of equivalent specialised firms in the same industry is challenged as segments of diversified firms are systematically different to specialised firms (Villalonga, 2000; Whited, 2001; Chevalier, 2000). Mansi and Reeb (2002) have empirically shown that using the book value of debt to calculate "excess value", as Berger and Ofek (1995) have done, leads to a downward bias for diversified firms.

Self-selection and endogeneity have also been highlighted as methodological problems in respect of the discounted value of diversified firms. Graham, Lemmon and Wolf (2002) provide direct evidence of the importance of self-selection in determination of the diversification discount. Using firms acquisitions to evaluate diversification discount, Graham et al. (2002) show that a large part of the discount can be explained by the fact that the target firms are traded at a discount relative to specialised firms before the acquisition. Hence, the value discount relating to acquisitions may be caused by a tendency to acquire lower-than-industry benchmark firms rather than by diversification itself.

Hyland (1999), on the other hand, shows that conglomerate firms perform poorly and the diversification strategy is used to acquire growing opportunities. This finding is similar to that of Lang and Stulz (1994) who document that diversifiers are poor performers prior to conglomeration. This evidence from Hyland (1999) and Lang and Stulz (1994) is largely consistent with the finding of Chevalier (2000) that, while the stocks of acquirers tend to drop upon announcement of a diversification, the combined return to acquirers and targets in such deals is either close to zero or slightly positive. This result was recently confirmed by Akbulut and Matsusaka (2010) who examine

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4,764 acquisitions during 1950 to 2006 and find positive combined returns for diversifying acquisitions.

The issue of endogeneity is raised on the basis of the argument that firms that choose to diversify are fundamentally different to firms that remain specialised (Maksimovic and Phillips, 2002). Campa and Kedia (2002) document the negative relation between the choice of a firm to be diversified and its value. Firms that choose to diversify have a lower value than other firms in their industry which remained focused. As reported by Campa and Kedia (2002) when endogeneity is taken into account, the diversification discount always drops.

The second issue raised is a problem with segment data<sup>20</sup>. Maksimovic and Phillips (2007) indicate that one challenge for the study of firm structure is that researchers need to investigate the internal transactions within a firm, for which the data are largely unavailable or are subject to pervasive manipulation and reporting bias. Martin and Sayrak (2003) document three problems with segment data: the extent of disaggregation in segment financial reporting, flexible business segment definition and industry data<sup>21</sup>. Villalonga (2004) reports that when she uses databases (Business Information Tracking Series from the Bureau of Census) other than the commonly used COMPUSTAT database to calculate the value of diversified firms, the result changes from a discount to a premium. Using Longitudinal Research Database (of the Bureau of Census), Maksimovic and Phillips (2002) and Schoar (2002) find that plants in diversified firms are, on average, more productive than plants in comparable specialised firms.

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<sup>20</sup> Since 1977 it has been a requirement that segment data be reported, following Statement of Financial standards (SFAS) No.14 and SEC regulation S-K which was later replaced by SFAS No.131 in 1997. For a comparison of these standards refer to Berger and Hahn (2003).

<sup>21</sup> Refer to Davis and Duhaime (1992) and Hyland (1999) for further discussion of the problems.

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Some studies on this sceptical side argue that the diversification discount may exist but that it does not necessarily reflect value destruction. Lamont and Polk (2001) argue that investors in firms with a diversification discount will receive a higher expected stock return. Thus, diversification discount simply reflects the difference between future returns and cash flows between diversified and specialised firms, that is discounted firms will have higher subsequent returns (than premium firms). Although Lamont and Polk cannot empirically show that stocks of diversified firms provide higher returns than stocks of specialised firms, they do show that stocks of discounted diversified firms generate better results than those of premium diversified firms. Mitton and Vorkink (2010) extend Lamont and Polk (2001) to show that discounted diversified firms offer higher returns in order to compensate investors for a lack of upside potential (or skewness exposure) than specialised firms. Thus, the evidence further indicates that corporate diversification may not destroy value although it does reduce the chance of an extremely high return for investors. Hund, Monk and Tice (2010) adopt the rational learning model developed by Pastor and Veronesi (2003) to show that diversified firms have lower value than specialised firms due to lower uncertainty about average profit. Mansi and Reeb (2002) suggest that diversification discount reflects the wealth transfer from shareholders to bondholders due to the risk-reduction effects of diversification rather than destruction of the overall firm value. Evidently, Mansi and Reeb do not find diversification discount in all equity firms.

The methodological critique is, in turn, addressed by studying the relation between value of diversified firms and exogenous change in level of diversification. In Lamont and Polk (2002), in order to address the endogeneity of the decision to diversify, the authors employ shocks in industry investment to measure dispersion of within-firm-investment or “diversity”. The negative relation between firm value and the exogenous

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increase in the level of diversification (due to changes in industry investment) is given as evidence that diversification destroys firm value.

Several studies (Gertner, Powers and Scharfstein, 2002; Dittmar and Shivdasani, 2003; Burch and Nanda, 2003; Ahn and Denis, 2004) employ a “natural experiment” approach (i.e., spin-off and divestiture events) to overcome the problems relating measurement errors (Whited, 2001; Chevalier, 2000). The benefit of this approach is that researchers can investigate the change of efficiency of capital allocation in association with exogenous changes in the degree of diversification. Gertner et al. (2002) find that a segment’s investment becomes significantly more efficient once it has been spun-off from its parent. Ahn and Denis (2004) report improvement in the investment efficiency of the hypothetical combined firm (combining the post-spin-off segment with the parent) following the spin-off. Overall, these studies present evidence of performance improvement following reduction in the degree of diversification.

This type of evidence is somewhat consistent with findings from a large body of studies focusing on the downward trend in corporate diversification since the 1980s (Bhide, 1990; Comment and Jarrell, 1995; John and Ofek, 1995; Liebeskind and Opler, 1993, among others). The general finding is that increasing focus leads to higher market valuations. Bhide (1990) and Hubbard and Palia (1999) argue that economic, regulatory and technological development reduces the information asymmetry between firms and financial providers in an external capital market. Thus, corporate diversification with operation of internal capital markets which is expected to overcome this problem of informational inefficiency becomes much less important.

Taken together, the current empirical evidence is not conclusive on the subject of whether diversification adds or destroys value. Given that the theoretical framework discussed in the previous subsection also does not provide a clear-cut prediction of

whether diversification is, on average, good or bad, Stein (2003) and Villalonga (2003) suggest that researchers should focus more on the cross-sectional variation of the discount.

### **2.5. Cross-section variations**

Studies of cross-sectional variation in the value of diversified firms are important for several reasons. Firstly, they are another way of addressing the critique relating to measurement errors in calculating a diversification discount raised by Whited (2001) and Chevalier (2000). For instance, even if one accepts that there is a bias in the measure of the discount, it is still hard to explain why the discount correlates with, for instance, internal capital market efficiency or measures of corporate governance. Secondly, and more importantly, the cross-sectional studies may suggest those situations in which diversification is most likely to create value and those in which it tends to destroy value.

#### **2.5.1. Value of diversified firms and internal capital market**

Several studies (both theoretical and empirical) in diversification literature suggest a significant link between the value of diversified firms and the function of internal capital markets. Theoretically, Alchian (1969), Weston (1970), Williamson (1975) and Donaldson (1984) argue that efficient capital allocation within internal capital markets is a justification for corporate diversification. Comment and Jarrell (1995) suggest that failure of a diversified firm to exploit the function of internal capital markets is the reason behind corporate focusing in the 1980s. Hubbard and Palia (1999) argue that one possible explanation for positive abnormal returns for bidding firms during the 1960s conglomerate merger wave was the expectation that internal capital markets would be able to overcome the information deficiencies of the less-developed external capital market. Evidently, the authors find the highest return in the acquisitions where



financially unconstrained buyers acquire constrained targets - the case in which internal capital markets are most likely to create value. De Motta (2003) similarly finds that the relative value of a diversified firm to a stand-alone firm is inversely related to the development of the capital market.

Berger and Ofek (1995) show empirically that the larger the overinvestment and cross-subsidisation within internal capital markets, the higher is the value loss for the diversified firms. Rajan et al. (2000) develop a measure for internal capital markets efficiency and report a positive relationship between investment efficiency and firm value. The measurement propounded by Rajan et al. (2002) is widely used in subsequent papers (Datta, D'Mello and Iskandar-Datta, 2009; Sautner and Villalonga, 2010; Ozbas and Scharfstein, 2010) with which similar results are reported. Billet and Mauer (2003) find little evidence of the relationship between the value of diversified firms and the overall value of their internal capital markets. Nevertheless, the authors do show that efficient subsidies to financially constrained segments significantly increase the value of diversified firms, while inefficient transfers from segments with good investment opportunities significantly decrease the value.

### **2.5.2. Value of diversified firms and degree of diversification**

A general finding in the literature is that value is lower in more diversified firms. Stein (1997) argues that, theoretically, when the number of projects overseen by the headquarters increases, the quality of monitoring declines respectively. Furthermore, valuation errors in ranking projects are likely to be larger when the projects are in distinct industries, leading to a declining value of diversification. In the model of Rajan et al. (2000), internal capital allocations are more efficient when the differences in the resources and investment opportunities of segments are not so pronounced.

Consequently, this model predicts an inverse relation between the value of diversified firms and the diversity of their segments' resources and investment opportunities.

Lang and Stulz (1994) and Berger and Ofek (1995) both empirically find a negative relationship between the value of a diversified firm and the number of segments it has. Notably, the marginal difference is most pronounced between single-segment and two-segment firms and is more trivial among firms with a larger number of segments (Lang and Stulz, 1994). Measuring diversification as diversity in segments' levels of resources and investment opportunities, Rajan et al. (2000) also empirically show that increase in the diversity leads to more inefficient investment allocations and less valuable firms.

Berger and Ofek (1995) document that the diversification discount is considerably reduced in related diversified firms (i.e., firms with more segments operating in the same 2-digit SIC code). The finding is somewhat consistent with Khanna and Tice (2001) who found that related diversified retailers responded more efficiently to Wal-Mart's entry into their market than did stand-alone firms. A large body of strategic management studies (e.g., Rumelt, 1974, 1982; Christensen and Montgomery, 1981; Wernerfelt, 1984; Hoskisson, 1987; Farjoun, 1994, and others) which are based on arguments of economies of scope, synergy effects, resource-based and resource-dependence theory also find similar results to Berger and Ofek<sup>22</sup>.

### **2.5.3. Value of diversified firms and corporate governance**

The review of theoretical arguments in sub-section 2.3.4 necessarily suggests that the value of diversified firms is significantly affected by agency problems within those firms,

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<sup>22</sup> For instance, Rumelt (1974, 1982) posits that the success of related diversification lies in capabilities such as economies of shared factors of production. Farjoun (1994) argues that firms can more efficiently utilise their resources by sharing and transferring them among divisions that are in related industries. Hillman et al. (2009), adopting the perspective of resource dependency theory, suggest that vertical diversification may be optimal for reducing a firm's dependence on suppliers or consumers.

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particularly through impacts on motivations for diversification and efficiency of internal capital allocations. Empirical evidence relating to the problems is also broadly documented (see e.g., Amihud and Lev, 1981; Aggarwal and Samwick, 2003; Duchin and Sosyura, 2013; Graham, Harvey and Puri, 2010; Glaser, Lopez-de-Silanes and Sautner, 2012, among many others).

A strand of studies, accordingly, investigates the link between the value of diversified firms and different aspects of corporate governance – a mechanism believed to be able to mitigate agency problems within firms.

Corporate governance may induce (reduce) optimal (suboptimal) diversifying decisions on the part of managers. Amihud and Lev (1981) argue that managers may choose to diversify even when this does not benefit shareholders. Importantly, Amihud and Lev (1981) empirically show that risk-reduction activities by diversification are more intensive in manager-controlled firms than in owner-controlled firms as managers are relatively free to exercise their discretion in the former where ownership is widely dispersed across stockholders. Denis, Denis and Sarin (1997) find that the level of diversification is negatively related to managerial equity ownership. In addition, decreases in diversification are associated with external corporate control threats, financial distress and management turnover. Servaes (1996) reports a negative relationship between insider ownership and diversification during the 1960s when there is a large diversification discount. Nevertheless, when the discount was found to decline during the 1970s, firms with high insider ownership were the first to diversify.

Corporate governance may also improve efficiency of internal capital allocation. Scharfstein (1998) finds that sensitivity of a segment's capital expenditure to its industry Q is higher in a diversified firm where top management hold more equity. This research was reproduced by Datta, D'Mello and Iskandar-Datta (2009) who empirically reported

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a positive relationship between a measure of internal capital market efficiency and the value of diversified firms, and CEO equity-based compensation. Similarly, Palia (1999) reveals that cross-subsidisation within diversified firms is more prevalent if a segment manager's compensation is less tightly linked to the firm's overall performance.

Sautner and Villalonga (2010) provide evidence of the positive relationship between the efficiency of the internal capital market, the value of diversified firms and ownership concentration. More specifically, it shows that internal capital markets are more efficient and the value of firms enhances with an increase in ownership by other corporations, governments and insiders. Evidently, large owners seem to play an important role in reducing agency problems in diversified firms, possibly by preventing management from misallocating funds for reasons of private benefit. This finding is consistent with Palia (1999) in which socialism in internal capital markets is more pronounced in firms with large (and therefore presumably less effective) boards of directors.

Altogether, research on the relationship between diversification strategy and its impact on value has, for a long time, attracted the attention of scholars from a wide range of disciplines. Nevertheless, the results of this research remain rather inconsistent. The most influential finding is the discovery of the "diversification discount" by Lang and Stulz (1994) and Berger and Ofek (1995). The intense debate triggered by this finding presents the recent development of the topic in financial economics literature. While a conclusion on the average impact of diversification on firm value has still not been agreed among researchers, a new research direction is to focus on the cross-sectional variance of the value of diversified firms. Researchers have, so far, been able to show that the value of diversified firms is broadly correlated to the operation of internal capital markets, the level of diversification and corporate governance.

## **2.6. Diversification and financial management**

There are two fundamental ways in which corporate diversification may affect a firm's financial management. The "more-money" effect (so named by Stein (2003)) refers to a situation where integration of multiple businesses under the roof of a single parent company may allow more total external financing to be raised than could be raised by each individual business operating as a stand-alone entity. The "smarter-money" effect (also a term coined by Stein) refers to efficient capital transfers among segments of diversified firms. These two effects and their implications on financial management will be discussed in the following sections.

### **2.6.1. The more-money effect**

The more-money effect is seen as a benefit of diversification that arises from increasing stabilisation of the diversified firm's income streams (Gort, 1966). Levy and Sarnat (1970, p.801) document that "... the diversification can be expected to create true economic gain owing to the fact that combination of financial resources of two firms making up the merger reduces lenders' risk..." Diversification may enhance diversified firms' access to the debt as well as equity market.

Lewellen (1971) introduced the coinsurance effect, with which the imperfect correlation among segments' income streams reduces the chance of sharp declines in total firm earning. Consequently, this significantly reduces a diversified firm's probability of default and hence increases its debt capacity. Montgomery and Singh (1984, p.184) argue similarly that "Diversified cash flows are likely to reduce bankruptcy risk of a firm, and increased firm size will tend to provide better access to the capital markets and cost savings when securing financing." Comment and Jarrell (1995) suggest that greater debt capacity is a motivation for diversification. In a more recent theoretical model, Inderst and Muller (2003) note that the ability to use excess liquidity from high

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cash flow projects to finance low cash flow projects allows diversified firms to make greater payments to outside investors which ease the firm's financing constraint. Shleifer and Vishny (1992), on the other hand, argue that diversified firms may have a higher debt capacity as, in the worst situation, they can have the choice of selling assets in those industries that suffer the least from liquidity problems.

The empirical evidence as to whether there is greater use of debt in diversified firms is rather mixed. Early studies in the literature report a higher leverage ratio in diversified firms compared to specialised firms. Melicher and Rush (1973) compare a group of 45 conglomerates to a group of 45 non-conglomerates and find a higher leverage ratio in the group of conglomerate firms during 1965 to 1971. Weston and Mansinghka (1971) report a higher debt ratio in diversified firms in the years 1958 and 1968. A similar finding of higher leverage among unrelated diversifiers is also documented in Montgomery and Singh (1984). Subsequent studies, nevertheless, show that diversified firms do not borrow significantly more than their specialised counterparts. Berger and Ofek (1995) find that diversified firms borrow only 1% more of their assets than comparable specialised firms over 1986-1991. Comment and Jarrell (1995) report economically insignificant variations in debt ratio among a group of firms with different degrees of diversification. Peyer (2002) find that diversified firms in general use less external capital than comparable specialised firms. However, the author also documents higher external capital use in diversified firms with efficient internal capital allocation. Dimitrov and Tice (2006) study differences in access to credit market between diversified and specialised firms by looking at the behaviour of these firms during recession. The evidence of lower sales growth and inventory growth in specialised firms during recessions supports the hypothesis that diversified firms have better access to the external capital market.

Stulz (1990) argues that information asymmetry between managers and shareholders may, theoretically, lead to inefficient investment, especially when cash flow is low, as the managers cannot credibly convince shareholders that cash flow is too low for all potential projects. Lower cash flow uncertainty due to diversification reduces this underinvestment problem as shareholders will be more willing to provide new capital when their predicted and real cash flows will not differ significantly. Hadlock, Ryngaert and Thomas (2001) find that errors in valuing individual unrelated segments of diversified firms are not perfectly correlated. This implies that the total error in valuing diversified firms will be likely to be smaller than that for specialised firms. Consequently, the adverse-selection problem in issuing equity will be smaller for diversified firms relative to specialised firms. In support of this theoretical argument, Hadlock et al. (2001) find a smaller price impact from equity issues by diversified firms than from equity issues by comparable specialised firms.

Summarily, it seems obvious a greater access to external capital market for diversified firms from the theoretical arguments. There is, nevertheless, less direct empirical evidence as to whether diversified firms raise more external capital than specialised firms.

### **2.6.2. The smarter-money effect**

The theoretical ground for the smarter-money effect in diversified firms has a long tradition and has been discussed in several studies (see e.g., Alchian, 1969; Weston, 1970; Williamson, 1975; Donaldson, 1984; Stein, 1997, among others). It is widely argued that internal capital allocation may be more efficient than capital allocation by the external capital market and, thus, a given amount of funds will be used in a smarter way by diversified firms. This argument was subsequently challenged by a number of subsequent studies (Scharfstein and Stein, 2000; Rajan et al., 2000; Wulf, 1999, among

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others) which argue that an internal capital market is not necessarily efficient, due to agency problems<sup>23</sup>.

Empirical evidence is largely consistent with the latter argument. A line of empirical papers (Lamont, 1997; Shin and Stulz, 1998; Scharfstein, 1998; Rajan et al., 2000, Billet and Mauer, 2003; Obzas and Scharfstein, 2010, among others) examines the efficiency of internal capital markets by focusing on the investment behaviour of diversified firms' segments. Shin and Stulz (1998, p.543) characterise an efficient internal capital market as “(1) it gives priority in the allocation of funds to the segment with the best investment opportunities; (2) it makes that segment's investment less sensitive to its own cash flow as well as to other segments' cash flow; and (3) its allocation of funds to a segment falls when other segments have better investment opportunities”. Accordingly, Shin and Stulz find evidence that an internal capital market is active but has limited efficiency. More specifically, the study shows that internal capital markets are not able to protect investment in segments with the best opportunities because investment in these segments is still significantly sensitive to the segments' own cash flow and other segments' cash flow. Nevertheless, the study also documents that investment in segments of highly diversified firms is less dependent on their cash flow than the investment of comparable specialised firms.

Lamont (1997) shows that diversified oil firms use cash flow from oil segments to invest at industry level in non-oil segments which generate lower than average industrial profit. According to Scharfstein (1998) and Obzas and Scharfstein (2010), sensitivity of investment to industry Q is much lower for segments of diversified firms than it is for specialised firms. Rajan et al. (2000) develop a measurement of internal capital allocation activity and find that the industry-adjusted investment of low-Q

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<sup>23</sup> For more details of the theoretical discussions, refer to the previous subsection.



segments is higher than the industry-adjusted investment of high-Q segments. Taken together, the general finding from this line of studies suggests that funds are internally allocated too much to low-Q segments and too little to high-Q segments. This implies inefficiency in a form of “socialist” cross-subsidisation in the internal capital markets of diversified firms.

### **2.6.3. The implications for financial management**

Apparently, diversified firms’ better access to external funding and advantageous position in respect of optimising the allocation of internally generated funds provide diversified firms with greater flexibility in financing (Palich, et al. 2000). The operation of internal capital markets may reduce firms’ reliance on a costly external capital market which may force firms to forgo positive net present-value projects (Myers and Majluf, 1984). This reduces the underinvestment costs. The other side of reducing underinvestment is, however, an overinvestment problem. Unused borrowing power and greater ability to self-finance without accessing the external capital market may magnify the agency cost of free cash flow in diversified firms due to lack of capital market discipline and monitoring (Jensen, 1986; Meyer, Milgrom and Robert, 1992).

Recent studies (Duchin, 2010; Subramaniam et al., 2011) provide evidence of the effects of corporate diversification on financial management: diversified firms are shown to save less precautionary cash than specialised firms. This effect is seen as a benefit of diversification with firms saving on costs of cash holdings (Duchin, 2010)<sup>24</sup>. Subramaniam et al. (2011) further argue that a diversified firm’s structure may act as a substitute for cash holdings.

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<sup>24</sup> Kim, Mauer and Sherman (1998) and Opler, Pinkowitz, Stulz and Williamson (1999) provide intensive discussion of the cost of cash holdings.

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Importantly, these studies implicitly attribute the lower cash balance in diversified firms to the operation of the smarter-money effect<sup>25</sup>. More specifically, Duchin (2010) introduces the notion of investment opportunity risk and argues that optimal cash holdings in diversified firms is reduced because investments can be internally financed using cash flow due to the lower volatility of segmental investment opportunities and cash flow<sup>26</sup>. Diversification is measured as a cross-segmental correlation of investment opportunity and cash flow as well as an intra-segmental correlation of investment opportunity and cash flow. Evidence of less cash holdings when cross-segmental correlation in cash flow and investment opportunity is lower and correlation of investment opportunity and cash flow is higher supports the argument. As does Duchin (2010), Subramaniam et al. (2011) are also able to attribute lower cash holdings in diversified firms to complementary investment opportunities across different segments and to the ability to reallocate capital among segments in internal capital markets. Put together, these studies suggest that diversification influences financial management in a positive way (reducing the cost of cash holdings) through the smarter-money effect (diversified firms are in a better position to match internal cash flow with investment demand).

To summarise, the literature has identified two basic financing-related ways (i.e. more-money and smarter-money effects) in which corporate diversification may create value by allowing diversified firms greater flexibility in financial management. The recent studies of Duchin (2010) and Subramaniam et al. (2011) show that diversified

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<sup>25</sup> This implication, in some aspects, supports the hypothesis of an efficient internal capital market. On the other side, Tong (2011) finds contrasting evidence that cash holdings have a lower value in diversified firms due to an inefficient internal capital market.

<sup>26</sup> In Duchin (2010), diversified firms have a better ability to use cash flow to finance investment for three reasons. Imperfect cross-divisional correlation of cash flow (investment opportunity) reduces the possibility of simultaneous multiple cash flow shocks (investment opportunities) in divisions. Moreover, intra-divisional correlation of cash flow and investment opportunity allows cross-financing from high cash flow divisions to low cash flow ones.

firms are in a more advantageous position to save less precautionary cash than are specialised firms.

## **2.7. Conclusions**

The conceptual foundation of research on corporate diversification is established on the basis of various theoretical perspectives (i.e., portfolio selection theory (Markowitz, 1952, 1959), transaction cost economy theory (Coase, 1937), resource-based theory (Penrose, 1959), resource-dependence theory developed (Pfeffer and Salancik, 1978) and agency theory). On the one hand, the diversity of theories can benefit the study of corporate diversification by providing views from the standpoint of different disciplines. On the other hand, it may lead to different or occasionally counter opinions on several specific empirical issues.

Two main empirical issues within financial economics literature have been reviewed, namely the influence of diversification on firm value and on financial management. Contemporary financial economics literature on the first issue (i.e. the link between diversification and firm value) takes off from the finding of Lang and Stulz (1994) and Berger and Ofek (1995) that diversified firms are traded at a discount compared to equivalent specialised firms. Subsequent active debate on the finding essentially turns this matter into one of the biggest puzzles in the literature. My research complements the discussion on two important points.

First, as suggested by Stein (2003), as theoretical arguments are equally strong on both side of the discussion (i.e., whether or not diversification destroys value), empirical studies should not hinge too much on determining the average value of diversification. Rather, further research should focus more on cross-sectional variation of the value, that is pointing to specific circumstances under which diversification may

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destroy (or create) value. As shown in the above review of literature, the value of diversified firms is shown to partly vary with the efficiency of the internal capital market, the level of diversification and corporate governance. Still, there is plenty of room for further investigation of which factors allow diversification to benefit some firms but not for others. Adopting a novel perspective taken from organisational literature, my research investigates the hypothesis that learning from experience of previous diversification plays a crucial role in determining the success of a firm's diversification.

Second, an implication of the diversification discount which is widely agreed upon by finance scholars, is that corporate diversification destroys shareholder wealth. Indeed, Martin and Sayrak (2003) note that "Conventional wisdom among finance scholars suggest that corporate diversification, especially conglomerate diversification, destroys shareholder wealth such that shares of diversified firms sell at a discount" (p.38). Nevertheless, one-third of US diversified firms are still traded at a premium (Mitton and Vorkink, 2010). And more importantly, it is unclear why major US corporations remain highly diversified (Montgomery, 1994; Hatfield et al., 1996). A line of recent studies (Lamont and Polk, 2001; Mitton and Vorkink, 2010) argue that even if diversification discount does exist, this does not necessarily imply a destruction of shareholder wealth. My research addresses this proposition in a novel portfolio approach, particularly by comparing the performance of portfolios of randomly selected diversified firms and of randomly selected specialised firms. Performance of portfolios of firms, rather than of average firm performance, may be a more appropriate way to reflect shareholder wealth as investors will normally invest in a (small) group of diversified (specialised) firms rather than in all available diversified (specialised) firms.

The second issue relates to the effect of diversification on financial management. This effect is established in two separate arguments that (1) diversification may enhance

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a firm's access to an external capital market (the more-money effect), and (2) diversification facilitates the allocation of funds within firms (the smarter-money effect). These effects necessarily suggest that diversified firms should have greater flexibility in financial management. This issue has become increasingly significant in practice within the context of an overall increased risk level in the business environment (Graham and Harvey, 2001; Bates, Kahle and Stulz, 2009; Irvine and Pontiff, 2009).

The importance of this stream has been recently highlighted in the studies of Duchin (2010) and Subramaniam et al. (2011) which report that diversified firms can keep a significantly lower precautionary cash balance than can specialised firms. While these studies focus on the diversification effects on cash balance, my research will go further, to investigate differences in cash flow management between diversified and specialised firms.

The next chapter will describe the process used to select the sample for the research and to provide definitions of some key concepts and variables. The three research issues will be accordingly presented in the three empirical chapters.

## **3. Data and methodology**

### **3.1. Introduction**

This chapter presents the background of the data used in the empirical chapters: the sources, sampling process and descriptive statistics of the main variables will be described. The thesis examines US firms over the period 1990-2009. Some concepts and variables that form the core of the thesis will also be introduced.

The organisation of the chapter is as follows: section two lists the database used for downloading the data and provides the process for constructing the whole sample for the thesis, as well as sub-samples used in each empirical chapter. Section three is used to define the key concepts (particularly, diversification, specialised and diversified firms) and variables (particularly, diversification measurements) for the study. Discussion of the descriptive statistics of main variables will be provided in section four. Section five concludes the chapter.

### **3.2. Sample construction**

This subsection describes the sample construction for the thesis and for each empirical chapter. The US market is selected for several reasons. First, the size of the economy and the number of diversified firms which operate in it mean that it can provide the largest sample for the study. Second, segmental data is perhaps the first requirement for

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research into corporate diversification. As a result of SFAS No.14 and SEC regulation S-K in 1977, US firms are required to report audited information on segments whose assets, sales or profits exceed 10% of the firm's consolidated totals. Segmental data is, therefore, most readily available for US firms.

A sample was firstly compiled of all US firms (both survivors and non-survivors) with more than ten million US dollars market capitalisation available, as shown in Thompson One Banker during 1990 to 2009. The segment data (including segment assets, capital expenditures, depreciation, operating income, sales and SIC code) and firms' financial data were extracted from the WorldScope database while the Thompson Financial database was used to retrieve data on cash flow statements. The stock prices used in the second empirical chapter were collected from the DataStream database.

Several criteria, which are widely regarded as the standard of the literature, were then applied to the sample, following Lang and Stulz (1994) and Berger and Ofek (1995). More specifically, firms in the final sample must meet the following restrictions:

1. All financial firms (SIC code 6000-6999) and utility firms (SIC code 4000-4999) were excluded due to differences in accounting standards and the regulatory environment for these firms (Shin and Stulz, 1998; Dimitrov and Tice, 2006; Duchin, 2010, among others).
2. To ensure the integrity of segment data, it was required that the sum of segment sales be within 1% of the firm's total sales (i.e., summation of segment sales must not be more (less) than 101% (99%) of a firm's total sales). Furthermore, firm-year observations with missing segment SIC codes were also not included (Dimitrov and Tice, 2006; Duchin, 2010; Subramaniam et al., 2011, among others).

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3. Following Duchin (2010), firms in the sample should not have cash holdings, any cash flows components, or total long-term debts larger than the value of the total assets.

All the sample data was CPI-adjusted into 2000 dollars (Duchin, 2010; Subramaniam et al., 2011). The final sample consisted of 34,869 firm-year observations for 4,560 firms of which 1,886 were diversified firms (10,309 firm-year observations) and 3,930 were specialised firms (24,560 firm-year observations).

This full sample is used in the third empirical chapter which investigates the influence of diversification on financial management. In the other two empirical chapters, two separate sub-samples were created, respectively (from the full sample) to address the specific research questions in each chapter.

Specifically, for the first empirical chapter examining the impact of learning from diversification experience on the value of diversified firms, the sub-sample only retains firms that diversified (i.e., increase the reported number of segments) at least once during 2000 to 2009. The sub-sample includes 1,956 firm-year observations from 1,357 firms. The data from 1990 to 2000 are still used to calculate the experience variables for these firms.

For the second empirical chapter, which compares the performance of portfolios of diversified and specialised firms, some restrictions are applied to ensure validity of stock price data. To be included in the sub-sample, firm-year observations must have at least 30 trading days out of 250 total trading days (Brown and Warner, 1985). Observations with a daily return exceeding 1000% are also excluded. In a further processing of the data, some firm-year observations with zero mean and zero standard deviation of return (i.e., daily stock price is unchanged for the whole year) are considered as data errors and are excluded from the sample. The sub-sample for the



chapter consists of 12,798 firm-year observations for the period 1991-2009 in which 7,823 observations relate to 1,769 specialised firms and 2,858 observations relate to 815 diversified firms<sup>27</sup>.

### **3.3. Key concepts and main variables**

The fundamental concepts underlying the whole thesis are the definition of corporate diversification and diversified firms, and the methods used to measure diversity level. These are discussed in the first two parts of this section. Following this, the definitions and descriptive analysis of the main variables that will be used throughout all the empirical chapters are then presented. The other key variables that are specific to each empirical study will be defined in the respective empirical chapter.

#### **3.3.1. Diversification and diversified firms**

As is clear from a review of the literature, there are a number of ways in which diversification can be conceptualised. Diversifications or conglomerations are widely referred to as strategy activities that result in the entry of a firm into a new product market (Gort, 1962; Ansoff, 1965) or geographic market (Booz, Allen and Hamilton, 1985), or which result in the firm operating in an increasing number of industries (Gort, 1966; Smith and Schreiner, 1969; Berry, 1975; Lang and Stulz, 1994, among others). Gort (1966, p.31) clearly defines that “By diversification I mean an increase in the number of industries in which a firm is active.”

The thesis adopts the general concept of industrial diversification. More specifically, in the first empirical chapter of the thesis a diversification event is recorded when a firm’s reported number of segments increases. The definition essentially follows the notion of Lang and Stulz (1994) that a firm that increases its reported number of

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<sup>27</sup> Only one diversified firm-year observation which meets all the restrictions is available in 1990, so the sub-sample commences from 1991.

segments is a firm that either has acquired or has internally developed a new line of business or has expanded its existing lines of business to the point that it is required to report new business segments. When the new segment is in the same industry as (one of) the existing segments it can also be referred to as a related diversification<sup>28</sup>.

Diversified firms can be accordingly defined following the above concept of industrial diversification. Smith and Shreiner (1969, p.414) propose that "...a conglomerate is taken to be a company that (1) invests capital in several industrial categories..." In Lang and Stulz (1994), diversified firms are defined as firms that operate in more than one industry. This definition is also widely adopted in the literature (see e.g., Maksimovic and Phillips, 2007; Duchin, 2010; Subramaniam et al., 2011, among others).

Consistent with the literature, diversified firms in my research are defined as firms that report more than one business segment with different SIC codes at the two-digit level. The terms diversified firms or conglomerate firms are used interchangeably throughout the thesis. Respectively, firms with one reported segment or with two or more segments in the same two-digit SIC code are classified as specialised or focused firms.

### **3.3.2. Measurement of firm diversification**

There are stark differences in measures of diversification across research disciplines as well as within them. Measurement can be developed in regard to extent (i.e., less or more) and (or) direction (i.e., relatedness or un-relatedness) of diversification (Ramanujam and Varadarajan, 1989). Measurement of diversification can be objective or subjective and can take a categorical or continuous form.

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<sup>28</sup> For instance, suppose a firm has two existing segments (in SIC code 11 and 21): a new segment with SIC code 11 is recognised as a (related) diversification according to my definition. It should be noted that this may not be a diversification under the terms of the stricter view in the literature, which require an increase in the number of industries operated in.

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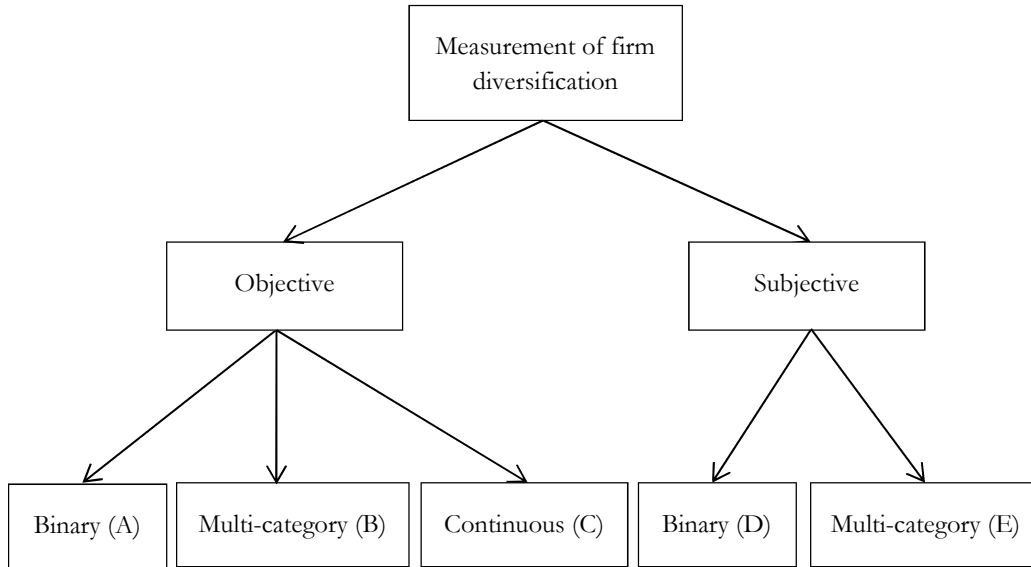
Studies of corporate diversification in financial literature widely use objective and categorical (or continuous) measurement of diversification which can be calculated easily from publicly available data. More specifically, degree of diversification can objectively be presented by the number of SIC codes that a firm operates in. Accordingly, firms which report three different SIC codes will be considered more diversified than firms operating in two SIC codes. The number of digits of the four-digit SIC codes to be used is also an issue. Researchers can use two-digit, three-digit or four-digit SICs to define industries: the four-digit SIC code is the most refined measure.

The advantage of this counting measure is its simplicity. However, the problem is that it cannot capture the relative importance or distribution of a firm's involvement in each industrial segment. Several studies (Berry, 1971; McVey, 1972; Comment and Jarrell, 1995; Lang and Stulz, 1994) use the Herfindahl index to capture the relative importance of a firm's different segments. More specifically, the index can be computed as the sum of the squared values of sales (assets) per segment as a fraction of the firms' total sales (assets). Firms with one segment will, therefore, have an index of one. Firms with ten segments with an equal sales (assets) fraction of 10% of the firms' total sales (assets) will have an Herfindahl index of 0.1. Hence, the Herfindahl index falls when the degree of difference between segments or diversity level increases.

A subjective or strategic measure of corporate diversification is more popular in strategy management literature. The measure relies on the subjective judgement of researchers to categorise the relatedness of a firm's business segments. For instance, Wrigley (1970) proposes four different diversification categories, including single business, dominant business, related business and unrelated business. The measurement from Wrigley (1970) was later extended in Rumelt (1974) to nine categories.

To illustrate these different approaches to measuring diversity level in the literature, the following figure is adopted from Ramanujam and Varadarajan (1989).

**Figure 3.1 Approach to the measurement of firm diversification**



Approach	Illustrative examples
A	Conglomerate and non-conglomerates (Weston and Mansinghka, 1971; Melicher and Rush, 1973; Beattie, 1980) or diversified and specialised firms (Lang and Stulz, 1994; Berger and Ofek, 1995; Duchin, 2010; Subramaniam et al., 2011)
B	Number of segments (Lang and Stulz, 1994; Berger and Ofek, 1995), low, medium or high (Daniels, Pitts and Tretter, 1984) or broad and narrow spectrum diversity (Varadarajan, 1986)
C	Herfindahl index (Berry, 1971; McVey, 1972; Comment and Jarrell, 1995; Lang and Stulz, 1994); Entropy measure (Palepu, 1985); diversity of segments' investment opportunity (Rajan et al., 2000); cross-segmental correlation in investment opportunity and in cash flow (Duchin, 2010)
D	Product diversity and market diversity (Ward, 1976)
E	Relatedness-based measures (Wrigley, 1970; Rumelt, 1974)

(Adopted from Ramanujam and Varadarajan (1989))

The differences in results from using alternative measurements are, however, trivial. Lang and Stulz (1994) use both categorical (number of segments) and continuous (Herfindahl index) measurement of diversification and find that they are highly correlated and provide similar outcomes. Montgomery (1982) shows that Rumelt's

subjective categories generally accord well with the objective SIC count measures or other continuous scale. Palich et al. (2000) also note that level of diversification (i.e. low, moderate, high diversification as measured by number of segments) is highly equivalent to type of diversification (i.e. single-business, related and unrelated as defined by Rumelt (1974)). Ramanujam and Varadarajan (1989) suggest that “The use of alternative approaches for measuring diversity has not led to greater insights into the impact of diversification on performance” (p.539).

This research adopts the conventional objective measurements of diversification in financial literature. More specifically, a binary variable is used to categorise firms, which applies the value one for diversified firms and zero for specialised firms. The degree of diversification is measured by the objective number of a firm’s segments.

### **3.4. Definition of, and descriptive statistics for, main variables**

Table 3.1 provides the definition of several variables that are used in different empirical chapters of this thesis. Other variables that are specific to each empirical study will be defined in the corresponding empirical chapter.

**Table 3.1 Definition of variables**

<b>Variable</b>	<b>Definition</b>
Specialised firms	Firms with segment(s) operating in only one two-digit SIC code
Diversified firms	Firms with more than one segment operating in more than one two-digit SIC code
Cash/assets	Cash and short-term investments /total assets
Net cash flow/assets	Change in cash and short-term investment from one year to the next/total assets
Net operating cash flow/assets	Net cash receipts and disbursements from operating activity representing the sum of cash flow, extraordinary items and other operating cash flow/ total assets
Net investing cash flow/assets	Net cash receipts and disbursements resulting from capital expenditures, disposal of fixed assets, increase in other assets and other investing activities /total assets
Free cash flow/assets	(Net operating cash flow- Net investing cash flow)/ total assets
Net financing cash flow/assets	Net cash receipts and disbursements resulting from changes in long or short term debt, proceeds from sale of stock, stock repurchased, dividends paid and other financing activities /total assets
Tobin's Q (Q)	Market value of assets (total assets + market value of common equity – common equity –deferred taxes) / (0.9*total assets + 0.1* market value of assets)
Capex/assets	Capital expenditure / total assets
Cash flow/assets	(Income before extraordinary items + depreciation and amortisation)/total assets
Book leverage	(Debt in current liabilities + long-term debt)/ total assets
Payout/assets	(Cash dividends + purchase of common and preferred stocks)/total assets
Net working capital (NWC)/assets	(Current assets – current liabilities – cash)/ total assets
Number of segments	A count of the segments that represent 10% or more of firm

	consolidated sales
Firm size	Natural logarithm of total assets

Table 3.2 presents the descriptive statistics of the main variables used in this study for the whole sample of 4,560 firms and 34,869 firm-year observations and the sub-samples of 1,886 diversified firms (10,309 firm-year observations) and 3,930 specialised firms (24,560 firm-year observations). The differences in these key financial variables between diversified and specialised firms are all statistically significant, at a 1% level.

The group of cash flows variables show that, during 1990 to 2009, firms in the sample hold a large proportion of their total assets in cash. More specifically, consistent with Bates et al. (2009) one-fifth of the firms' assets are liquid assets. Similar to the findings of Duchin (2010) and Subramaniam et al. (2011), specialised firms' cash balance are roughly twice those of diversified firms. Positive net cash flow indicates that both firms accumulate cash regularly throughout the period, though the "speed" of saving cash in specialised firms is double that in diversified firms. Further analysis of these cash flow items clearly demonstrate that diversified firms generate more cash, invest less and rely less on external sources of finance<sup>29</sup>.

In respect of other important firm characteristics, consistent with Lang and Stulz (1994), the table shows that specialised firms have significantly higher Q than diversified firms. Higher Q, lower firm size and larger capital expenditure suggest that specialised firms are mostly immature and growing firms, relative to diversified firms (Duchin, 2010).

Average (median) debt ratio in diversified firms is 23.8% (22.3%) which is significantly higher than the average (median) ratio of 18.1% (12.4%) in specialised

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<sup>29</sup> Further analysis of differences in cash flow components between diversified and specialised firms will be provided in the final empirical chapter.

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firms. Thus, although diversified firms were previously shown to rely less on external financing than specialised firms during the period, their leverage ratio is still high compared to the non-diversifiers. One explanation is that the ratio may already be larger in diversified firms in the previous period (i.e., prior to 1990). Also, it is possible that diversified firms keep their lower financing cash flow by mostly distributing to shareholders rather than reducing debts. The table indeed shows that diversified firms have a higher pay-out ratio than specialised firms.

In summary, the table indicates that the sample is comparable to the literature with a more extended period (see e. g., Duchin, 2010; Subramaniam et al., 2011; Bates et al., 2009; among others). It is clearly demonstrated that diversified and specialised firms are entirely distinct, not only in respect of several firm characteristics, but also in respect of financial activities. Diversified firms are characterised as larger firms with a higher leverage ratio, less investment opportunities and lower cash saving. Within the period, diversified firms are shown to mainly rely on internal finance for their financing demand while specialised firms need to use more external financing.



**Table 3.2 Summary statistics for the whole sample and for sub-samples of specialised and diversified firms**

This table contains summary statistics for the sample which includes non-financial and non-utility US firms from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms and firms with any cash flows components, cash holdings or total long-term debts larger than total assets are excluded from the sample. The whole sample includes 4,560 firms and 34,869 firm-year observations, the sub-sample of specialised firms contains 3,930 firms and 24,560 firm-year observations and the sub-sample of diversified firms includes 1,886 firms and 10,309 firm-year observations. T-statistics and P-values are for comparison of sub-samples of specialised and diversified firms. Definitions of the variables are provided in table 3.1.

Variable	Whole sample			Specialised firms			Diversified firms			T- statistics of difference in means	Wilcoxon P-value
	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std		
<b>I. Cash flows variables</b>											
Cash/assets	0.192	0.096	0.225	0.221	0.126	0.242	0.124	0.060	0.160	7.180***	<.0001***
Net cash flow/assets	0.016	0.003	0.132	0.019	0.004	0.147	0.008	0.002	0.086	-15.940***	<.0001***
Net operating cash flow/assets	0.059	0.083	0.156	0.051	0.079	0.172	0.080	0.088	0.109	6.550***	<.0001***
Net investing cash flow/assets	0.088	0.066	0.150	0.091	0.068	0.162	0.080	0.063	0.117	-18.180***	<.0001***
Free cash flow/assets	-0.028	0.006	0.192	-0.040	0.000	0.208	0.000	0.019	0.142	22.590***	<.0001***
Net financing cash flow/assets	0.044	0.000	0.197	0.060	0.003	0.215	0.008	-0.012	0.139	24.420***	<.0001***
<b>II. Other financial variables</b>											
Firm size	5.655	5.546	1.899	5.314	5.209	1.778	6.466	6.448	1.933	7.180***	<.0001***
Tobin's Q	1.853	1.514	1.095	1.945	1.579	1.175	1.633	1.402	0.835	5.410***	<.0001***
Capex/assets	0.063	0.042	0.076	0.065	0.041	0.081	0.060	0.043	0.065	-18.390***	<.0001***
Cash flow/assets	0.048	0.086	0.182	0.036	0.083	0.200	0.075	0.091	0.124	-25.130***	<.0001***
Book leverage	0.198	0.159	0.193	0.181	0.124	0.195	0.238	0.223	0.182	-5.010***	<.0001***
Payout/assets	0.028	0.003	0.068	0.027	0.000	0.071	0.031	0.011	0.059	-3.700***	<.0001***
NWC/assets	0.097	0.085	0.196	0.094	0.082	0.206	0.103	0.090	0.168	-137.480***	<.0001***
Number of segments	2.062	2.000	1.454	1.503	1.000	1.094	3.392	3.000	1.336	-53.810***	<.0001***

\*\*\*, \*\* and \* indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

### **3.5. Conclusions**

This chapter has presented the sources used to collect the data and the process used to construct the samples used in this thesis. Consideration of sample selection and measurement construction has been discussed in the context of the existing literature. Key concepts and variables that form the foundation for the thesis have also been provided. The descriptive statistics for the main variables estimated with the whole sample and sub-samples of diversified and specialised firms evidently indicate that diversified and specialised firms are significantly different.

The following chapter is the first empirical chapter of the thesis. It examines the impact of learning from diversification experience on the value of diversified firms.

## 4. Diversification experience, organisation learning and value of diversified firms

### 4.1. Introduction

The value of diversification has for a long time been the subject of intense discussions among financial researchers<sup>30</sup>. While some studies (Lang and Stulz, 1994; Berger and Ofek, 1995) find evidence that diversification discounts the value of firms, others claim that these results may not be valid (e.g. Campa and Kedia, 2002; Graham, Lemmon and Wolf, 2002; Villalonga, 2004). While most of the debate in the literature hinges on the mean value of diversification, Stein (2003) suggests that research should pay more attention to cross-sectional variation, i.e., identifying specific circumstances in which diversification may be a value-creating or value-destroying strategy.

This empirical chapter investigates how the cross-sectional variation of diversification value is influenced by organisational learning from diversification

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<sup>30</sup> As already noted in the “Introduction” chapter, the terms “value of diversification” and “value of diversified firms” are used equivalently as, in this research, the main interest is the effect of diversification on firm value. Hence, when value of diversification is higher, the firm value is also higher and vice versa. For more details refer to the discussion of Lang and Stulz (1994) and Berger and Ofek (1995) presented in this chapter.

experience<sup>31</sup>. Studies in organisational learning literature provide a wide range of theoretical arguments and empirical evidence illustrating the impact of learning from prior experience on the performance of strategic activities (e.g. acquisition, strategic alliance, diversification, etc.)<sup>32</sup>. In particular, as noted by Bapuji and Crossan (2004), an important development in the literature is the emergence of a learning perspective, i.e. using the concept of organisational learning to explain various organisational phenomena such as performance, innovation or market orientation. Taken together, it suggests that an organisational learning perspective can potentially be used to explain the cross-section of diversification value.

Following the theoretical arguments developed in organisational learning literature, three main hypotheses in this thesis on the relationship between diversification value and the level, similarity and timing of diversification experience are constructed. First, following arguments by Haleblan and Finkelstein (1999), it is expected that diversification value varies with the level of diversification experience in a U-shaped pattern. In more detail, in a firm's diversification sequence, the value of the first diversification may be considered as a baseline, where a firm does not have any experience to learn from. The value of a second diversification tends to be lower than the first as the firm is still a novice in diversifying and therefore tends to inappropriately generalise their experience (in comparison with the first diversification where there is no experience to generalise from). As firms gain more diversification experience and gradually become experts, the tendency to inappropriately generalise experience will reverse, to reach an appropriate generalisation<sup>33</sup>. Put together, the initial negative effect of experience on the value of diversification may reverse, to become a positive effect,

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<sup>31</sup> In this study, organisational learning is narrowly defined, following Argote and Miron-Spektor (2011) and Huber (1991), as a change in an organisation's knowledge that occurs as a function of experience.

<sup>32</sup> Refer to Barkema and Schijven (2008) and Argote and Miron-Spektor (2011) for comprehensive reviews of the literature.

<sup>33</sup> Further discussions of the differences between novices and experts are documented in Novick (1988), Chi, Feltovich and Glaser (1981) and Haleblan and Finkelstein (1999).

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following a point where a firm becomes expert enough to correctly learn from experience. This results in a U-shaped curve.

Secondly, as argued in Haleblan and Finkelstein (1999) and Finkelstein and Haleblan (2002), it is more likely that firms can successfully learn from their experience when a new acquisition is similar to the previous one. This research adopts this contention in a diversification context and hypothesises that the value of diversification in an industry that is the same as the previous diversification will be higher than the value of diversification into a new industry.

Finally, several studies argue that the process of learning and inferring experience (Brown and Eisenhardt, 1999; Gersick, 1994; Hayward, 2002) may be derailed when there is too long or too short a temporal interval between acquisitions. On the one hand, firms may not have sufficient time to generate meaningful inferences from too-recent acquisition. On the other, the inferences may become inaccessible, be forgotten or become irrelevant if the time which elapses between acquisitions is too long. Applying these arguments to diversifications, the research hypothesises that the value of diversification has a relationship to the temporal interval between diversifications, in an inverted U-shaped pattern.

Using a sample of US firms in the 1990 to 2009 period, this chapter finds that the evidence supports all the hypotheses. More specifically, for the first hypothesis, the research finds a U-shaped relationship between the value of diversification and the level of experience: learning from experience may improve the value of diversification after the point where firms have conducted two diversifications. Supporting the second hypothesis, value of diversification is higher when the diversification is in a similar industry to that of the previous one. Finally, diversification timing affects value in an inverted U-shape, with a turning point at seven years suggesting that diversification

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value increases (decreases) with the temporal interval between diversifications, when the interval is less (more) than seven years.

The effects are also sizable in economic terms. Diversification similarity increases the value of diversified firms (industry-adjusted Q) by 30% of the average firm value in the whole sample. The effect of experience level and timing marginally varies along the non-linear curve. The value of diversification in firms with two (four) preceding diversifications marginally decreases (increases) by 0.097 (0.143) - that is, equal to 17% (25%) of the mean value of the sample. As regards the timing of experience, on the one hand, if a firm increases the temporal interval between diversifications from two to three years the value of diversification may increase by 17.7% of the mean value of the sample. On the other hand, a one year delay between diversifications, from nine to ten years, will reduce the value by 10.3% of the average industry-adjusted Q of the sample.

While the main analysis of the chapter presents the effect of internal learning from a firm's own experience on the value of diversified firms, an extension of the chapter investigates whether and how external learning from other firms' experience (i.e., industry experience) may affect the value of diversification. More particularly, it hypothesises that industry experience may affect the value of diversification in a cubic pattern, with three phases: in the first phase, when the experience is rare, firms may not find appropriate lessons to learn from. Therefore, industry experience may have a negative effect on value. When the experience is more abundant in the second phase, it may be beneficial to value. In the third phase, when industry experience is too heterogeneous and complicated, it may become detrimental to learning and value. Consistent with the hypothesis, the study empirically shows a cubic relationship between industry experience and the value of diversification.

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This research contributes to both organisational learning and diversification literature. As the review of diversification literature shows, it is the first study to adopt an organisational learning perspective to investigate the cross-sectional variation of the value of diversified firms. Previous studies show that the value of diversified firms is negatively related to diversity of segments' resources and investment opportunities (Rajan, Servaes and Zingales, 2000; Lamont and Polk, 2002) or agency problems at headquarters level (Scharfstein, 1998) and segment level (Palia, 1999). Using theoretical arguments and empirical methods from organisational learning literature, this study shows that learning from a firm's own experience as well as from industry experience plays a significant role in determining the value of diversification. More specifically, it shows a U-shaped relationship between the level of experience and the diversification value, with a higher value of diversification when diversifications are in a similar industry, and an inverted U-shaped relationship between diversification value and the temporal interval between diversifications. The industry experience affects the value of diversification in a cubic pattern.

The research also directly complements the influential discovery by Lang and Stulz (1994) and Berger and Ofek (1995) of the negative relationship between diversification value and number of segments. In these studies (Lang and Stulz, 1994; Berger and Ofek, 1995) and a number of subsequent papers (see e.g., Rajan et al., 2000; Lamont and Polk, 2002, among others), the relationship is commonly interpreted as evidence of the effect of diversification level (number of segments) on value. In my research, the number of segments may also act as a proxy for the level of diversification experience. Taken together, by adopting the perspective of organisational literature, the research is able to significantly extend the current understanding of the cross-sectional variation of value of diversified firms in financial literature.

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In regard to organisational learning literature, the finding of a cubic relationship between the value of diversification and industry experience is a unique discovery. Indeed, only a few studies (Baum and Ingram, 1998; Sarkar, Echambadi and Ford, 2003; Beckman and Haunschild, 2002) in the literature have investigated the effects of external learning and, more importantly, all of them report a linear relationship between population experience and value.

While empirical evidence on the impact on value of experience is mostly found in the context of acquisitions, this study documents the relationship between experience and value in the setting of diversification. This is significant as diversification is considered by Pennings, Barkema and Douma (1994) as among the most important strategic decisions a firm's managers can make. Evidence from this research also importantly suggests that future research on the effects of experience on diversification value can directly use the number of segments as a measure of the level of diversification experience.

This chapter is constructed as follows: Sections 2 and 3 review the relevant literature and develop research hypotheses. Section 4 provides research methods. Section 5 describes the data sample. Section 6 reports and discusses the main results, investigating the effects of internal learning from a firm's own experience on value. A robustness test is conducted in section 7. Section 8 presents the extended analysis, in which the impact of external learning from industry experience is examined. The last section concludes the discussion.

### **4.2. Related literature**

This part of the chapter serves two main purposes: first, it provides a critical review of the main relevant studies in two areas of research (i.e., organisation learning and value



of diversification), in its two subsections. Second, it highlights the link between the areas of literature out of which the research is formed.

#### **4.2.1. Learning from experience and performance of strategy activities**

Learning in an organisation can occur in two ways: internally, from a firm's own experience, and (or) externally, from the experience of other firms (Bapuji and Crossan, 2004). The main analysis of this research focuses on investigating how internal learning from a firm's own experience of diversification affects cross-sectional diversification value. As such, the study follows Argote and Miron-Spektor (2011), Huber (1991), Penning et al. (1994), and others in its definition of internal organisation learning. More specifically, Argote and Miron-Spektor (2011) combine a wide range of studies in the field to define organisational learning as a change in an organisation's knowledge that occurs as a function of experience. Huber (1991) considers learning from experience to be a sub-process of knowledge acquisition Penning et al. (1994) define longitudinal learning as temporal learning gained from a firm's cumulative experience or from the process of doing certain things.

Following this definition, a more important question from the literature arises: whether and how the organisational learning from prior activities influences the performance of subsequent strategy decisions. Most of the early studies (from 1980 to the mid-1990s) in the literature adopt a traditional learning-curve perspective which predicts a positive relationship between experience and performance of strategy activities (Bakerma and Schijven, 2008). Empirical evidence of the perspective is, however, mixed. Fowler and Schmidt (1989) report a significant positive relationship between acquisition experience (measured by number of acquisitions the in prior four years) and market-based acquisition performance. Markides and Ittner (1994) examine international acquisitions by US firms and show that international acquisition

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experience of an acquirer increase short-term abnormal stock return of focal international acquisitions. Nevertheless, several other studies do not find a significantly positive relationship (Baum and Ginsberg, 1997; Lubatkin, 1982; among others).

The traditional learning-curve perspective, though it helps in providing some preliminary insights into the relationship between learning and the performance of strategic activities, is considered to be more applicable in an operating context<sup>34</sup>. Recent studies (from the mid-1990s onward) in the field have moved beyond the traditional learning-curve perspective, basing their arguments on theories from related disciplines such as psychology or sociology.

The influential study by Haleblan and Finkelstein (1999), drawing on work from behavioural theory in psychology, challenges the important assumption that the effects of experience are always positive. The authors argue that transferring acquisition routines from one industry to another is tantamount to transferring old lessons to new settings where they do not apply. It is therefore hypothesised that experience may have negative effects on performance until firms develop the needed expertise to enable them to correctly generalise prior experiences. Consistent with the theoretical argument, Haleblan and Finkelstein (1999) empirically find a U-shaped relationship between acquisition experience (measured by the number of acquisitions undertaken since 1948) and performance (measured by short-term abnormal stock returns and profitability) in a sample of 449 acquisitions during 1980 to 1992.

Developing from this seminal paper, Finkelstein and Haleblan (2002) show that the negative effects are moderated if later acquisitions are in a similar industry. The arguments of Haleblan and Finkelstein (1999) have been further investigated in different contexts. Experience heterogeneity is linked to performance of alliances

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<sup>34</sup> The perspective had been widely applied at the level of individual worker or teams (see Dutton and Thomas (1984)).

(Reuer, Park and Zollo, 2002) or acquisition performance (Hayward, 2002). Porrini (2004) and Zollo and Reuer (2006) investigate experience spill-over across distinct corporate development activities. Schijven and Barkema (2007) provide a dynamic approach to relating experience heterogeneity and learning.

Studies of other strategy activities provide additional evidence. Pennings, Barkema and Douma (1994) find that experience from previous diversifications increases the survival probability of following expansions. Anand and Khanna (2000) report strong positive effects of alliance experience, measured as the number of prior alliances on abnormal stock return following announcement of a new alliance. Other studies have been conducted in a corporate restructuring context, e.g. divestitures (Shimizu and Hitt, 2005; Sampson, 2005), and sell-offs and spin-offs (Bergh and Lim, 2008).

The studies reviewed above generally recognise a significant link between learning from experience and the outcomes of strategic decisions. This suggests that as diversification is among the most important strategic decisions, theoretical arguments and empirical methods developed from these studies can be adopted, to explore the link between experience and performance of diversification.

### **4.2.2. Diversification value**

The most influential methods used to value diversification have been developed by Lang and Stulz (1994) and Berger and Ofek (1995). In both studies, the value of diversification is measured as the difference between the value of a diversified firm and its imputed value. The imputed value of a firm is the sum of the imputed values of the firm's segments, which is the value of the firm if all of its segments are operated as stand-alone firms. Specifically, Lang and Stulz infer a diversification value by comparing a diversified firm's Tobin's Q with the asset-weighted sum of imputed Q of the firm's

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segments. In a similar valuation approach, Berger and Ofek (1995) term the measure of diversification value as being the excess value which is the natural log of the ratio of a firm's actual value to its imputed value<sup>35</sup>. Higher (lower) actual firm value compared to its imputed value indicates a gain (loss) in value from diversification.

Importantly, both studies reveal that the actual value of diversified firms is significantly lower than their imputed value, implying a diversification discount in the firms' value<sup>36</sup>. Other researches follow these valuing methods and also find the existence of this discount for diversified firms in different time periods and countries<sup>37</sup>. Nevertheless, a number of subsequent papers challenge the findings of the discount in diversified firms on the basis of data problems (Villalonga, 2004), measurement errors (Whited, 2001) or selection and endogeneity bias (Campa and Kedia, 2002; Graham, Lemmon and Wolf, 2002).

Given the intense, yet inconclusive, debate surrounding the average diversification discount phenomenon, Stein (2003) suggests research should focus more on the cross-sectional variation of diversification value.

Research on the cross-sectional variance of diversification value has been provided in several papers. Rajan et al. (2000), Lamont and Polk (2002), Berger and Ofek (1995), among others, link the value of diversification to the degree of diversification, and find a negative relationship. The value of diversification is also evidently shown to relate to the efficiency of the internal capital market (Rajan et al.

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<sup>35</sup> More details of the calculation can be found in the appendix.

<sup>36</sup> Lang and Stulz (1994) document diversification discount as measured by industry-adjusted Q equivalent to -0.27 to -0.73 for the period 1978-1990. Berger and Ofek (1995) report the discount to be in range of 13-15% firm value for the period 1986-1991.

<sup>37</sup> Servaes (1996) finds a discount for conglomerates during the 1960s. Lins and Servaes (1999) document no discount for Germany and a significant discount in Japan and the United Kingdom. Lins and Servaes (1998) report a diversification discount in a sample of firms from seven emerging markets whereas Khanna and Palepu (2000) find little evidence of a diversification discount in these markets.

(2000)) or corporate governance (see e.g., Hoechle, Schmid, Walter and Yermack, 2012; Scharfstein, 1998; Palia, 1999)<sup>38</sup>.

To summarise, research into diversification value is not conclusive on whether there is, on average, a discount in the value of diversified firms. Cross-sectional studies on the value of diversified firms are also important: researchers can provide information on specific situations or firm characteristics that are likely to make diversification a beneficial or detrimental strategy in respect of firm value (Stein, 2003).

As suggested in the review of the organisation learning literature, learning from experience of diversification may have impacts on the performance of diversification. Nevertheless, no study in diversification literature examines the relationship between diversifying experience and the value of diversification. The present chapter, therefore, adopts this organisational perspective to investigate the cross-sectional value of diversified firms.

### **4.3. Development of hypotheses**

The traditional learning-curve perspective argues that learning from experience always enhances performance of strategic activities (see e.g., Fowler and Schmidt, 1989; Pennings et al., 1994; Anand and Khanna, 2000, among others). Thus, it suggests that diversification experience will be positively related to diversification value.

Haleblian and Finkelstein (1999) challenge the learning-curve perspective by arguing that a positive relationship is more likely when firms can generalise experience from one acquisition to another. When experience cannot be generalised or is inappropriately generalised, the effects of a firm's acquisition experience on the performance of subsequent activity may be neutral or negative.

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<sup>38</sup> The "Literature review" chapter provides intensive discussion of these papers.

Elaborating the above argument, Haleblan and Finkelstein (1999) suggest that inappropriate generalisation is more common in the first stages of acquisitions, when firms do not have sufficient experience to accurately learn from experience (i.e. premature learning (Bapuji and Crossan, 2004)). Therefore, the subsequent acquisition will be likely to perform less well than the first. As a firm becomes more experienced in acquisition, the tendency to generalise inappropriately will diminish while the tendency of appropriate generalisation will increase leading to improved performance. Thus, the initial negative relationship between acquisition experience and performance will be improved along with subsequent acquisition experience. The present study extends the argument of Haleblan and Finkelstein (1999) into the context of diversification, and hypothesises that:

***Hypothesis 1:*** *Level of experience and value of diversification may have a U-shaped relationship.*

To be more specific, in the diversification sequence inappropriate generalisation of experience will be common in the first few diversifications, leading to a negative relationship between experience and diversification value. At some point, when a firm gains further experience and becomes expert in diversifying, appropriate generalisation will dominate. As such, the initial negative relation will possibly reverse, to a positive one.

The results from Haleblan and Finkelstein's (1999) study and from other studies (e.g. Reuer, Park and Zollo, 2002; Porrini, 2004, among others) evidently suggest that learning from experience may not always lead to superior performance. Following these findings, Barkema and Schijven (2008) suggest important contingencies that are at play, while Bapuji and Crossan (2004) note that the most interesting insights from a learning perspective are not the learning-performance relationship, per se, but relate to

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the boundary conditions of the relationship. Hayward (2002) contends that organisational learning relates to the quality as well as the quantity of experience. Taken together, the arguments made in these studies suggest the effect of several factors on the relationship between experience and value. As such, the present analysis explores how similarity and timing of diversification experience affects diversification value.

It is argued that the nature of prior diversifications affects the quality of inferences that are deployed in a subsequent diversification (Hayward, 2002). Haleblan and Finkelstein (1999) and Finkelstein and Haleblan (2002) show that learning is facilitated and hence performance improves if later acquisitions are in the same industry as prior acquisitions. Similarly, studies in diversification literature have widely reported that firms pursuing related diversification strategy outperform firms with an unrelated strategy (Rumelt, 1982; Montgomery and Wernerfelt, 1988; Barney, 1988, among others). This leads to the second hypothesis that:

***Hypothesis 2:*** *Diversification value may be higher when focal diversification is in the same industry as prior diversification.*

Arguments about the timing of experience proposed in several studies (Brown and Eisenhardt, 1999; Gersick, 1994; Hayward, 2002) clearly suggest that too long or too short a temporal interval between acquisitions may hamper performance. On the one hand, a too long interval may cause the inferences from prior experience to be inaccessible, forgotten or irrelevant (Huber, 1991). On the other hand, where intervals are too short, firms may not have enough time to generate meaningful inferences and learn sufficiently from very recent acquisitions (Chang, 1996; Haunschild, Davis-Blake and Fichman, 1994; Huber, 1991). These arguments, which can be comfortably applied to the case of diversification, lead to the third hypothesis of the research:

***Hypothesis 3:** An inverted U-shaped relationship exists between diversification value and the temporal interval between the focal diversification and the diversification(s) prior to it.*

## **4.4. Methodologies**

In this study, organisational learning is framed as longitudinal learning (Penning et al, 1994) which is accumulated in a firm's diversification experience. Diversification is perceived as a firm's strategic movement which occurs when the firm's reported number of segments increases. The definition essentially follows the notion of Lang and Stulz (1994). More specifically, a firm that increases its reported number of segments is a firm that either has acquired or internally developed new lines of business or has expanded its existing lines of business, up to the point that it is required to report new business segments. These definitions of learning and diversification are used to develop main variables of the study described in this section.

### **4.4.1. Valuation methodology**

To study the relationship between diversification experience and diversification value the present study adopts the valuation methodology proposed in the seminal work of Lang and Stulz (1994). Specifically, the value of diversification is captured by estimating how diversification affects a firm's value. Diversification value is therefore the difference between the value of a diversified firm and its imputed value, i.e. the value of the firm if all of its segments are operated as specialised firms. Following Lang and Stulz (1994), diversification value is estimated as a firm's industry-adjusted Q, which is the difference between a firm's Q and the asset-weighted sum of imputed Q of all the firm's segments. Q is calculated as the ratio of market value to book value of assets. The imputed segment Q is approximated by averaging the Q of all specialised firms in the



same two-digit SIC code industry. The industry-adjusted Q (IAQ) is calculated as follows:

$$IAQ = FirmQ - \sum_{i=1}^n Q_i * \left( \frac{BV_i}{FirmBV} \right) \quad (4.1)$$

FirmQ is the firms' actual Q.

$Q_i$  ( $i=1...n$ ) is estimation of segment  $i$ 's Q which is imputed as the average Q of all specialised firms in the same industry.

N is the number of segments.

$BV_i$  is the book value of segment  $i$ 's assets.

FirmBV is the book value of firms' total assets.

#### 4.4.2. Diversification experience

The sample includes only firms which extended the number of their reporting segments at least once during 2000 to 2009. A diversification event is recorded when a firm's reported number of segments increases from the prior year's number of segments. Following Haleblan and Finkelstein (1999), diversification experience is measured as the number of diversifications that firms in the sample made from 1990 to the year of focal diversification. The focal diversification is the diversification firms make during 2000 to 2009. For instance, if a firm made one diversification in 2002 and one in 1998 it will have an experience score of one for the diversification event in 2002. Firms with only one diversification made during 2000 to 2009 and no diversification made in the period 1990-2000 will be given an experience score of zero. Firms with more than five diversification moves will be assigned an experience score of five<sup>39</sup>.

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<sup>39</sup> The imputed procedure is to facilitate the analysis and interpretations of results. There are a small number of observations at each experience score larger than 5. Originally, there are 40 observations with experience score of 5, 30 with experience score of 6, 13 with experience score of 7, 9 with experience score of 8 and 1 each with experience score of 9, 12 and 15. The main results are robust when compared with the original experience score.

### 4.4.3. Similarity of diversification experience

Similarity in diversification is presented by a dummy variable which will have a value of (zero) one if the new segment in the focal diversification (does not) share the same two-digit SIC code as the new segment in the prior diversification. Notably, this variable definition is not the same as the method used to categorise related and unrelated diversification by Berger and Ofek (1995), in which relatedness is defined as the degree of industry similarity among segments of firms. The variable is differently constructed so as to specifically capture learning from diversification experience, for which the focal diversification is directly compared with the previous diversification. Following this particular construction, it should be noted that the variable is missing for firm-year observations with no prior diversification.

### 4.4.4. Timing of diversification experience

Experience timing is defined as the number of years between the focal diversification and the one before it. For the first diversification, the research follows Hayward (2002) to impute the maximum interval that is the year of the diversification less the first year of the sample (1990). For example, if a firm diversifies for the first time in 2001, the experience timing for this diversification will be 11 (2001-1990).

### 4.4.5. Empirical models

Following Lang and Stulz (1994), the value of diversification will be used as a dependent variable that is used to study the relationship between value and experience. The experience and its squared term are included as independent variables to estimate the curvilinear relationship between value and experience. The models are adopted from Halebian and Finkelstein (1999), as follows:

$$\text{Value}_{i,t} = \alpha + \beta_1 * \text{Exp}_{i,t} + \beta_2 * Z_{i,t} + \sum_t \text{Year} + U_{i,t} \quad (4.2)$$

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$$\text{Value}_{i,t} = \alpha + \beta_1 * \text{Exp}_{i,t} + \beta_2 * \text{Exp}_{i,t}^2 + \beta_3 * Z_{i,t} + \sum_t \text{Year} + U_{i,t} \quad (4.3)$$

Value is the value of diversification measured by industry-adjusted Q (Lang and Stulz, 1994).

Exp is diversification experience measured by total number of firm's year-to-year increases in reported number of segments, from year 1990 to the focal diversification.

Exp<sup>2</sup> is the squared term of diversification experience.

Z is a vector of control variables, including firm size, dividend dummy, asset tangibility, capital expenditure and leverage<sup>40</sup>. U is a regression error.

On the one hand, larger firms are, presumably, more mature and therefore may be more experienced. On the other hand, larger firms are shown to be less efficient (Lang and Stulz, 1994). The relationship between experience and value may therefore result from differences in firm size rather than from experience itself. Lang and Stulz (1994) argue that firms may have higher Q as they have more trouble raising funds to exhaust their positive net present-value projects. Dividend status is added to control for the firms' ability to access financial market. Firms with lower asset tangibility may generate greater cash flows from intangibles and thus will have higher Q. Capital expenditure is included to control for growth opportunities (Laeven and Levine, 2008).

The above models are also adopted to examine the relationship between diversification value and diversification similarity, and diversification timing. Diversification similarity and diversification timing, as defined above, will be used as independent variables in the following models.

$$\text{Value}_{i,t} = \alpha + \beta_1 * \text{Diversification similarity}_{i,t} + \beta_2 * Z_{i,t} + \sum_t \text{Year} + U_{i,t} \quad (4.4)$$

Diversification similarity takes a value of one if the new segment in the focal diversification shares the same two-digit SIC code as the new segment in the prior diversification, and zero otherwise.

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<sup>40</sup> Lang and Stulz (1994) also control for research and development (R&D) investments which represent intangible assets that are not accounted for in calculating Q. I do not include this variable as it is frequently reported missing in the database. Nevertheless, the asset tangibility variable may also adequately control for the effects of intangibles.

$$\text{Value}_{i,t} = \alpha + \beta_1 * \text{Timing}_{i,t} + \beta_2 * \text{Timing}_{i,t}^2 + \beta_3 * Z_{i,t} + \sum_t \text{Year} + U_{i,t} \quad (4.5)$$

Timing is equal to the number of years between the focal diversification and the one prior to it.

Timing<sup>2</sup> is the squared term of timing.

## 4.5. Data sample

The sample's period ranges from 1990 to 2009, which includes all non-financial and non-utility US firms available in the WorldScope database that increased their reported number of segments at least once during 2000 to 2009. All the sample data is CPI-adjusted into 2000 dollars. The segment data (including a segment's assets, capital expenditure, depreciation, operating income and SIC code) and the firm's financial data are extracted from the WorldScope database while Thompson Financial database is used to retrieve data on cash flow statements.

The sample includes 1,956 firm-year observations from 1,357 different firms. All the financial data is winsorised at 1% in both extremes.

**Table 4.1 Summary statistics**

The sample includes all non-financial and non-utility firms with complete segment data and total market capitalisation of more than \$10M available in the WorldScope database that diversified at least once from 2000 to 2009. Q is a firm Tobin's Q calculated in the year of focal diversification. Industry-adjusted Q is the difference between a firm's Q and the sum of asset-weighted segments' Q, in which a segment's Q is approximated averaging the Q of all single-segment firms in the same two-digit SIC code industry. Diversification experience is estimated as the sum of the firm's recent year-to-year increases in the reported number of segments from year 1990 to the focal diversification. A firm that makes no diversification during the period is assigned a zero experience score while a firm with more than five diversifications is given a score of five. Diversification similarity takes a value of one if the focal diversification shares the same two-digit SIC code with the prior diversification, and zero otherwise. Diversification timing is measured by the number of years between the focal diversification and the one prior to it. When a firm has only one diversification the timing is imputed by the number of years between the year of the focal diversification and the first year of the sample (1990). Asset tangibility is the ratio of fixed assets to total assets. Other variables are defined in the table 3.1.

Variable	Mean	Median	Standard deviation	Min	Max	Number of observation
Q	1.780	1.460	1.060	0.610	6.490	1956
Industry-adjusted Q	-0.570	-0.600	1.350	-4.860	4.110	1331
Diversification experience	1.480	1.000	1.540	0.000	5.000	1956
Diversification similarity	0.310	0.000	0.460	0.000	1.000	1248
Diversification timing	6.930	5.000	5.040	1.000	19.000	1956
Number of segments	3.880	4.000	1.370	2.000	7.000	1956
Firm size	5.980	6.050	2.090	0.820	10.200	1956
Asset tangibility	0.240	0.170	0.200	0.000	0.940	1955
Capex/assets	0.050	0.030	0.060	0.000	0.400	1956
Book leverage	0.180	0.140	0.190	0.000	0.999	1950

Table 4.1 provides a background for the firms undertaking diversifications in my sample. On average, these firms undertook 1.5 diversifications before the focal diversification. The mean of diversification similarity, which is 0.3, indicates that firms overwhelmingly (70%) diversify into an industry that is different to that of the previous diversification. The temporal interval between diversifications ranges from 1 to 19 years and is an average of roughly 7 years. It is noticeable that the average industry-adjusted Q is negative suggesting that, consistent with Lang and Stulz (1994), and Berger and

Ofek (1995), the value of diversified firms in the sample are discounted compared to the value of a comparable portfolio of single-segment firms.

## **4.6. Empirical results**

### **4.6.1. Univariate analysis**

Table 4.2 provides a univariate analysis of the relationship between diversification value and level, similarity and timing of diversification experience. All panels of the table report the mean, median and standard deviation of the diversification value measured by industry-adjusted Q, following the method of Lang and Stulz (1994). Only firms with non-missing industry-adjusted Q are reported in the table. Panels A and C include 1,331 observations, while panel B only contains 922 observations as firms without prior diversification are excluded, in order to construct the diversification similarity variable.

**Table 4.2 Diversification value by level, similarity and timing of diversification experience**

The sample includes all non-financial and non-utility firms with complete segment SIC code and total market capitalisation of more than \$10M available in the WorldScope database that diversified at least once from 2000 to 2009. Industry-adjusted Q is the difference between a firm's Q and the sum of the asset-weighted segments' Q, in which a segment's Q is approximated by averaging the Q of all single-segment firms in the same two-digit SIC code industry. In panel A, diversification experience is measured as the sum of the times a firm increases its reported number of segments from 1990 to the year of focal diversification. A firm that makes no diversification during the period is assigned a zero experience score while a firm with more than five diversifications is given a score of five. In panel B, diversification similarity takes a value of one if the focal diversification shares the same two-digit SIC code with the prior diversification, and zero otherwise. In panel C, diversification timing is measured by the number of years between the focal diversification and the one prior to it. When a firm has only one diversification the timing is imputed by the number of years between the year of the focal diversification and the first year of the sample (1990). J-T (Jonckheere-Terpstra) test reports the standardised JT statistic. \*\*\*, \*\* and \* indicates a statistical significance of 1%, 5% and 10% respectively.

Panel A											
Industry-adjusted Q											
Diversification experience	Mean	Median	Std	N							
0	-0.211	-0.450	1.439	409							
1	-0.670	-0.667	1.495	324							
2	-0.868	-0.717	1.171	244							
3	-0.750	-0.603	1.160	165							
4	-0.579	-0.637	1.067	94							
5	-0.702	-0.583	1.111	95							
<b>J-T test when experience ≤ 2</b>	-5.222	***									
<b>J-T test when experience ≥ 2</b>	1.281	*									
<b>J-T test for whole sample</b>	-4.317	***									
Panel B											
Diversification similarity=0				Diversification similarity=1				T- statistics for mean		Wilcoxon P-value	
Media											
Mean	n	Std	N	Mean	Median	Std	N				
Industry-adjusted Q	-0.820	-0.740	1.300	653	-0.500	-0.530	1.200	269	-3.580***		0.001***
Panel C											
Industry-adjusted Q											
Diversification timing (T)	Mean	Median	Std	N	T	Mean	Median	Std	N		
1	-0.795	-0.637	1.341	162	11	-0.250	-0.535	1.340	69		
2	-0.897	-0.788	1.120	181	12	-0.372	-0.479	1.486	62		
3	-0.489	-0.539	1.302	186	13	-0.580	-0.945	1.636	31		
4	-0.673	-0.676	1.196	143	14	-0.596	-0.633	1.605	39		
5	-0.522	-0.462	0.974	85	15	0.040	-0.415	1.517	47		
6	-0.664	-0.401	1.448	56	16	0.026	-0.468	1.711	40		
7	-0.301	-0.271	1.373	31	17	0.069	-0.225	1.576	29		
8	-0.511	-0.569	0.936	29	18	-0.214	-0.389	1.236	18		
9	-0.251	-0.300	0.976	16	19	-0.337	-0.566	1.097	13		
10	-0.795	-0.637	1.341	94							
<b>J-T test for T ≤ 10</b>	3.359	***									
<b>J-T test for T ≥ 10</b>	0.138										
<b>J-T test whole sample</b>	6.211	***									

Panel A of the table reports the cross-sectional variation of diversification value with each level of diversification experience. A J-T test is used to test for ordered differences in the diversification value in each level of experience, with the null hypothesis that there is no trend in the statistics<sup>41</sup>.

The results illustrate that experience may not always lead to improvements in return. The mean (median) of industry-adjusted Q is higher in the first diversification (i.e. where experience score is zero) and lower in subsequent diversifications.

Importantly, the panel supports the hypothesis of a U-shaped relationship between the value of diversification and the level of experience. Evidently, a J-T test for industry-adjusted Q is negative and statistically significant at 1% when the experience score is less than or equal to 2. This suggests a downward trend in firm value as diversification experience increases. When an experience score is higher than 2 the J-T statistic is positive and significant at 10%, implying an increasing trend in diversification value.

Panel B of the table shows that mean (median) diversification value is significantly higher in the group of firms in which the industry of the focal diversification is in the same two-digit SIC code digit as the industry of the prior one. The evidence is, accordingly, consistent with the hypothesis as to the effect of diversification similarity.

Panel C of the table reports the cross-sectional variation of diversification value with each level of timing of the diversification experience. The positive and statistically significant (1%) J-T test illustrates that the value of diversification increases along with

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<sup>41</sup> A positive (negative) standardised JT statistic indicates an increasing (decreasing) order. The significance level indicates whether the alternative hypothesis of increasing (decreasing) ordering difference may be accepted with some level of confidence.



the temporal interval between the focal and prior diversification. The inverted U-shaped relationship between diversification value and timing of experience is partly illustrated as J-T statistics are positive and significant at 1% where timing of diversification experience is lower than or equal to 10, and changes to negative and insignificant when the timing is larger than or equal to 10<sup>42</sup>.

Taken together, several important observations emerged from the table. First, the negative value of diversification widely shown in the table suggests that diversified firms are valued less than comparable specialised firms. Notably, this result is mostly consistent with the finding of diversification discount documented in Lang and Stulz (1994). Second, and more importantly, the table provides preliminary evidence of the relationship between value of diversification and the level, similarity and timing of the diversification experience. This evidence suggests that the cross-sectional variation of value of diversified firms can be attributed to the differences in level, similarity and timing of the diversification experience.

#### **4.6.2. Evidence from regressions**

Following the preliminary evidence provided in the above univariate analysis, this subsection investigates the effects of level, similarity, and timing of diversification experience on diversification value in a multivariate setting. Table 4.3 reports the regression results for the empirical models described in the method section. All the models use OLS regressions with year-fixed effects and are heteroskedasticity consistent<sup>43</sup>. The number of observations in each regression of the table is lower than the full sample of 1,956 observations as industry-adjusted Q is not calculable for some observations. Also as explained above, in order to construct the diversification similarity

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<sup>42</sup> The same pattern also exists where timing of experience is equal to 15 and 16.

<sup>43</sup> Firms making more than one diversification between 2000 and 2009 will appear more than once in the sample. However, Durbin-Watson statistics significantly reject the hypothesis of an autocorrelation problem in the analysis.

variable, some firms without prior diversification cannot be included. The number of observations in models 3, 4 and 5 is therefore reduced further to 921 observations.

**Table 4.3 The cross-section of diversification value with level, similarity and timing of diversification experience**

This table contains estimations from regressions investigating relations of value of diversification and measures of diversification experience. The sample includes all non-financial and non-utility firms with complete segment SIC code and total market capitalisation of more than \$10M available in the WorldScope database that diversified at least once from 2000 to 2009. The dependent variable is industry-adjusted Q in the year of focal diversification. Industry-adjusted Q is calculated following Lang and Stulz (1994) as the difference between a firm's Q and the sum of asset-weighted segments' Q in which a segment's Q is approximated by averaging the Q of all single-segment firms in the same two-digit SIC code industry. Diversification experience is measured as the sum of the times a firm increases its reported number of segments from 1990 to the year of focal diversification. A firm that makes no diversification during the period is assigned a zero experience score while a firm with more than five diversifications is given a score of five. Diversification similarity takes a value one if the focal diversification shares the same two-digit SIC code with the prior diversification, and zero otherwise. Diversification timing is measured by the number of years between the focal diversification and the one prior to it. When a firm has only one diversification the timing is imputed by the number of years between the year of the focal diversification and the first year of the sample (1990). A dividend dummy variable takes a value of zero when a firm pays no dividend and one otherwise. Asset tangibility is the ratio of fixed assets to total assets. All regressions include a year- fixed effect and standard errors are heteroskedasticity consistent. Other variables are defined in the table 3.1.

Variable	Model1		Model2		Model3		Model4		Model5	
	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	0.634	3.220***	0.773	3.890***	-0.017	-0.070	-0.226	-0.900	-0.183	-0.530
Diversification experience	-0.075	-3.260***	-0.337	-4.920***					-0.156	-1.090
Diversification experience square			0.060	4.210***					0.030	1.230
Diversification similarity					0.170	1.900*			0.186	2.080**
Diversification timing							0.141	3.090***	0.143	3.120***
Diversification timing square							-0.010	-3.100***	-0.010	-3.050***
Firm size	-0.122	-5.400***	-0.124	-5.500***	-0.056	-2.140**	-0.067	-2.530**	-0.065	-2.430**
Dividend dummy	0.107	1.430	0.128	1.710*	0.114	1.300	0.111	1.270	0.116	1.320
Asset tangibility	-0.610	-2.950***	-0.614	-2.980***	-0.466	-1.880*	-0.385	-1.540	-0.441	-1.770*
Capex/assets	3.033	3.350***	2.855	3.160***	0.915	0.800	0.736	0.640	0.862	0.740
Book leverage	0.119	0.510	0.121	0.511	0.039	0.884	0.128	0.56	0.022	0.090
Year F.E.	Y		Y		Y		Y		Y	
R-Square	0.110		0.120		0.100		0.100		0.100	
N Obs	1330		1330		921		921		921	

\*\*\*, \*\* and \* indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

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A serious concern with the models is multi-collinearity: the independent variables measuring different aspects of the experience may be correlated. Furthermore, the regressions are in a polynomial form in which the collinearity may be particularly problematic. Multi-collinearity can be investigated by checking variance inflation factor, eigenvalue and condition number, following Belsley, Kuh and Welsch (1980). Estimations of these statistics indicate that multi-collinearity is not a significant problem in these regressions<sup>44</sup>.

Models 1 and 2 of the table study the relationship between diversification value and level of diversification experience. The results support the first hypothesis. As shown in model 1, the negative and statistically significant coefficient for diversification experience indicates the negative impact of experience on value. Model 2 provides evidence supporting the prediction of the U-shaped relationship between experience and value in which the coefficient for diversification experience remains negative and significant while its square term is positive and significant.

The effect is also economically important. In model 1, one increase in experience reduces the firm value measured by industry-adjusted Q (larger diversification discount) by 0.075, which is equal to 13% average industry-adjusted Q in the sample<sup>45</sup>.

With the quadratic form in model 2, the marginal effects of experience on value can be estimated using the following formula:

$$\partial \text{Value} / \partial \text{Exp} = \beta_1 + \beta_2 * \text{Exp} \quad (4.6)$$

Figure 4.1 represents the marginal impact of experience on diversification value calculated using formula 4.6. As shown in the figure, the marginal effect increases from

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<sup>44</sup> Estimations from model 5 table 3 show that for all variables the variance inflation factor is less than 10, eigenvalue is less than 0.01 and condition number is less than 30 - necessarily suggesting, according to Belsley, Kuh and Welsch (1980), that collinearity does not exist in the model.

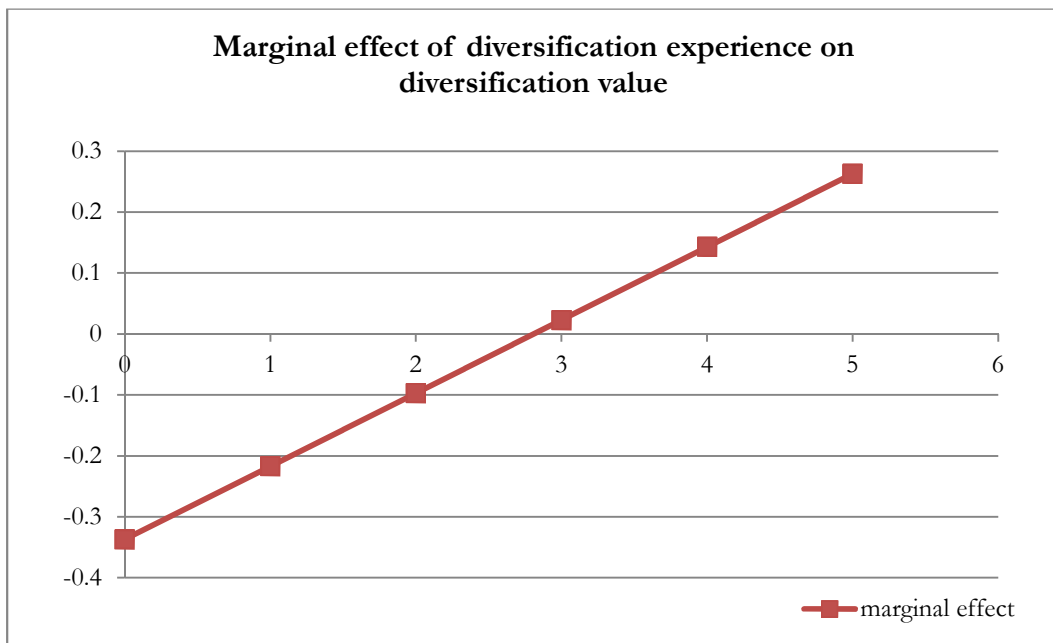
<sup>45</sup> 13%=(0.075/0.57)\*100%

negative to positive, indicating a U-shaped relationship between experience and value. The marginal impact is also economically significant. In model 2, one increase in experience score when the experience score is two (four) results in 0.097 (0.143) marginal losses (gains) in industry-adjusted Q which are equal to 17% (25%) of the average industry-adjusted Q in the sample<sup>46</sup>.

**Figure 4.1 Marginal effect of diversification experience on diversification value.**  
The marginal effect of experience on diversification value is estimated as follows:

$$\partial \text{Value} / \partial \text{Exp} = \beta_1 + \beta_2 * \text{Exp}$$

The diversification value is industry-adjusted Q of a firm in the year of focal diversification. Industry-adjusted Q is calculated following Lang and Stulz (1994) as the difference between a firm's Q and the sum of the asset-weighted segments' Q in which a segment's Q is approximated by averaging the Q of all specialised firms in the same two-digit SIC code industry. Diversification experience is measured as the sum of the times a firm increases its reported number of segments from 1990 to the year of focal diversification. A firm that makes no diversification during the period is assigned a zero experience score while a firm with more than five diversifications is given a score of five.



<sup>46</sup> 0.097=-0.337+2\*0.06\*2; 0.143=-0.337+2\*0.06\*4; 17%=(0.097/0.57)\*100%; 25%=(0.143/0.57)\*100%

Using the formula, the reflection point of the U-shaped relationship is estimated at 2.8, suggesting that experience will negatively affect diversification value approximately up to the point where a firm has made two diversifications prior to the focal diversification<sup>47</sup>. For firms with at least three diversifications preceding the focal diversification, past experience enhances diversification value.

Results from model 3 generally support hypothesis 2. The coefficient for diversification similarity which is positive and statistically significant at 10% (marginally close to 5%) level of confidence suggests that firms that choose to diversify into an industry similar to the industry of a previous expansion tend to outperform firms that diversify into different industries. This finding is largely consistent with Berger and Ofek's (1995) paper which reports that relatedness of segments mitigates the value loss of diversification. The economic impact of similarity of diversification experience is also noteworthy. Industry-adjusted Q of firms with similar diversifications (diversification similarity=1) is, on average, 0.17 higher than industry-adjusted Q of firms with different diversifications. This size of the difference is equal to 30% of average industry-adjusted Q of the sample<sup>48</sup>.

Model 4 of the table illustrates the predicted inverted U-shaped relationship between the value of diversification and the timing of experience. As is clearly shown in the table, the coefficient of diversification timing is positive and significant at 1% while its squared term is negative and significant at 1%. The marginal effect of diversification timing on diversification value is estimated in a way that is similar to the above formula:

$$\partial \text{Value} / \partial \text{Timing} = \beta_1 + \beta_2 * \text{Timing} \quad (4.7)$$

Following the model 4 of the table, the reflection point of the inverted U-shaped relationship is 7, suggesting that firms will be able to benefit more from their

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<sup>47</sup>  $2.8 = 0.337 / (2 * 0.06)$

<sup>48</sup>  $30\% = (0.17 / 0.57) * 100\%$

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experience where there is more time between the focal diversification and the previous one. However, this is only the case if this time does not exceed seven years<sup>49</sup>. When the two diversifications are too far apart (i.e. more than seven years), the increase in this time gap will reduce firm value.

The marginal impact of experience timing on value which is represented in figure 4.2 is also remarkable. For instance, on the one hand, if a firm increases the temporal interval between diversifications from two to three years, the value of diversification may increase by 0.101 (equal to 17.7% the mean value of the sample)<sup>50</sup>. On the other side, a one year delay in the time between diversifications, from nine to ten years, will reduce a firm's industry-adjusted Q by 0.059 (which is approximately 10.3% the average industry-adjusted Q of the sample)<sup>51</sup>.

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<sup>49</sup>  $7=0.141/(2*0.010)$

<sup>50</sup>  $17.7\%=((0.141-2*0.01*2)*1)/0.57*100\%$

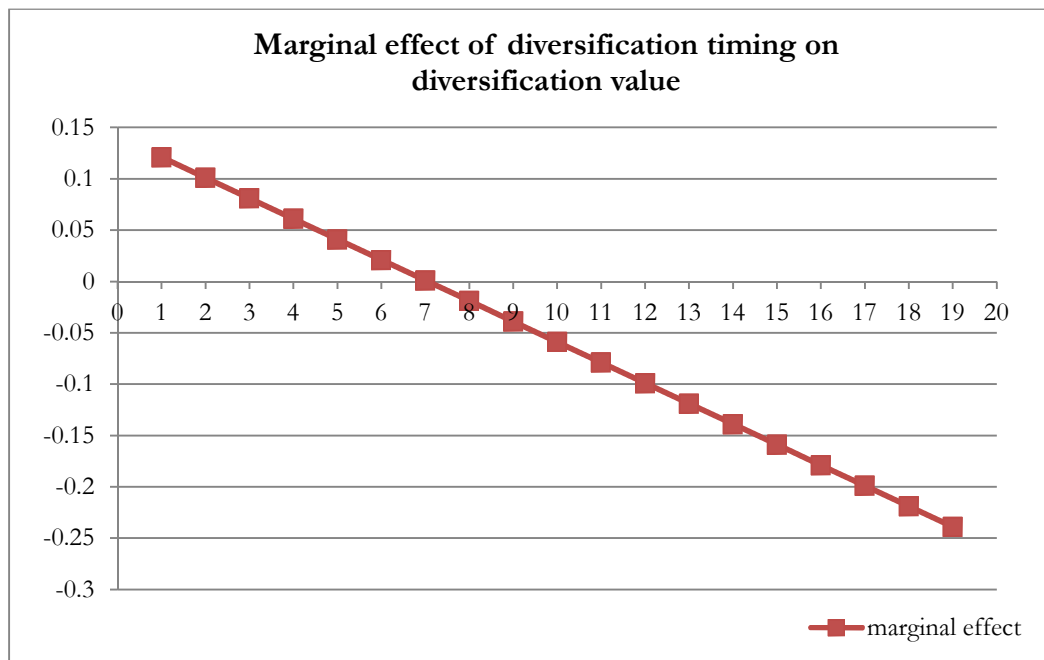
<sup>51</sup>  $10.3\%=((0.141-2*0.01*9)*1)/0.57*100\%$

**Figure 4.2 Marginal effect of diversification timing on diversification value**

The marginal effect of experience on diversification value is estimated as follows:

$$\partial \text{Value} / \partial \text{Timing} = \beta_1 + \beta_2 * \text{Timing}$$

The diversification value is the industry-adjusted Q of a firm in the year of focal diversification. Industry-adjusted Q is calculated following Lang and Stulz (1994) as the difference between a firm's Q and the sum of asset-weighted segments' Q in which a segment's Q is approximated by averaging the Q of all specialised firms in the same two-digit SIC code industry. Diversification timing is measured by the number of years between the focal diversification and the one prior to it. When a firm has only one diversification the timing is imputed by the number of years between the year of the focal diversification and the first year of the sample (1990)



Model 5 simultaneously studies the measures of level, similarity and timing of diversification experience. Coefficients for similarity and timing of diversification experience are still highly significant and largely consistent (in terms of sign and

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magnitude) with the model 3 and 4<sup>52</sup>. The coefficients for level of experience are not significant though they are still similar in sign with model 1 and 2.

Noticeably, the inclusion of the similarity necessarily excludes a number of firm-year observations with no prior diversification<sup>53</sup>. Possibly, the impact of the experience level (i.e. the marginal effect of diversification) is at its strongest when a focused firm has its first diversification.

Coefficients on control variables are mostly statistically significant, except for the dividend dummy which is only marginally significant in model 2. This is consistent with Lang and Stulz (1994) who do not find a significant relationship between diversification value and the dividend dummy variable. The signs of the other coefficients are as expected in the models. Specifically, they show that large firms and firms with a higher level of tangible assets have a lower value, whereas firms with more growing opportunities (larger capital expenditure) have a higher value.

Taken together, the results suggest that level, similarity and timing of diversification experience have significant impacts on the value of diversification. The study importantly identifies those situations in which diversification can create or destroy value in respect of the level, similarity and timing of diversification experience. Firm value is higher when firms have sufficient expertise (have diversified more than twice) to learn from their experience. Diversification brings more benefits when a new diversification is in a similar industry to the prior one, so that diversification experience can be appropriately generalised. Finally, diversification value is higher when a firm is

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<sup>52</sup> The results are comparable to research (in an acquisition context) by Hayward (2002). The author did not find that the level of acquisition experience had a significant effect on announced returns when all experience variables were included in regression.

<sup>53</sup> The variable represents the industry similarity between the focal diversification and the previous one. Therefore, only observations with a previous diversification are included. Refer to the methodology section for further details on the variable construction. This definition aims at capturing the learning from a similar diversification experience.



able to learn from an experience which occurs not too shortly and not too long before the focal diversification, with seven years as the cut-off point.

### **4.6.3. Degree of diversification, diversification experience, and diversification value**

The seminal studies of Lang and Stulz (1994) and Berger and Ofek (1995) have unambiguously documented a diversification discount in the value of diversified firms. More importantly, the authors report a negative relationship between diversification value and the level of a firm's diversification which is measured by number of segments<sup>54</sup>. It is, however, unclear from the studies why a higher degree of diversification should lead to a lower value of diversification.

The analysis so far provides strong evidence of the link between diversification experience and firm value. While my measure of experience is specifically constructed to capture the level of diversification before the focal one, such a proxy is closely related to the measurement used to measure degree of diversification in prior studies. One pertinent conjecture is that the number of segments may, apart from a measurement of diversification degree, represent a firm's level of diversification experience. I therefore expect that the relationship between the number of segments and diversification value may be U-shaped.

My analysis is conducted as follows. First, I adopt the regressions from Berger and Ofek (1995) and Lang and Stulz (1994) to investigate the relationship between diversification value and number of segments. Second, I add the squared term of the number of segments to examine the possibility of a U-shaped relationship. Finally, the variables measuring similarity and timing of diversification experience to the regressions are included, to see whether the relationship changes.

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<sup>54</sup> The relationship is roughly consistent with Rajan et al. (2000) who find that diversity in resources and investment opportunities reduce a firm's value.

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Table 4.4 gives the results of the above regressions. The dependent variable is industry-adjusted Q, calculated as in Lang and Stulz (1994). The sample includes 1,331 firm-year observations during the period 2000-2009. In model 1, value of diversification is regressed on the number of segments reported by diversified firms and controlled for size, dividend, asset tangibility, capital expenditure and leverage. The squared term of number of segments is added to model 2. Models 3 and 4 replicate the regressions in models 1 and 2, with the addition of variables measuring similarity and timing of diversification experience<sup>55</sup>. All the models use OLS regressions with year-fixed effects and are heteroskedasticity consistent.

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<sup>55</sup> The number of observations in model 3 and 4 is lower than in model 1 and 2 due to the construction of a diversification experience similarity variable. I also re-estimated models 3 and 4 without the experience similarity variable: the results are largely consistent.

**Table 4.4 Diversification value, diversification degree, and similarity and timing of diversification experience**

This table contains estimates from regressions investigating the relationship between diversification value, diversification degree (number of segments) and measures of similarity and timing of diversification experience. The sample includes all non-financial and non-utility firms with complete segment SIC code and total market capitalisation more than \$10M available from WorldScope database that diversify at least once from 2000 to 2009. The dependent variable is industry-adjusted Q in the year of focal diversification. Industry-adjusted Q is calculated following Lang and Stulz (1994) as the difference between a firm's Q and the sum of asset-weighted segments' Q in which a segment's Q is approximated by averaging the Q of all specialised firms in the same two-digit SIC code industry. Diversification similarity takes a value of one if the focal diversification shares the same two-digit SIC code as the prior diversification, and zero otherwise. Diversification timing is measured by the number of years between the focal diversification and the one prior to it. When a firm has only one diversification the timing is the number of years between the year of the focal diversification and the first year of the sample (1990). Control variables are similar to those in table 4.3. All regressions include a year-fixed effect and standard errors are heteroskedasticity consistent.

Variable	Model 1		Model 2		Model 3		Model 4	
	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	0.740	3.700***	1.766	5.170***	-0.232	-0.810	0.756	1.520
Number of segments (NOS)	-0.078	-2.890***	-0.610	-4.200***	-0.026	-0.770	-0.487	-2.480**
NOS square			0.061	3.740***			0.050	2.380**
Diversification similarity					0.167	1.830*	0.152	1.680*
Diversification timing					0.134	2.930***	0.139	3.010***
Diversification timing square					-0.010	-2.970***	-0.011	-3.120***
Control variables	Y		Y		Y		Y	
Year F.E.	Y		Y		Y		Y	
R-Square	0.110		0.120		0.100		0.110	
N Obs	1330		1330		921		921	

\*\*\*, \*\* and \* indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

The negative coefficient on number of segments in model 1 indicates that, consistent with the findings of Lang and Stulz (1994) and Berger and Ofek (1995), diversified firms have a lower value when they are more diversified. Furthermore, the coefficients on number of segments and its squared term are both statistically significant in model 2, suggesting a U-shaped relationship between value and number of segments. In model 3, the measures of similarity and timing of diversification experience completely absorb the effect of the number of segments on diversification value. Nevertheless, the diversification experience similarity and timing variables do not play a

dominant role when both the number of segments and its squared term are included in model 4.

The results shown in the table are largely consistent with the results in the main analysis (table 4.3) which accordingly suggests that the number of segments may be used as a measure of a firm's level of diversification experience<sup>56</sup>. The negative relationship between number of segments and diversification value observed by Lang and Stulz (1994) and Berger and Ofek (1995) can therefore be at least partly explained as the negative effect of diversification experience on diversification value. The finding of a U-shaped relationship between number of segments and diversification value extends the previous analysis, implying that the negative effect of number of segments on value turns to a positive effect when a firm gains sufficient expertise to diversify.

#### **4.7. Robustness test**

In order to check the robustness of the results, the research uses a number of different methods to measure firm value. Firstly, instead of using industry-adjusted Q in the year of diversification, the average industry-adjusted Q for two years following the focal diversification is used. Secondly, the valuation method applied by Berger and Ofek (1995) is adopted as a different measure of the value of diversified firms. More specifically, diversification value is termed the excess value which is the natural log of the ratio of a firm's actual value to its imputed value. In this study, the imputed value of each segment is calculated by multiplying the median ratio, for specialised firms in the same industry (with the segment), of the total capital to a segment's sales. An excess value which is above 1.386 or below -1.386 (i.e., actual value is either more than four times, or less than one-fourth the imputed value) is excluded.

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<sup>56</sup> The correlation between number of segments and the measurement of the level of a firm's diversification experience is 0.5 (significant, at 1%).

$$I(V) = \sum_{i=1}^n AI_i * \left( IND_i \left( \frac{V}{AI} \right)_{mf} \right) \quad (4.8)$$

$$EXVAL = \ln \left( \frac{V}{I(V)} \right) \quad (4.9)$$

$I(V)$  is a firm's imputed value, which is the sum of imputed values of the firm's segments.

$AI_i$  is segment  $i$ 's actual value of accounting item (sales).

$V$  is a firm's actual value, which is measured by its total capital (market value of common equity plus book value of debt).

$IND_i \left( \frac{V}{AI} \right)_{mf}$  is the ratio of total capital to an accounting item (sales) for median specialised firm in the same two-digit SIC code as segment  $i$ .

$EXVAL$  is the excess value (as termed by Berger and Ofek) which is the measure of diversification value.

$\ln \left( \frac{V}{I(V)} \right)$  is the natural logarithm of the ratio of actual value to its imputed value.

$n$  is number of segments.

Finally, an accounting-based measure of firm value is developed. Specifically, I use a three-year average industry-adjusted ratio of ROA for the three years following the focal diversification. The industry-adjusted ROA, which is calculated by adopting the valuation method used by Lang and Stulz (1994), is the difference between a diversified firm's ROA and its imputed value. The firm's imputed ROA is the sum of the asset-weighted segments' ROA, in which a segment's ROA is approximated by its two-digit SIC industry code median ROA. The industry-adjusted ROA is calculated as follows:

$$\text{Industry - adjusted ROA} = \text{FirmROA} - \sum_{i=1}^n \text{ROA}_i * \left( \frac{\text{BV}_i}{\text{FirmBV}} \right) \quad (4.10)$$

FirmROA is a firm's actual return on assets.

ROA<sub>i</sub> (i=1...n) is an estimation of segment i's ROA which is imputed as the median ROA of all specialised firms in the same industry.

N is number of segments.

BV<sub>i</sub> is the book value of segment i's assets.

FirmBV is the book value of the firm's total assets.

Models 1, 2, and 3 of table 4.5, respectively, report results from regressions using the above measures of diversification value as dependent variable. The models include all the measures of diversification experience. All the models use OLS regressions with control variables (unreported)<sup>57</sup> and year-fixed effects, and are heteroskedasticity consistent.

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<sup>57</sup> Control variables in the models are similar to table 4.3.

**Table 4.5 The different measures of diversification value, with level, similarity and timing of diversification experience**

This table contains estimates from regressions investigating relationship of the value of diversification to measures of diversification experience. The sample includes all non-financial and non-utility firms with complete segment SIC code and total market capitalisation of more than \$10M recorded in the WorldScope database that have diversified at least once from 2000 to 2009. The dependent variable in model 1 is two-year average industry-adjusted Q for two years following the focal diversification. Industry-adjusted Q is calculated following Lang and Stulz (1994) as the difference between a firm's Q and the sum of asset-weighted segments' Q in which a segment's Q is approximated by averaging the Q of all single-segment firms in the same two-digit SIC code industry. The dependent variable in model 2 is a measurement of diversification value following Berger and Ofek (1994): being the natural logarithm of the ratio of a firm's actual value to its imputed value. Actual value is a firm's capital which is the sum of the market value of its equity and total book value of debts. The imputed value is the sum of the imputed values of its segments, with each segment's imputed value equal to the segment's sales multiplied by its industry median ratio of capital to sales. The dependent variable in model 3 is three-year average industry-adjusted ratio of ROA for three years following the focal diversification. Industry-adjusted ROA is calculated as the difference between a firm's ROA and the sum of asset-weighted segments' ROA, in which a segment's ROA is approximated by its two-digit SIC code industry median ROA. Other variables are defined as in table 4.3. All regressions include year fixed effect and standard errors are heteroskedasticity consistent.

Variable	Average industry-adjusted Q		Excess value		Average industry-adjusted ROA	
	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	-0.260	-0.810	-0.724	-5.080***	-0.126	-2.910***
Diversification experience	0.044	0.280	0.090	1.300	-0.021	-1.120
Diversification experience square	-0.017	-0.630	-0.019	-1.590	0.005	1.520
Diversification similarity	0.179	1.710*	0.093	2.040**	-0.006	-0.410
Diversification timing	0.095	1.940*	0.033	1.390	0.018	2.700***
Diversification timing square	-0.009	-2.590***	-0.004	-1.820*	-0.001	-2.830***
Control variables	Y		Y		Y	
Year F.E.	Y		Y		Y	
R-Square	0.050		0.030		0.060	
N Obs	611		943		640	

\*\*\*, \*\* and \*, indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

The coefficients on the level of diversification experience and its squared term are not significant in any of the models. In model 1, all coefficients on similarity and timing of diversification experience are significant and consistent with the main results. Model 2 shows that the coefficient on diversification similarity still holds in terms of sign, magnitude and significant level, whereas only the squared term of diversification timing is significant at marginal level (10%). The model, however, still demonstrates the

U-shaped relationship between diversification timing and diversification value. Model 3 consistently illustrates an inverted U-shaped relationship between diversification timing and diversification value; both coefficients on timing of diversification experience and its squared term are highly significant in this model. The coefficient on similarity of diversification experience shows the opposite sign to the main results but is also insignificant.

Taken together, the results of the robustness checks are largely consistent with the main results. Coefficient on similarity of diversification experience is significant and consistent, in terms of magnitude, with the main results in two out of three models. The inverted U-shaped relationship between timing of diversification experience and diversification value, as found in the main regressions, is persistently shown in three models. Notably, the turning points of the relationship calculated in models 1, 2, and 3 are 4, 5, and 6 years respectively, which is comparable to 7 years calculated from the main analysis. This suggests that firms can maximise the benefit from diversification when the temporal interval between focal diversifications and the previous diversification is between approximately 4-7 years.

### **4.8. Additional analysis: external learning and diversification value**

The previous section evidently shows that the value of diversification is significantly affected by internal learning from a diversified firm's own experience. However, as asserted by Bapuji and Crossan (2004) and Barkema and Schijven (2008) external learning from the experience of other firms is also an important type of organisational learning. This subsection, therefore, aims to extend the main analysis by investigating



whether and how learning from the experience of others can affect the value of diversification.

The literature documents a substantial body of evidence that firms imitate others in different strategy contexts (e.g., acquisitions (Haunschild 1993, 1994; Haunschild and Beckman, 1998; Haunschild and Miner, 1997, among others) or alliances (Martin and Park, 2004; Gulati, 1999; Sarkar, Echambadi and Ford, 2003, among others)<sup>58</sup>. There are, nevertheless, only a few studies that investigate the impact of imitative behaviour on performance. Baum and Ingram (1998) show that the probability of survival of a Manhattan hotel is improved with the accumulation of the experience of other hotels. Sarkar, Echambadi and Ford (2003) find that internal mechanisms that foster external learning about alliances increase a firm's alliance performance. Beckman and Haunschild (2002) document evidence that external learning from a firm's partner's acquisition experience enhances performance of the firm's own acquisition. There is, therefore, evidence of external learning and it seems that learning from the experience of others tends to improve performance.

As Barkema and Schijven (2008) comment that research on the contingencies of external learning is still in an early stage<sup>59</sup>, my research focuses on the effects of external learning from population experience on the value of diversification and aims to bring further nuances to the understanding of this relationship. It is hypothesised that external learning may not always improve the value of firms. Arguably, when industry experience is low and simple, firms may not find appropriate lessons to learn from. Therefore, learning from industry experience may have negative effects on value. When more industry experience is accumulated, lessons from it may bring benefits to firms. Beckman and Haunschild (2002) show that the premium paid by a firm tends to be

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<sup>58</sup> Refer to Barkema and Schijven (2008) for a comprehensive review.

<sup>59</sup> The term population experience is used to refer to others' experience following Baum and Ingram (1998)

lower and its abnormal returns higher if the acquisition experience of its network partner is more heterogeneous. Ingram and Baum (1997, p.75) argue that “the experience of industry may offer opportunities for organisational learning that the experience of the organisation does not, because industry experience is more varied...” Nevertheless, as the industry experience becomes excessively heterogeneous and complicated the probability of misinterpreting the experience of others is greater (Bakerma and Schijven, 2008).

Taken together, it is expected that industry experience will affect the value of diversification in three phases: (1) when the experience is rare, it may negatively affect value, (2) when the experience is more abundant, it may be beneficial to value, and (3) when it is too heterogeneous and complicated, it may become detrimental to learning and value.

As there is no study which investigates the effect of population experience on diversification, a measure of population experience specific for this context needs to be constructed. In my research, external learning is defined as congenital learning (Huber, 1991; Bapuji and Crossan, 2004) (i.e., firms learn from the experience of the population accumulated prior to the focal diversification)<sup>60</sup>.

The population experience is, accordingly, reflected through the number of diversifications that are similar to the focal diversification during the previous three years<sup>61</sup>. It is widely shown in the literature that similarity is an important factor which facilitates learning and imitation between organisations.

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<sup>60</sup> Following Bapuji and Crossan (2004), external learning occurs in the form of congenital learning, vicarious learning and inter-organisational learning. Congenital (vicarious) learning refers to learning from the experience of other firms accrued before (following) the firm’s entry or strategic event. Inter-organisational learning occurs when firms interact with other organisations through, for instance, alliance, collaborations or joint-ventures (Liebeskind et al., 1996; Powell et al., 1996; Zollo et al., 2002)

<sup>61</sup> The window of three years used to calculate the number of diversifications is rather arbitrary. The time is selected as being not “too long” as Baum and Ingram (1998) note that “... other organisations’ experience may differ in its value to the focal organisation depending on when it is generated...” (p.997).

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In this research, similarity is defined in respect of the direction of diversifications. The (diversifying) direction broadly captures the link between a firm's present industry (or industries) and the industry where the firms expand to. The diversification direction is represented by a four-digit number which is formed from the two-digit SIC code of the present segment(s) and the two-digit SIC code of the new segment. For instance, a firm with a segment in SIC code 12 which diversifies into an industry with an SIC code of 23 in the year 2000 will be given diversification direction 1223. External experience for this firm will be measured by the number of diversifications (of other firms in the sample) in the direction 1223 during the period 1997 to 1999. Similarly, a firm with two segments in a 20 and 21 SIC code which diversifies into an industry with the SIC code 35 will have external experience equal to the sum of the number of diversifications in directions 2035 and 2135 during the previous three years. Firms are then sorted in ascending order, based on the number of similar diversifications, into ten groups numbered from one to ten. The group's number is used as a measure of population experience. This is termed the industry experience score as in this research the external experience is recorded based on similarity of industry aspects of diversifications. According to this variable construction, a higher industry experience score indicates a greater level of population experience accrued prior to the time of focal diversification<sup>62</sup>.

To more directly capture the effect of industry experience on the value of diversification, only firms that increase their number of segments by exactly one

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An experience that takes place too long in the past not be applicable as a business environment may change. The results hardly change when a window of two or four years is adopted.

<sup>62</sup> The categorical variable (i.e. the group's number) is used to measure the population experience instead of the number of similar diversifications, for two reasons. First, the number of diversifications is a quite heterogeneous factor to use as a measurement of industry experience. Second, using the number of similar diversifications as the measure of industry experience may not be capable of capturing the effect of the experience on value as the marginal effects of industry experience on the value of diversification may be trivial (i.e. it may need a great deal of similar diversifications to produce significant learning). For instance, the value of diversified firms with ten similar diversifications may not be significantly different to the value of firms with twenty similar diversifications.

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segment during the period 1990-2009 are selected (i.e., firms that diversified from one to two or two to three segments are selected while firms that diversified from one to three or two to four segments are not). Thus, the sample used for the analysis in this section includes 498 firm-year observations. The number of observations in model 4 is lower as a number of firms missing diversification similarity variable is excluded.

Table 4.6 reports the results of the analysis of the relationship between diversification value and industry experience. Panel A presents the univariate analysis of the cross-sectional variation of diversification value with each level of industry experience. Panel B studies the effects of industrial experience on diversification value in a multivariate setting. All the models in panel B use OLS regressions with year-fixed effects and are heteroskedasticity consistent.

**Table 4.6 Population experience, external learning and diversification value**

The sample includes all non-financial and non-utility firms with complete segment SIC code and total market capitalisation of more than \$10M recorded in the WorldScope database that increased their number of segments by exactly one segment from 2000 to 2009. Population experience is presented through the number of diversifications that are similar to the focal diversification during the previous three years. Similarity is defined in respect of the direction of diversifications. The diversification direction captures the link between a firm's present industry (or industries) and the industry into which the firm expands. Firms are sorted into ten groups according to the number of similar diversifications. The industry experience score is used as the measure of the level of population experience. Panel A presents the univariate analysis. Panel B provides results from multivariate settings. The dependent variable is industry-adjusted Q. Other variables are defined as in table 4.3.

<b>Panel A</b>								
Industry experience score (I-experience)	Average number of similar diversifications	Industry-adjusted Q			N			
		Mean	Median	Std.Dev.				
1	4.900	0.034	-0.103	1.817	50			
2	17.460	-0.466	-0.276	1.186	50			
3	33.180	-0.419	-0.541	1.544	50			
4	56.060	-0.460	-0.428	0.894	50			
5	85.400	-0.105	-0.461	1.371	50			
6	126.040	-0.351	-0.578	1.046	50			
7	177.780	0.042	-0.210	1.277	50			
8	258.120	-0.432	-0.555	1.111	50			
9	377.140	-0.299	-0.461	1.114	50			
10	808.667	-0.593	-0.647	0.987	48			
<b>J-T test when I-experience&lt;=5</b>		-0.921	<b>J-T test when I-experience&gt;=6</b>		-1.390 *			
<b>J-T test for whole sample</b>		-1.556 *						
<b>Panel B</b>								
Variable	Model1		Model2		Model3		Model4	
	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	1.194	3.540***	1.687	3.530***	1.942	4.060***	0.697	1.110
I-experience	-0.052	-2.610***	-0.625	-2.250**	-0.682	-2.490**	-0.534	-1.680*
I-experience square			0.136	2.480**	0.148	2.730***	0.133	2.170**
I-experience cubic			-0.009	-2.740***	-0.009	-2.980***	-0.009	-2.550**
Diversification experience					-0.310	-2.940***	-0.288	-1.270
Diversification experience square					0.057	2.300**	0.052	1.260
Diversification similarity							0.082	0.590
Diversification timing							0.240	2.760***
Diversification timing square							-0.021	-2.520**
Control variables	Y		Y		Y		Y	
Year F.E.	Y		Y		Y		Y	
R-Square	0.110		0.130		0.100		0.110	
N Obs	497		497		497		308	

\*\*\*, \*\* and \*, indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

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From panel A, the J-T test for ordered differences in the diversification value in the whole sample is negative and only significant at a 10% level. This suggests that learning from others' experience may not improve value. The results support the hypothesis that greater heterogeneity of experience may be detrimental to learning; this is not consistent with the findings of Baum and Ingram (1998), Sarkar, Echambadi and Ford (2003) and Beckman and Haunschild (2002) who document a positive effect of external learning on performance.

Model 1 of panel B, which includes only the industry experience variable and other control variables (as in the main analysis), produces consistent results with the preliminary evidence in panel A. The coefficient on the industrial experience variable is negative and statistically significant at 1%. One increase in the industry experience score reduces a firm's industry-adjusted Q by 0.052, which is equal to 17% of the average industry-adjusted Q of firms in this sub-sample<sup>63</sup>.

To study the non-linear relationship between the value of diversification and industry experience, model 2 in panel B includes the industry experience variable, its square and cubic terms, and other control variables. Model 3 further adds the level of a firm's own experience, while model 4 incorporates all measures of a firm's own experience (i.e. level, similarity, and timing of a firm's own diversification experience) as studies (Lu, 2002; Sarkar, Echambadi and Ford, 2003; Barkema and Schijven, 2008) widely show that external learning effects tend to become weaker in more experienced firms.

Models 2, 3 and 4 of panel B consistently show a cubic relationship between industrial experience and diversification value. In all the models, the turning points can be estimated at around three and seven, suggesting that external learning reduces value

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<sup>63</sup>  $17\% = (0.052/0.3) * 100\%$

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when the industry experience score is less than three or greater than seven. External learning is beneficial to value when the industry experience score is between three and seven. The results are consistent with the hypothesis. It is possible that with extremely low (or even no) industry experience (an industry experience score of one), firms may not attempt to learn from outside and thus no misinterpretation of experience is made. Firms begin to learn from others when more industry experience is accumulated. Nevertheless, as lessons are still rare and are simple, firms may not be able to find a “good” example to imitate. Attempting to learn from the “imperfect” lessons of others may turn out to be detrimental to value. When more similar diversifications are undertaken and the industry experience accumulates, firms have a higher chance of picking the right lesson to learn from, so external learning improves value. In the final phase, as industry experience becomes excessively heterogeneous and complicated, the chance of misinterpretation is greater and external learning reduces value again.<sup>64</sup>

The marginal impact of industry experience is also economically significant. In model 3, one increase in the industry experience score, when the score is three (six), associates with 0.05 (0.07) marginal losses (gains) in industry-adjusted Q which are equal to 17% (24%) of the average industry-adjusted Q for all firms in the sub-sample<sup>65</sup>.

To summarise, this subsection shows that external learning from industry experience affects the value of diversification in a cubic pattern. External learning reduces value when the level of industry experience is too low or too high. This suggests that too simple or too complicated industry experience is detrimental to learning and to the value of diversification.

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<sup>64</sup> There is an alternative explanation for the second turning point. As there is more industry experience, there is also a higher level of competition which may reduce the value of the diversification.

<sup>65</sup>  $17\%=(0.05/0.3)*100\%$ ;  $24\%=(0.07/0.3)*100\%$

## 4.9. Conclusions

This chapter has analysed the effects of diversification experience on the cross-sectional variance of diversification value. Three main hypotheses were examined. First, firms may initially generalise inappropriate lessons from experience which leads to a negative return with respect to diversification experience. The negative relationship will continue up to the point where a firm gains sufficient knowledge and expertise to appropriately generalise experience. Thus, the hypothesis predicted a U-shaped relationship between diversification value and level of diversification experience. Second, the chance of appropriate experience generalisation is higher when diversifications are in a similar industry. The value of diversification for firms diversifying into a similar industry will be higher than the value for firms expanding into different industries. Finally, meaningful inferences from experience may not occur when the interval between diversifications is too short. Meanwhile, too long a temporal interval between diversifications may cause inferences from experience to be inaccessible, forgotten or irrelevant. An inverted U-shaped relationship between diversification value and timing of diversification experience was, therefore, expected.

Using data for US firms in the 1990-2009 period, the study finds evidence supporting these hypotheses. Notably, when estimated in separate regressions, all the measures of level, similarity and timing of diversification experience are statistically significant. When jointly studied in one model, the results suggest that for firms with at least one diversification experience, the effects of similarity and timing of diversification experience are more important than the level of experience. The research further shows that external learning from industry experience also significantly affects value, in a cubic pattern. The cubic relationship is significant even when the internal learning is



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controlled for. This suggests that external learning from industry experience is an important type of organisational learning.

Another important finding is that number of segments of a firm can be used as a measure of the firm's diversification experience. Thus, the negative relationship between number of segments and diversification value can be explained as the negative effect of experience on value, as documented in organisational learning theory.

Altogether, the study finds that firms may learn from their own and others' diversifying experience to enhance the value of subsequent diversifications. The finding is an original contribution to the important line of research in diversification literature which investigates the cross-sectional variance of the value of diversification.

Although studying factors that affect the value of diversification is a new trend in research, the question of whether, on average, diversification adds or destroys value is an important question that has been asked over a long time, and remains important. The next study in the present thesis attempts to examine the effects of diversification on investor wealth.

## **5. Value of diversified firms, investor self- diversification and managerial motivation of diversification**

### **5.1. Introduction**

One of the most influential findings in diversification literature is that diversified firms are traded at a discount relative to non-diversifiers (Lang and Stulz, 1994; Berger and Ofek, 1995). The conventional interpretation of the finding is that corporate diversification destroys shareholder value<sup>66</sup>.

A natural question that arises from this widely known phenomenon is: what induces investors to buy stocks of discounted diversified firms? Or to put it differently, as an investment vehicle, what characteristics or what potential of stocks of diversified firms will attract investors? The most prominent reason investors buy stocks of discounted diversified firms is perhaps the reduced level of risk associated with diversified firms (Gort, 1966; Smith and Schreiner, 1969; Lewellen, 1971; Amihud and Lev, 1981; Mansi and Reeb, 2002; Duchin, 2010, among others). Specifically, a combination of operations in different industries may stabilise the income streams of diversified firms (Gort, 1966). Smith and Schreiner (1969) document that "...by

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<sup>66</sup> Refer to Villalonga (2003) for a comprehensive review of the literature.

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engaging in different types of activity, the conglomerate firm is able to reduce its overall exposure to risk” (p.414).

Also, a number of studies (Lamont and Polk, 2001; Mitton and Vorkin, 2010) produce evidence to show that investors in firms with a diversification discount will receive a higher expected stock return. This implies that diversification discount may simply reflect the difference, in respect of future returns, between diversified and specialised firms.

The present research adopts a portfolio approach to address the first question. More specifically, it compares performances, particularly returns and risks characteristics, of portfolios of diversified and specialised firms. Portfolios are compared because, according to Kopp (1968), the main interest of stock investors may be the performances of portfolios of firms, rather than the average performance of individual firms.

Using a random sampling procedure, the research has constructed and compared the performance of 1,000 portfolios of diversified and specialised firms. The study clearly shows that, generally, portfolios of diversified firms are characterised by a higher level of returns and a lower level of risks compared to portfolios of specialised firms. This suggests that investments in portfolios of diversified firms will, on average, result in better risk-adjusted returns than investments in specialised firms’ portfolios.

The main analysis of the first research question is also extended, by investigating the relationship between the performance of portfolios of firms and the degree of firms’ diversifications, given that a number of previous studies (Lang and Stulz, 1994; Berger and Ofek, 1995; Rajan et al. 2000) document a negative relationship between the value of diversified firms and the degree of diversification. The present research shows that the performance of portfolios of diversified firms relates to the degree of diversification

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of firms in an inverted U-shaped relationship. Performance is improved (there are higher returns and lower risk) with the degree of diversification for the portfolios of firms with three or fewer segments. Investing in portfolios of firms with four or more segments, however, provides lower rates of returns and higher levels of risk compared to investments in portfolios of three-segment diversified firms. Importantly, linking this finding to the finding of a U-shaped relationship between firm value and degree of diversification documented in the previous chapter implies a negative relationship between firm value and stock returns. More particularly, it suggests that investing in firms with a lower value (larger diversification discount) will provide higher subsequent returns.

While the above results clearly demonstrate that investing in diversified firms provides investors with a higher risk-adjusted rate of return or better diversification efficiency, compared to investments in specialised firms, a number of studies suggests that this benefit can be achieved by the firms' shareholders with their "homemade" portfolio (Gort, 1966; Levy and Sarnat, 1970; Amihud and Lev, 1981). The implication is that investors have the option of self-diversifying their investment portfolio rather than holding the stocks of diversified firms. The second question of the chapter is, therefore, whether investing in self-diversified portfolios with a similar asset composition to diversified firms can provide investors with a level of return and risk comparable to direct investments in those diversified firms.

Following the empirical method developed in Smith and Schreiner (1969), Mason and Goudzwaard (1976) and Armstrong and Vashishtha (2012), a self-diversified portfolio is simulated which follows the asset structure embedded in each diversified firm. Diversified firms are viewed as a portfolio in which each segment represents an investment in a distinct industry – just as investors consider investing in different

securities. The proportion of investment in each particular industry in the portfolio is estimated as the percentage of the firm's assets employed in each segment. The research, thus, terms self-diversified portfolios as simulated diversified firms.

After simulated diversified firms have been formulated, returns and risks of portfolios of simulated diversified firms are calculated. Comparing the returns and risk measurements for 1,000 portfolios of diversified firms and simulated diversified firms reveals that the simulated portfolio has, on average, lower risk and lower returns than the portfolio of diversified firms. Results from different risk-adjusted returns measures are rather mixed. Sharpe and Treynor ratio suggest that simulated portfolios can provide better risk-adjusted returns while it shows from Jensen alpha that portfolios of diversified firms have higher abnormal returns.

The results evidently support the proposition that, applying the assumption of a perfect capital market<sup>67</sup>, shareholders can invest in their own self-diversified portfolios and attain lower level of risk and more efficient diversification than they would obtain by directly investing in diversified firms<sup>68</sup>. Consequently, this suggests that if risk-reduction is widely identified as the major motivation for corporate diversification it may not create real economic gain for shareholders as they can self-diversify in the market. Thus, it is highly questionable, from the perspective of shareholder benefit, why firms continue to diversify.

This leads to the third question of the chapter: why firms diversify if a self-diversifying portfolio may provide better returns for investors? This analysis follows the theoretical arguments in the literature which suggest that managers may pursue

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<sup>67</sup> Applying the assumption of a perfect capital market, several transaction costs (e.g., brokerage fee or management fee) and taxes are not considered in my calculations of returns of portfolios.

<sup>68</sup> From the point of view of a private investor who may not be able to invest in a well-diversified portfolio, Sharpe ratio which takes into account of both systematic and idiosyncratic risk is a more important measure of risk-adjusted returns. Treynor ratio and Jensen alpha which are calculated based only on market risk are more appropriate to measure performance of well-diversified portfolios.

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diversification strategies for their private benefit even if these strategies do not increase, or may even reduce, shareholders wealth (Amihud and Lev, 1981; Jensen, 1986, 1993; Stulz, 1990; Shleifer and Vishny, 1989, among others). More specifically, the chapter focuses on two possibilities. First, managers may maintain a diversification strategy to reduce a firm's overall risk, and simultaneously their employment risk, even when there is no obvious benefit to shareholders. Amihud and Lev (1981, p.605) note that "...managers, as opposed to investors, are hypothesized to engage in conglomerate mergers to decrease their largely un-diversifiable "employment risk" (i.e., risk of losing job, professional reputation, etc...)".

Second, diversification may also be used as a means of altering the composition of a firm's risk, particularly to increase the percentage of systematic risk in the firm's total risk. A recent line of studies (Duan and Wei, 2005; Tian, 2004; Armstrong and Vashishtha, 2012) suggests that as a firm's systematic risk can more easily be hedged by trading market portfolio, managers have an incentive to increase the proportion of systematic risk in a firm's total risk.

Following Armstrong and Vashishtha (2012), using returns and risks of simulated diversified firms to capture expectations of managers with respect to a firm's returns and risks, the results in this chapter support both the hypotheses. They show that managers expect diversification to lower the level of risk, not to increase the level of returns, and to raise the percentage of systematic risk in a firm's total risk.

The chapter makes several important contributions to the strand of studies on the value of diversified firms. Firstly, it directly complements several papers (Mansi and Reeb, 2002; Lamont and Polk, 2001; Mitton and Vorkink, 2010; Hund, Monk and Tice, 2010) which challenge the conventional perception in the literature that diversification destroys shareholder value. Indeed, the findings imply that investors can gain more

while bearing less risk when investing in portfolios of diversified firms. Nevertheless, they also show that benefits from investing in (portfolios of) diversified firms do not increase monotonically with a firm's diversification level.

Secondly, a special contribution is the unique and novel empirical method used to compare the performances of portfolios of firms rather than the conventional method in the literature of comparing the average value of individual firms. The present study gives evidence that investing in portfolios of diversified firms provides higher returns and lower risks to investors than does investment in portfolios of specialised firms.

This study therefore significantly extends the earliest studies in diversification literature (e.g., Smith and Schreiner, 1969; Levy and Sarnat, 1970; Melicher and Rush, 1973; Joehnk and Nielsen, 1974, among others), which used market-based measurements to investigate value of diversified firms. While these studies were conducted on a limited number of firms, the random sampling procedure in this chapter helps to enlarge the sample size, which significantly enhances the generalisation and credibility of the results<sup>69</sup>. Furthermore, a number of recently affine market models (e.g., Fama and French, 1993; Carhart, 1997; Pastor and Stambaugh, 2003) are used in this study to improve the estimations of returns and risks.

Thirdly, the chapter provides evidence supporting the argument made in the literature that shareholders of firms can achieve lower level of risks with their self-diversified portfolios (Gort, 1966; Levy and Sarnat, 1970; Amihud and Lev, 1981).

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<sup>69</sup> For instance, the samples are 19 conglomerates from 1953 to 1967 in Smith and Schreiner (1969), 10 conglomerates during 1954 to 1968 in Westerfield (1970), or 45 conglomerates and 45 non-conglomerates in from 1960 to 1971 in Melicher and Rush (1972).

Finally, the chapter provides evidence that supports the argument that corporate diversification can be partly driven by the private interests managers have to reduce their un-diversifiable risk.

The chapter is constructed as follows: section 2 reviews the relevant literature and develops the research hypotheses. Sections 3 and 4 describe the research methods and data sample, respectively. Section 5 reports the main results. The extended analysis is conducted in section 6. The last section concludes.

## **5.2. Related literature and development of hypothesis**

### **5.2.1. Market-related performance of diversified and specialised firms**

For a long time it has been a widely accepted notion in financial literature that corporate diversification will result in lowering a firm's risk due to the imperfectly correlated incomes of the firm's multiple lines of business (Gort, 1966; Smith and Schreiner, 1969; Lewellen, 1971; Amihud and Lev, 1981; Mansi and Reeb, 2002; Duchin, 2010, among others). Theoretically, a combination of operations in different industries may stabilise the income streams of diversified firms (Gort, 1966). Lewellen (1971, p.522) lists one "financial" benefit of corporate diversification as "... simply obtaining a diminished variability of total corporate earnings through the portfolio diversification implied by conglomeration". Duchin (2010) introduces the notion of investment opportunity risk and gives evidence that diversified firms can hold less cash than specialised firms as they are less exposed to investment risk. Empirical evidence, however, do not always support this notion.

Melicher and Rush (1973) find higher standard deviation of stock return and market risks in a group of diversified firms than in a group of specialised firms during



the period 1966 to 1971, although the differences are not statistically significant. Joehnk and Nielsen (1974) do not find that conglomerate merger activities have a significant impact on a firm's systematic risk. Amit and Livnat (1988) are able to find empirical evidence showing related diversified firms as high return-high risk firms and unrelated diversified firms as low return-low risk firms

A series of studies in management literature also investigate the link between diversification strategy and a firm's systematic risk. Montgomery and Singh (1984) examine the link between diversification strategy and systematic risk and report that specialised and related diversified firms have lower systematic risk than unrelated diversified firms. Barton (1988) extends Montgomery and Singh's study to show that diversification strategy may influence a firm's systematic risk, either directly or by modifying the effects of financial context. Amit and Livnat (1988), however, do not find significant differences in systematic risk among firms with different diversification strategies.

The relationship between diversification and stock return is also inconclusive<sup>70</sup>. Melicher and Rush (1973) compare the stock return of a group of diversified firms and specialised firms and state of the results that "... while the conglomerate firms achieved a level of performance comparable to the considered non-conglomerate firms, their performance was not at all outstanding" (p.387). More specifically, the conglomerate sample is found to have significantly better risk-adjusted returns using the measure given by Westerfield (1970) but no significant differences in terms of Jensen, Sharpe and Treynor' measures<sup>71</sup>. Comment and Jarrell (1995) document returns to refocusing firms in the 1980s, whereas Morck, Shleifer and Vishny (1990) find that diversifying bidders earn lower abnormal returns on announcement of an acquisition than do

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<sup>70</sup> See Akbulut and Matsusaka (2010) for an intensive review of literature.

<sup>71</sup> Details of the calculations of these measures are provided in the methodology section.

bidders making related acquisitions. Conversely, Hubbard and Palia (1999) report a positive abnormal return for bidding firms in diversifying acquisitions during the 1960s. Lamont and Polk (2001) argue that investing in discounted diversified firms should provide higher stock returns for investors. The authors do not find a significant difference in returns, between diversified and specialised firms. Nevertheless, they do find that stocks of discounted diversified firms have higher returns than stocks of premium diversified firms. Akbulut and Matsusaka (2010) find that the announcement returns are significantly positive for diversifying mergers and are not lower than returns for related mergers for a period of 57 years (1950-2006).

To sum up, the theoretical arguments in the literature are quite consistent in respect of the lower risk of diversified firms. The empirical evidence is, nevertheless, not that clear. Altogether, it is more likely that diversified firms have lower risk than specialised firms. It is hypothesised that portfolios of diversified firms have lower risk than portfolios of specialised firms. There is no strong theoretical argument to predict returns from stocks of diversified firms relative to stocks of specialised firms. Results from empirical studies, therefore, also vary. Thus, the first hypothesis of the present chapter is:

***Hypothesis 1:** Investing in portfolios of diversified firms provides an indifferent level of returns compared to investing in portfolios of specialised firms. Investing in portfolios of diversified firms has a lower level of risk than investing in portfolios of specialised firms.*

### **5.2.2. Diversified firms and efficiency of diversification**

The literature reviewed above indicates that risk reduction is widely perceived as being the major benefit of diversification. The perception is, nevertheless, challenged by several authors (Gort, 1966; Levy and Sarnat, 1970; Amihud and Lev, 1981, among

others). The main argument is that corporate diversification may be unnecessary as stockholders can easily control the risk of their portfolios in a capital market.

This argument has given rise to several empirical studies<sup>72</sup>. Smith and Schreiner (1969) adopt a portfolio approach, to compare the “efficiency of diversification” of conglomerates and mutual funds. Sharpe ratio is adopted as a measure of diversification efficiency, which is calculated as excess return divided by the standard deviation of return. The results of Smith and Schreiner suggest that while some conglomerates are remarkably successful in their diversification objective, mutual funds are able to provide more efficient diversification. In a response to Smith and Schreiner’s study, Westerfield (1970) proposes a different measure of diversification as the correlation between return on security and return on market. Nevertheless, consistent with Smith and Schreiner, Westerfield also finds less efficiency in diversification in conglomerates than are found in mutual funds. The findings from these studies are subsequently confirmed by Weston, Smith and Shrieves (1972) who report that mutual funds outperform conglomerates in all measures. Beattie (1980), nevertheless, finds that Westerfield’s (1970) measure of diversification efficiency positively relates to the range of conglomerate activities (i.e. level of diversification). To conclude, the overall picture does not illustrate outstanding diversification efficiency on the part of conglomerates, compared to other types of investment companies. This is somewhat consistent with a theoretical model proposed by Levy and Sarnat (1970) who argue that “...in a perfect capital market an economic advantage cannot be achieved by a purely conglomerate merger” (p.795).

While previous studies focus on the performance of diversified firms and mutual funds, this study examines whether investors would be better off investing in a diversified portfolio of specialised firms rather than investing in diversified firms.

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<sup>72</sup> Beattie (1980) provides a review of the literature.

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Following the simulation technique of Smith and Schreiner (1969) and Mason and Goudzwaard (1976), a simulated diversified firm will be created with a diversification structure that mirrors the “real” diversified firm<sup>73</sup>. The characteristics (i.e. returns and risks) of the portfolios of simulated diversified firms will be compared to those of portfolios of diversified firms.

On the one hand, investing in a self-diversified portfolio replicating asset structure in diversified firms may benefit investors. Gort (1966), Smith and Schreiner (1969) and Stein (1997) suggest that diversified firms tend to expand in profitable industries. Amihud and Lev (1981) argue that managers of conglomerate firms engage in diversification to protect their human capital, implying that managers will choose to invest in an efficiently diversified portfolio of industries. Stein (1997) shows that headquarters of diversified firms have the right incentives to engage in winner-picking, i.e. allocating funds to the most profitable project. The result is the efficient allocation of funds to different investments in a corporate portfolio.

Several costs associated with the operation of a multi-segment organisation can also be avoided. One of the most prominent costs is agency cost which may result in an inefficient internal capital market in which cash flows from profitable segments are used to subsidise poorly performing segments (see e.g., Lamont, 1997; Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000, among others), self-interested managers (Scharfstein and Stein, 2000), or overinvestment due to access to additional capital (Jensen, 1986; Stulz, 1990). Furthermore, there may be a lack of transparency due to the complicated diversified firm structure (Krishnaswami and Subramaniam, 1999).

On the other hand, diversified firms may provide benefits that cannot be gained by simulated firms. First, operation synergism is gained by combining several business

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<sup>73</sup> Details of the technique will be discussed in methodology subsection.

activities that are larger than the sum of each individual activity's profit. Levy and Sarnat (1970) further this idea with a notion of financial synergism. According to the authors, true economic can be gained owing to the combination of the financial resources of two firms within a conglomerate, which will reduce the lenders' risks and therefore the firms' capital cost while combining each of the individual shares of the two companies in an investor's portfolio will not. This argument is also proposed in Lewellen (1971) who suggests that because of a coinsurance effect diversified firms will have a large debt capacity.

Second, the operation of internal capital markets within multi-segment firms can help ease a firm's capital constraints (Stein, 1997). Several pieces of research, however, suggest that this particular financial benefit is valued more in less-developed capital markets, such as during the conglomerate wave in the 1960s (Hubbard and Palia, 1999). The value of the benefit has gradually reduced recently during the trend toward corporate focus during the 1980s (Comment and Jarrell, 1995; Servaes, 1996; Akbulut and Matsusaka (2010)).

Thus, considering the trade-off of benefits and costs, it is expected that the simulated portfolio will have higher returns than the portfolios of diversified firms. The simulated diversified firms are created following the diversification pattern embedded in diversified firms so it is possible that they will have a similar level of risks. The second hypothesis is:

***Hypothesis 2:*** *Investing in portfolios of simulated diversified firms provides a higher level of returns than investing in portfolios of diversified firms. Investing in portfolios of simulated diversified firms has a similar level of risk to investing in portfolios of diversified firms.*

### **5.2.3. Managerial motivations of firm diversification**

The aforementioned argument made by Gort (1966), Levy and Sarnat (1970), among others, about a stockholder's ability to self-diversify, essentially leads to questions about the motivations for corporate diversification. A stream of studies views corporate diversification as an agency problem, with managers pursuing diversification strategies for their private benefit even if those strategies reduce shareholder wealth. Diversification may benefit managers as the managers' power, reputation and compensation relate proportionately to firm size. Accordingly, the "empire building" tendency is widely discussed in Jensen (1986, 1993), Stulz (1990), among others. Shleifer and Vishny (1989) suggest that managers will be likely to invest in projects that require their specific human capital and thus which make them indispensable to the firm. The present research focuses on two possibilities: diversifications are used by a firm's manager as a means of lowering or altering the composition of the firm's risk.

Managers have an incentive to reduce a firms' risk, to protect the specialised human capital of the firm, or to avoid large adjustment costs in finding new employment (Jensen and Meckling, 1976). Empirical studies find evidence largely consistent with this argument. Amihud and Lev (1981) find that manager-controlled firms (where managers have more discretion in making decisions) will engage in more diversification activities than owner-controlled firms. Denis, Denis and Sarin (1997) show that level of diversification is negatively related to managerial equity ownership which ties the interests of managers to those of shareholders and to the equity ownership of outside block-holders that provide monitoring benefits to the firm. Morck, Shleifer and Vishny (1990) report lower returns to shareholders by diversifying firms.

Taken together, the above studies imply that managers will maintain a diversification strategy to reduce a firm's overall risk and simultaneously their

employment risk, even when there is no obvious benefit to shareholders. Thus the third hypothesis is that:

***Hypothesis 3: Managers expect lower risks from a firm's diversification.***

Diversification may also be used as a means of altering the composition of a firm's risk. A recent line of studies (Duan and Wei, 2005; Tian, 2004; Armstrong and Vashishtha, 2012) suggests that as a firm's systematic risk can be hedged by the managers' ability to trade the market portfolio, the firm's managers will have an incentive to increase the proportion of systematic risk to total risk. As most of the managers' wealth is tied to the value of their firm, Armstrong and Vashishtha (2012) argue that a higher proportion of systematic risk implies that a higher proportion of a firm's total risk (this is also the risk associated with the managers' firm-specific holdings) can be hedged. Empirical findings in the present study indicate that managers tend to increase their firm's total risk by increasing systematic risk but not idiosyncratic risk. Following these arguments, it is possible that managers undertake diversification to alter the components of a firm's total risk (particularly, to increase the proportion of systematic risk to total risk). Thus, the fourth hypothesis is that:

***Hypothesis 4: Managers expect a higher proportion of systematic risk to a firm's total risk as a result of diversification.***

### **5.3. Empirical methods**

#### **5.3.1. Returns and risks of portfolios of diversified and specialised firms**

This subsection describes the methodology used to estimate returns and risks of the portfolios of diversified and specialised firms. As the method use to estimate the characteristics of portfolios of diversified and specialised firms is identical, the term

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“portfolio” is used to refer to the portfolios of each group of firms. Return of portfolio is calculated based on the daily stock returns of firms in the portfolio. The daily stock return of a firm is estimated as

$$\text{DailyReturnF}_{i,t} = \frac{\text{Stockprice}_{i,t} - \text{Stockprice}_{i,t-1}}{\text{Stockprice}_{i,t-1}} \quad (5.1)$$

$\text{DailyReturnF}_{i,t}$  is daily return of firm  $i$  in day  $t$ .

$\text{Stockprice}_{i,t}$  and  $\text{Stockprice}_{i,t-1}$  are the stock price of firm  $i$  in day  $t$  and day  $t-1$ .

The daily return of a portfolio is the market-value weighted average stock return of firms in the portfolio. The return of the portfolio is estimated as the average of portfolio’s daily returns. Risk of the portfolio is the standard deviation of the portfolio’s daily returns.

$$\text{DailyReturnP}_t = \sum_{i=1}^n \text{DailyReturnF}_{i,t} * \left( \frac{\text{MV}_{i,t}}{\sum_{i=1}^n \text{MV}_{i,t}} \right) \quad (5.2)$$

$\text{DailyReturnP}_t$  is portfolio return in day  $t$ .

$\text{DailyReturnF}_{i,t}$  is the return of firm  $i$  in day  $t$ .

$\text{MV}_{i,t}$  is the market value of the firm  $i$  in day  $t$ .

$$\text{ReturnP} = \sum_{t=1}^T \text{DailyReturnP}_t / T \quad (5.3)$$

$\text{ReturnP}$  is portfolio return.

$\text{DailyReturnP}_t$  is portfolio return in day  $t$ .



T is number of days.

### 5.3.2. Returns and risks of portfolios of simulated diversified firms

Simulated diversified firms are purposely constructed to address two main questions of the research: first, the returns and risks of simulated diversified firms roughly represent the returns and risks which investors can obtain from investing in their self-diversified portfolio (which follow the assets structure of diversified firms), instead of directly investing in stocks of diversified firms. Comparing the performance of portfolios of simulated diversified firms and portfolios of diversified firms reveals whether a self-diversified portfolio provides a trade-off of returns and risks that is comparable to a diversified firm's stock. Second, returns and risks of a simulated diversified firm can be used as imputed returns and risks of the "real" diversified firm which capture the managerial expectations of returns and risks<sup>74</sup>.

A simulated diversified firm is constructed by replicating the diversification structure in the "real" diversified firms using a portfolio approach (Smith and Schreiner, 1969; Mason and Goudzwaard, 1976). The method is, interestingly, fundamentally comparable to the influential imputing methods used to measure diversification value developed by Lang and Stulz (1994) and Berger and Ofek (1995). A diversified firm is viewed as a portfolio in which each segment represents an investment in a distinct industry, similar to the way an investor considers investing in various securities<sup>75</sup>.

The extent of each investment is indicated by the percentage of the firm's assets employed in this particular segment. The imputed return for the investment in each

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<sup>74</sup> For further discussion about inferring a manager's desired level of return and risk, please refer to the subsection "Managers' expectations: imputed measures of return and risk".

<sup>75</sup> As discussed in Smith and Schreiner's research there are some shortcomings of the method which one should be aware of. First, the diversified firms invest both capital and management resources while investors only allocate their financial resources. Second, investors have more flexibility in respect of the extent of each investment while this extent is rather fixed for diversified firms. Finally, investors can easily change or withdraw their investment after days or weeks but investment is virtually irreversible for diversified firms.

segment is approximated as the market-value weighted average of the stock returns for all specialised firms in the same two-digit SIC code as the segment. The return of the simulated diversified firm is then estimated as the asset-weighted sum of the imputed returns of the segments. The daily return of a simulated diversified firm is calculated as:

$$\text{DailyReturnSD} = \sum_{i=1}^n \text{DailyDR}_i * \left( \frac{\text{BV}_i}{\text{FirmBV}} \right) \quad (5.4)$$

DailyReturnSD is the daily return of simulated diversified firms.

DailyDR<sub>i</sub> is the estimation of the daily return from investment in segment i which is imputed as the market-value weighted average return for all specialised firms in the same two-digit SIC code industry as segment i.

n is the number of segments in the diversified firm.

BV<sub>i</sub> is the book value of segment i's assets.

FirmBV is the book value of the firm's total assets<sup>76</sup>.

The daily return of the simulated portfolio is calculated as the market-value weighted sum of the returns of simulated diversified firms. The market value of a simulated diversified firm is estimated by reference to the market value of the respective diversified firm. The daily return of the simulated portfolio is:

$$\text{DailyReturnSP} = \sum_{i=1}^n \text{DailyReturnSD}_i * \left( \frac{\text{MV}_{i,t}}{\sum_{i=1}^n \text{MV}_{i,t}} \right) \quad (5.5)$$

DailyReturnSP is the daily return of simulated portfolio.

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<sup>76</sup> As daily data relating to a firm's total assets and its segments' assets is not available, the research uses yearly data for assets.

$\text{DailyReturnSD}_i$  is the return of simulated diversified firm  $i$  (for which the calculation is described above).

$n$  is the number of firms.

$MV_{i,t}$  is the market value of diversified firm  $i$ .

As is the case with the portfolio of diversified and specialised firms, the return of the portfolio is the average of the portfolio's daily returns and the risk is the standard deviation of the portfolio's daily returns.

### 5.3.3. Models of performance measurement

Several models of performance measurement will be applied. First, within the framework of the capital asset-pricing model, the following model will be estimated:

$$R_{i,t} - R_{f,t} = \alpha + \beta * (R_{m,t} - R_{f,t}) \quad (5.6)$$

$R_{i,t}$  is the return of portfolio  $i$  on day  $t$ .

$R_{f,t}$  is the risk-free interest rate on day  $t$ .

$R_{m,t}$  is the market rate of return on day  $t$ .

$\beta$  is the systematic or non-diversifiable risk of a portfolio, which indicates the level of a portfolio's risk relative to market risk.

$\alpha$  (Jensen, 1968) represents the abnormal return of a security or a portfolio over the theoretical expected return predicted by a market model.

In addition to this traditional capital asset-pricing model, the research also employs the three-factor model proposed by Fama and French (1993), a four-factor model which includes the factors adopted by Fama and French, and a momentum

factor (Carhart, 1997) four-factor model including the factors adopted by Fama and French and a liquidity factor (Pastor and Stambaugh, 2003) and five-factor model including the factors from Fama and French, the momentum factor (Carhart, 1997) and the liquidity factor (Pastor and Stambaugh, 2003). The reasons behind the usage of different factors are to control for the difference between diversified and specialised firms. First, diversified firms are normally bigger and more mature with less growth opportunity than specialised firms so it is essential to control for the size and the growth factor in the model. Second, as diversified firms are shown to trade at a discount to specialised firms (Lang and Stulz, 1994; Berger and Ofek, 1995) the momentum factor is also important. Finally, as diversified firms are bigger their stocks will consequently have higher level of liquidity, the liquidity factor should also be included. The models are as follows:

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 * (R_{m,t} - R_{f,t}) + \beta_2 * \text{SMB} + \beta_3 * \text{HML} \quad (5.7)$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 * (R_{m,t} - R_{f,t}) + \beta_2 * \text{SMB} + \beta_3 * \text{HML} + \beta_4 * \text{MOM} \quad (5.8)$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 * (R_{m,t} - R_{f,t}) + \beta_2 * \text{SMB} + \beta_3 * \text{HML} + \beta_4 * \text{LIQ} \quad (5.9)$$

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 * (R_{m,t} - R_{f,t}) + \beta_2 * \text{SMB} + \beta_3 * \text{HML} + \beta_4 * \text{MOM} + \beta_5 * \text{LIQ} \quad (5.10)$$

SMB is size factor (Fama and French, 1993).

HML is the market to book factor (Fama and French, 1993).

MOM is the momentum factor (Carhart, 1997).

LIQ is the liquidity factor (Pastor and Stambaugh, 2003).

#### 5.3.4. One-parameter measures of performance

The comparisons in two measures – return and risk – unfortunately could not provide any conclusion as to the relative performance of different portfolios. A one-parameter measure of investment performance aims to replace the two measures of performance –

return and risk- with a single measure which can provide a definitive comparison of the performance of portfolios with different returns and risks. In this research, two measures of risk-adjusted performance proposed by Sharpe (1964) and Treynor (1965) will be estimated:

Sharpe measure relates excess return to the risk of the portfolio.

$$\text{SHARPE} = \frac{(\overline{R_i} - \overline{R_f})}{\sigma(R_{i,t})} \quad (5.11)$$

$\overline{R_i}$  is average of  $R_{i,t}$

$\overline{R_f}$  is average of  $R_{f,t}$

$\sigma(R_{i,t})$  is standard deviation of  $R_{i,t}$

Treynor ratio relates the same excess return as the Sharpe ratio to systematic risk.

$$\text{TREYNOR} = \frac{(\overline{R_i} - \overline{R_f})}{\text{Beta}} \quad (5.12)$$

### 5.3.5. Managers' expectations: imputed measures of returns and risks

The third question of the chapter requires the measurement of the level of returns and risk that managers expect to achieve following diversifying. The realised returns and risks of diversified firms might not directly capture a manager's desired level of returns and risks, for certain reasons. First, the realised returns and risks may not only reflect the manager's desired level of returns and risks but may also capture a firm's disclosures, information trades of the firm's shares, and other features of the firm's information environment (Amstrong and Vashishtha, 2010; Roll, 1988; Ross, 1989). Second, realised

performances may also be influenced by the ability of managers in operating the firm (Stein, 1997).

Amstrong and Vashishtha (2010) use an imputed measure of returns and risks, rather than the realised returns and risks of a firm, to more directly capture the managers' desired level of returns and risks. Their method is largely similar to the approach used in this research to simulate diversification in diversified firms. The approach treats each diversified firm as a portfolio of segments (or industries) in which the firm operates. The returns and risks profile of each individual industry is relatively stable and therefore can be estimated by the firm's managers. The managers can alter the level of returns and risks of the firm by diversifying into (entering) new industries. The level of returns and risks that managers attempt to achieve from diversification can be reflected from the returns and risks of the portfolio of industries which a manager chooses to invest. The returns and risks of simulated diversified firms, which are estimated from industry-level returns and risks profiles, are therefore used to measure the expectations of a firm's managers.

To disaggregate total risk into its systematic and idiosyncratic components, the five-factor model described above is employed. The total risk, systematic risk and idiosyncratic risk are then calculated as:

$$\text{Totalrisk} = \text{Var}(R_{i,t} - R_{f,t}) \quad (5.13)$$

$$\begin{aligned} \text{Sysrisk} = & \beta_1^2 * \text{Var}(R_{m,t} - R_{ft}) + \beta_2^2 * \text{Var}(\text{SMB}) \\ & + \beta_3^2 * \text{Var}(\text{HML}) + \beta_4^2 * \text{Var}(\text{MOM}) + \beta_5^2 * \text{Var}(\text{LIQ}) \end{aligned} \quad (5.14)$$

$$\text{Idiorisk} = \text{Totalrisk} - \text{Sysrisk} \quad (5.15)$$

The proportion of systematic risk and idiosyncratic risk to the total risk is accordingly calculated. To capture the managers' desired proportion of a firm's total risk, the imputed return of the firm is used to estimate the model and to calculate the total, systematic and idiosyncratic risk.

## 5.4. Data

### 5.4.1. Sample

The sample includes all US firms recorded in the WorldScope database, covering a 19 year period from 1991 to 2009<sup>77</sup>. The segment data and firm financial data are extracted from the WorldScope database, while the Thompson Financial database is used to retrieve data on the daily stock price. Data on Fama and French's (1993) three-factor model and the four-factor model with momentum factor (Carhart, 1997) are collected from the Fama and French website<sup>78</sup>. Data on liquidity factor are from Pastor's website<sup>79</sup>.

Financial and utility firms are excluded. To ensure the integrity of segment data, only firm-year observations with a sum of segment sales within 1% of a firm's total sales are kept in the sample. Also, firm-year observations with less than ten million US dollars market capitalisation are eliminated. The focus is on daily stock returns, thus (following Brown and Warner (1985)), firm-year observations with less than 30 trading days are excluded. The final sample includes 12,798 firm-year observations for the period 1991-2009; each portfolio contains 4,958 daily returns.

It should be noted that it is not always possible to simulate a diversified firm as several diversified firms do not have complete segment data for which an imputed value

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<sup>77</sup> Initially the sample was from 1990 to 2009. However, only one diversified firm in the year 1990 meets all of the study's conditions. The sample period is therefore from 1991 to 2009.

<sup>78</sup> [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

<sup>79</sup> [http://faculty.chicagobooth.edu/lubos.pastor/research/liq\\_data\\_1962\\_2011](http://faculty.chicagobooth.edu/lubos.pastor/research/liq_data_1962_2011).

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cannot be estimated. The number of firm-year observations for simulated diversified firms is therefore lower than for diversified firms. The final sample includes 7,823 firm-year observations of 1,769 specialised firms; 2,858 firm-year observations of 815 diversified firms; and 1,953 firm-year observations of 559 simulated diversified firms for the 19 years from 1991 to 2009.



**Table 5.1 Performance comparisons of specialised, diversified and simulated diversified firms**

The sample contains of all WorldScope firm-year observations from 1991 to 2009 with total market capitalisation of more than \$10M, sum of segment sales within 1% of a firm's total sales and at least 30 stock trading days in a year. Financial and utility firms and firms with missing segment SIC code are not included in the sample. The final sample includes 7,823 firm-year observations of 1,769 specialised firms; 2,858 firm-year observations of 815 diversified firms and 1,953 firm-year observations of 559 simulated diversified firms. The table presents the stock return statistics of these firms. Firm status is determined in each year from 1991 to 2009. Return statistics are averages across all firm-year observations, based on daily returns. The daily return is multiplied by 100. A T-test is used to compare mean and standard deviation of return.

Measures	Specialised firms	Diversified firms	Simulated diversified firms	Difference between		
				Specialised and diversified firms	Diversified and simulated diversified firms	Specialised and simulated diversified firms
(1)	(2)	(3)	(4)	(5)=(2)-(3)	6=(3)-(4)	(7)=(2)-(4)
Return, mean	0.1901	0.1071	0.0997	***		***
Return, std	5.4616	4.6132	1.5675	***	***	***

\*\*\*, \*\* and \*, indicate that estimates are significant at 1%, 5%, and 10%, respectively.

Table 5.1 reports the daily return statistics which are averages across all firm-year observations in the sample, sorted by type of firm (i.e., specialised, diversified and simulated diversified firms). Consistent with the general conception of high risk high return, specialised firms are shown to have a higher return and risk than diversified firms. The findings support the notion of lower risk in diversified firms (Gort, 1966; Smith and Schreiner, 1969; Amihud and Lev, 1981, among others) but are not consistent with arguments by Lamont and Polk (2001) that there is a higher expected return in diversification-discount firms. The results are also consistent with Amit and Livnat (1988) who show that diversified firms belong to a low return-low risk group of firms. The average return of diversified firms and simulated diversified firms is statistically indistinguishable; nevertheless, the standard deviation of simulated firms' returns is significantly lower, suggesting that shareholders may achieve higher efficient diversification by investing in a portfolio of their own which is formed on the asset structure of a diversified firm. Although the main interest lies in the level of returns and

risks of the portfolios of firms rather than the level of the average firm, the results in the table provide some suggestions with respect to the hypotheses. As diversified firms have, on average, lower risks and returns, it is likely that portfolios of diversified firms will have lower returns and risks. Likewise, portfolios of simulated diversified firms may have the same level of returns and lower risks than portfolios of diversified firms. The next section will directly compare the performance of portfolios of firms.

#### **5.4.2. Random sampling procedure**

Comparing performance of portfolios of specialised, diversified, and simulated diversified firms which include all firms in the sample may not be an appropriate approach to the research questions, for at least two reasons. First, from a practical aspect, it is not realistic to expect an investor to invest in a portfolio formed from all available firms in the sample. Second, comparing return/risk characteristics of portfolios containing an unequal number of firms (i.e., 1,769 firms in portfolios of specialised firms, 815 firms in portfolios of diversified firms and 559 firms in simulated portfolios) may lead to biased results. For instance, the standard deviation of a portfolio with 1,939 specialised firms may be lower than a portfolio of 892 diversified firms, simply because the former portfolio contains more firms than the latter.

The research adopts a random sampling procedure similar to that of Friend and Blume (1970) to construct portfolios. Three portfolios, each containing 1,000 firm-year observations, are randomly selected from the sample of all available specialised firms, diversified firms and simulated diversified firms<sup>80</sup>. The procedure is then repeated 1,000 times, giving 1,000 random portfolios from each group of firms. The measures of returns and risks described in the previous section above are separately computed for

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<sup>80</sup> The firm-year observations are used to form portfolios, for two reasons. First, it ensures that each portfolio contains the same number of observations. Second, from year to year a firm may change from a specialised to a diversified type of firm and vice versa; using firm-year observations ensures that each particular portfolio includes a precise type of firm.

each of these 1,000 random portfolios of specialised firms, diversified firms and simulated diversified firms. The average of these measures is then used to compare the performance among these groups of specialised, diversified and simulated diversified firms.

## **5.5. Empirical results**

### **5.5.1. Performance of portfolios of diversified and specialised firms**

This subsection presents an analysis of the performance of portfolios of diversified and specialised firms. The comparison of performance is based on mean-variance analysis (panel A) and asset-pricing models (panels B to F). It is shown in panel A that investing in a portfolio of diversified firms offers higher returns and lower risks than investing in a portfolio of specialised firms. More specifically, the mean (median) of the return from the portfolio of diversified firms is significantly higher than the return of the portfolio of specialised firms, while the standard deviation of return is lower than that of specialised firms' portfolio. All the differences are statistically significant, at 1%. Thus, while the previous part of this study shows that diversified firms have, on average, lower returns than specialised firms, the portfolios of diversified firms generate better average returns than do portfolios of non-diversified firms.

**Table 5.2 Comparison of performance of portfolios of specialised and diversified firms**

The sample contains of all WorldScope firm-year observations from 1991 to 2009 with a total market capitalisation of more than \$10M, a sum of segment sales within 1% of the firm's total sales and at least 30 stock trading days in a year. Financial and utility firms and firms with missing segment SIC code are not included in the sample. The sample used for this table includes 7,823 firm-year observations of 1,769 specialised firms and 2,858 firm-year observations of 815 diversified firms. A random procedure is conducted to form a portfolio of 1,000 firm-year observations from each sub-sample of firms. From the portfolio, several performance measures (described in the methodology subsection) are calculated. The procedure is repeated 1,000 times generating 1,000 random portfolios for each type of firm. Averaging the results from the procedure provides the measures reported in the table. The return mean in panel A is the average of 1,000 return means calculated from the above 1,000 random portfolios. Other measures are estimated similarly.

Measures	Portfolios of specialised firms	Portfolios of diversified firms
(1)	(2)	(3)
Panel A: Mean-variance analysis		
Return, mean	0.125	0.134***
Return, median	0.113	0.135***
Return, std	1.685	1.672**
Sharpe	0.066	0.072***
Panel B: Capital asset-pricing model		
Jensen alpha	0.083	0.089***
Beta	1.028	1.105***
Treynor	0.108	0.109
Panel C: Fama and French's (1993) three-factor model		
Jensen alpha	0.077	0.085***
Beta	1.056	1.124***
Treynor	0.105	0.107
Panel D: Fama and French's (1993) three-factor model, plus momentum factor (Carhart (1997)) model		
Jensen alpha	0.080	0.086***
Beta	1.038	1.118***
Treynor	0.107	0.107
Panel E: Fama and French's (1993) three-factor plus liquidity factor (Pastor and Stambaugh (2003)) model		
Jensen alpha	0.077	0.086***
Beta	1.056	1.125***
Treynor	0.105	0.107
Panel F: Fama and French's (1993) three-factor plus momentum and liquidity factors model		
Jensen alpha	0.080	0.087***
Beta	1.038	1.118***
Treynor	0.107	0.107

\*\*\*, \*\* and \* indicate a significant difference from portfolios of specialised firms at 1%, 5% and 10%, respectively. T-test statistics are used.

The results are in line with an extensive stream of studies in the literature which argue theoretically that diversified firms have a lower level of risk (Gort, 1966; Smith and Schreiner, 1969; Lewellen, 1971; Amihud and Lev, 1981; Mansi and Reeb, 2002; Duchin, 2010, among others). Although empirical evidence supporting the argument is documented, the argument is mostly confirmed in terms of accounting measures (i.e., standard deviation of ROA (Bettis and Mahajan, 1985; Hoskinson, 1987) and volatility of cash flows (Duchin, 2010). Melicher and Rush (1973) report no significant difference in market-based measures of return and risk between conglomerates and non-conglomerates during the period 1960-1971. The present research, in contrast, provides important evidence of lower market-based risk in portfolios of diversified firms.

The results in panels B to F consistently show that the average portfolio of diversified firms has a significantly higher abnormal return (Jensen alpha) and higher market risk (beta) than the average portfolio of specialised firms. In contrast to a line of early studies in the literature which investigate the performance of diversified firms within capital asset-pricing models (e.g., Weston, Smith and Shrieves, 1972; Melicher and Rush, 1973, among others) the results presented in the table evidently demonstrate that portfolios of diversified firms can offer significantly higher abnormal returns than portfolios of specialised firms. The result, of higher non-diversifiable risk in portfolios of diversified firms, is comparable to findings of higher market risk in diversified firms documented in several previous studies (e.g., Melicher and Rush, 1973; Montgomery and Singh, 1984; Barton, 1988).

The Sharpe ratio indicates that portfolios of diversified firms provide higher return for each total risk unit than do portfolios of specialised firms. Nevertheless, the Treynor measures mostly suggest that the return gained for a unit of market risk does not differ between portfolios of diversified firms and portfolios of specialised firms.

Taken together, the results apparently suggest that investors are more likely to gain a higher level of return by investing in portfolios of diversified firms than by investing in portfolios of specialised firms. Regardless of the measure of risks and returns, the risk-adjusted returns of portfolios of diversified firms are always at least equal to or higher than those of portfolios of specialised firms. Importantly, the results imply that the widely accepted interpretations of shareholder value being destroyed in discounted diversified firms may not be wholly correct.

### **5.5.2. Diversified firms and self-diversified portfolios**

Performances of portfolios of simulated diversified firms are compared with performances of diversified firms' portfolios to see whether investing in a self-diversified portfolio is able to provide more efficient diversification for investors. Clearly, panel A of table 5.3 shows that portfolios of simulated diversified firms are characterised as low return-low risk portfolios, while the portfolios of diversified firms are high return-high risk portfolios<sup>81</sup>. The results are largely consistent and statistically significant, at 1%, across all the panels of the table, with their different measures of returns and risks.

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<sup>81</sup> The calculations of the simulated portfolios' returns and risks are greatly simplified: they do not take into account taxes, transaction costs, the cost of acquiring information and the cost of managing the portfolio which exist in an imperfect capital market (Levy and Sarnat, 1970).

**Table 5.3 Comparison of performance of portfolios of diversified and simulated diversified firms**

The sample used for this table includes 2,858 firm-year observations of 815 diversified firms as in the previous table and 1,953 firm-year observations of 559 simulated diversified firms. A simulated diversified firm is constructed by replicating the asset structure of “real” diversified firms. A random procedure is conducted to form a portfolio of 1,000 firm-year observations from each firm sub-sample. From the portfolio, several performance measures (described in the methodology subsection) are calculated. The procedure is repeated 1,000 times, generating 1,000 random portfolios for each type of firm. Averaging the results from the procedure provides the measures reported in the table. The return mean in panel A is the average of 1,000 return means calculated from the above 1,000 random portfolios. Other measures are estimated similarly.

Measures	Portfolios of diversified firms	Portfolios of simulated diversified firms
(1)	(2)	(3)
Panel A: Mean-variance analysis		
Return, mean	0.134	0.111***
Return, median	0.135	0.116***
Return, std	1.672	1.251***
Sharpe	0.072	0.077***
Panel B: Capital asset-pricing model		
Jensen alpha	0.089	0.074***
Beta	1.105	0.797***
Treynor	0.109	0.121***
Panel C: Fama and French's (1993) three-factor model		
Jensen alpha	0.085	0.069***
Beta	1.124	0.824***
Treynor	0.107	0.117***
Panel D: Fama and French's (1993) three-factor model plus momentum factor (Carhart (1997)) model		
Jensen alpha	0.086	0.071***
Beta	1.118	0.810***
Treynor	0.107	0.119***
Panel E: Fama and French's (1993) three-factor model plus liquidity factor (Pastor and Stambaugh (2003)) model		
Jensen alpha	0.086	0.069***
Beta	1.125	0.824***
Treynor	0.107	0.117***
Panel F: Fama and French's (1993) three-factor model plus momentum and liquidity factors model		
Jensen alpha	0.087	0.071***
Beta	1.118	0.810***
Treynor	0.107	0.119***

\*\*\*, \*\* and \* indicate a significant difference from portfolios of diversified firms, at 1%, 5% and 10%, respectively. T-test statistics are used.

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From panel A, investing in portfolios of simulated diversified firms is shown to greatly lower the level of total risk and to only modestly reduce the level of return compared to investing in portfolios of diversified firms. Therefore, portfolios of simulated firms have higher risk-adjusted rates of return than portfolios of diversified firms. In other words, portfolios of simulated firms provide more efficient diversification for investors than portfolios of diversified firms. The findings are somewhat consistent with the early studies in the literature which widely show that diversified firms provide less diversification compared to mutual funds (Smith and Schreiner, 1969; Smith and Weston, 1977).

The results of the asset-pricing models in panels B to F in the table demonstrate higher market risk in portfolios of diversified firms, relative to portfolios of simulated diversified firms. Nevertheless, it is less clear of which portfolio has better risk-adjusted return. The panels show higher market-based abnormal return (Jensen alpha) in portfolios of diversified firms. However, the results also suggest that the higher rate of return in panel A for portfolios of diversified firms is offset by the higher level of systematic risk. Consequently, the Treynor ratio indicates lower market risk-adjusted performance by portfolios of diversified firms compared to portfolios of simulated diversified firms.

Collectively, the findings do not support the second hypothesis. First, the higher return on the portfolios of diversified firms suggests that benefits of operating numerous business segments under one roof may still outweigh the associated costs. Second, it was hypothesised that portfolios of diversified firms have a similar level of risk to simulated portfolios but the findings show that the simulated portfolios have a significantly lower level of risk. The difference in level of risk between diversified firms and the simulated firms may result from several factors (e.g., the complex structure of



diversified firms makes the firms' risk assessment difficult (Hadlock, Ryngaert and Thomas, 1999), specific features of firms' information environments (Roll, 1988; Ross, 1989; Amstrong and Vashishtha, 2012) or constraints of the management's ability (Stein, 1997).

Two important implications arise from the results. First, if a perfect capital market is assumed, this shows that portfolios of simulated diversified firms have lower rates of return, lower levels of risks than portfolios of diversified firms. The results obtained from applying the three risk-adjusted rate of returns measuring technique (i.e., Sharpe ratio, Jensen alpha and Treynor ratio) are inconsistent. However, from point of view of private investors, Sharpe ratio may be the most important measure of risk-adjusted returns as it contains both systematic and un-systematic risks. Treynor ratio and Jensen alpha may be more appropriate for well-diversified portfolios which are hold by institutional investors. As the research is developed mostly from the base of private investors who may need to invest in diversified firms to improve level of diversification of their portfolio, the results importantly imply that investors can achieve more effective diversification by investing in self-diversified portfolios instead of investing in portfolios of diversified firms<sup>82</sup>. Second, the findings of lower returns and lower risks in simulated diversified firms' portfolios suggest that asset structure in diversified firms may be developed by managers particularly to reduce risk rather than to improve returns. An examination of managerial motives for firm diversification is conducted in the next subsection.

### **5.5.3. Managerial motivations of firm diversification**

This subsection examines whether managers expect to alter a firm's risk following firm diversification. The examination is conducted by comparing the present level of firms'

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<sup>82</sup> The assumption is essential, as in the calculation of returns and risks in the study several transaction costs (e.g. trading fees, managing fee, cost of acquiring information (Levy and Sarnat, 1970)) are not taken into account.

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returns and risks to managers' desired levels of returns and risk. A key issue in the analysis is the measure of the managers' desired levels of returns and risk. Following Armstrong and Vashishtha (2012), the imputed measure of returns and risks developed from respective measures of simulated diversified firms are used to capture the managers' desired levels of returns and risk. Compared to realised measures of returns and risk, these imputed measures may better reflect managers' expected levels of returns, for various reasons. First, simulated diversified firms can be broadly viewed as portfolios of industries a manager has selected in order to achieve his or her desired levels of returns and risk. A manager's decision to add a new industry to the portfolio may reflect his or her desire to alter the firm's risk profile. Second, when adding new industries to the portfolio, a manager is more likely to estimate their desired level of returns and risk based on industry-level information. The measures of simulated diversified firms calculated from industry-level market data can, therefore, reflect a manager's anticipated levels of returns and risk.

Panel A of table 5.4 documents the mean, median and standard deviation of return calculated from firm-year observations sorted by the firms' levels of diversification measured by the number of segments in which the firms operate. Single-segment firms are firms with only one operating segment. I do not estimate measures of return and variance from portfolios of firms (as was done in the previous tables) because the main interest here is with the motivation for diversifying of the firms' managers who aim to change the returns and risk of their own firm, rather than of a portfolio of firms.

**Table 5.4 Realised and imputed measures of firms' returns and risk**

The sample as in table 5.2 is used for this table. The table presents stock return statistics calculated from firm-year observations, sorted by the number of segments in which the firms operate. Single-segment firms are firms with only one operating segment. Firms with four or more segments are grouped into four-segment plus diversified firms. Imputed measures of the returns and risk of a diversified firm are calculated from the respective measures of its simulated firm. Firm type is determined in each year from 1991 to 2009. Return statistics are averages across all firm-year observations, based on daily return. The daily return is multiplied by 100. Panel A reports the mean, median and variance of return. Panel B includes the systematic risk as a percentage of the total risk. The systematic risk in panel B is estimated from the five-factor model including the three factors of Fama and French (1993), momentum factor (Carhart, 1997) and liquidity factor (Pastor and Stambaugh, 2003).

	Single-segment firms	Two-segment firms imputed		Two-segment firms realised		Three-segment firms imputed		Three-segment firms realised		Four-segment plus firms imputed		Four-segment plus firms realised	Difference between columns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<b>Panel A: Mean and variance analysis</b>																
Return, mean	0.176	0.135	**	0.101		0.102		0.128		0.078		0.093				
Return, median	0.076	0.103	***	0.068	***	0.090	*	0.072	*	0.063		0.056	***			**
Std, mean	5.454	1.87	***	5.161	***	1.551	***	4.768	***	1.411	***	4.132	***			**
Std, median	3.423	1.486	***	3.505	***	1.237	***	3.180	***	1.089	***	2.813	***			***
<b>Panel B: Proportion of systematic risk in total risk</b>																
Sys risk, mean	17.670	52.640	***	20.060	***	57.250	***	20.240	***	59.220	***	22.990	***	***		***
Sys risk, median	10.730	49.380	***	13.060	***	54.050	***	15.110	***	58.440	***	17.780	***	***	**	***

\*\*\*, \*\* and \* indicate a significant difference between the two columns to the left of each column, at 1%, 5% and 10% level, respectively. T-test statistics are used.

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Columns (2), (6) and (10) represent the imputed returns and risk while columns (4), (8) and (12) show the realised mean and median of the returns and risk of diversified firms with two, three- and four or more segments, respectively. The imputed measures of two-segment firms (column (2)) represent the level of returns and risk that managers of single-segment firms expect to achieve from current levels of returns and risk (column 1) when the firms diversify from one to two segments. Column (4) represents the average operating (or real) level of returns and risk of two-segment firms. Column (4) can also be viewed as the current level of returns and risk that managers desire to change by diversifying from two to three segments. Columns (6) and (8) show the expected and realised level of returns and risk when firms diversify from two to three segments.

The odd columns from (3) to (13) (i.e. columns (3), (5), (7), (9), (11) and (13)) indicate the significant level of difference between the two columns to the immediate left (i.e., column (3) indicates the difference between columns (1) and (2), column (5) indicates the difference between columns (2) and (4), and so on).

The results from the table are largely consistent with the hypothesis that managers expect lower risk but not higher returns from diversification. A comparison of firms' present returns and risk with those expected by managers from diversification reveals that the differences in present and expected returns are mostly statistically insignificant while the differences with respect to levels of risk are highly significant. For instance, column (7) indicates that the average returns of two-segment firms (column (4)) are statistically indistinguishable (marginally different) from the average returns expected when firms diversify to three segments (column (6)). The results demonstrate that the differences between present risk and the expected level of risk are always significant, at 1%. The pattern is consistent in other levels of diversification (columns (3)

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and (11)) where the differences in risk are always statistically significant, at 1%, while the differences in returns are mostly insignificant. The results, therefore, support the hypothesis that managers undertake diversification with the expectation of achieving lower firm risk but not to improve returns.

Columns (5), (9) and (13) further show that the difference between expected and realised returns are mostly insignificant while the differences between expected and realised risks are all significant, at 1%. Columns (15), (16) and (17) also show that, in reality, the level of risk is not significantly lowered with the increase of a firm's diversification. The results, thus, suggest that managers are unsuccessful in achieving their desired level of risk.

The other hypothesis, that the aim of managers in diversifying a firm is to increase the proportion of systematic risk to a firm's total risk, is investigated in panel B. The panel reports the mean and median proportion of systematic risk to total risk sorted by the level of diversification.

The results in panel B support the hypothesis that managers expect to increase the proportion of systematic risk to a firm's total risk following a firm's diversification. Columns (3), (7) and (11) reveal that the desired proportion of systematic risk is always significantly higher than the current proportion. The differences between the expected and realised proportion of systematic risk are statistically significant, at 1%, (columns (5), (9) and (13)) suggesting that managers fail to achieve their desired percentage of systematic risk. Nevertheless, columns (14), (15) and (16) of the panel illustrate that managers are able to raise the portion of systematic risk to a firm's risk as the number of segments increases.

Collectively, the results from this study support the hypothesis that managers may maintain a diversification strategy for their private benefit. The findings of lower

expected risks but not higher returns evidently support Amihud and Lev's (1981) arguments that managers engage in corporate diversification mainly to reduce their employment risk. Also, consistent with Armstrong and Vashishtha (2012), the findings show that managers expect diversification to increase the proportion of systematic risk to a firm's total risk.

### **5.6. Extended analysis: portfolios of firms with different degrees of diversification**

The previous subsection interestingly documents the superior results of investments in portfolios of diversified firms compared to investments in portfolios of specialised firms. While Lang and Stulz (1994) and Berger and Ofek (1995) document the relationship between the value of diversified firms and the firms' diversification, this subsection investigates the relationship between the performance of portfolios of firms with the firms' levels of diversification.

Firms that are more diversified may have more efficient internal capital market (Stein, 1997) and lower volatility of income streams (Duchin, 2010; Lewellen, 1971). Thus, in general, firms that are more diversified are likely to have a lower level of risk. Lang and Stulz (1994) find a larger discount in more diversified firms, suggesting that investing in these firms may provide higher returns. Mitton and Vorkink (2010) argue, and provide empirical evidence to show, that firms that are more diversified have higher expected returns, which compensates for the lower upside potential (or skewness exposure) in these firms. It is therefore possible that the performance of a firm's portfolio will positively relate to the firm's degree of diversification.

In table 5.5, diversified firms are sorted by the firm's number of segments. A random sampling procedure is employed to form portfolios of firms with one, two,

three and more than four segments<sup>83</sup>. 1,000 portfolios of each category of firm are generated. Measures of the returns and risk of portfolios are estimated in a similar way to the method applied in the previous subsections. Although an estimate from all market models has been made, as in the preceding tables, only the results estimated from the five-factor model are reported in panel B of table 5. Panel A provides the results of mean-variance analysis.

**Table 5.5 Comparison of performance of portfolios of firms with different degrees of diversification**

The sample used for this table is extracted from the sample in table 5.1 which includes 5 371 firm-year observations of single-segment firms, 752 firm-year observations of two-segment diversified firms and 936 firm-year observations of three-segment diversified firms. Firms with four or more segments are grouped into four-segment plus diversified firms. There are 1,170 firm-year observations of four-segment plus diversified firms. A random procedure is conducted to form a portfolio of 300 firm-year observations from each sub-sample of firms. From the portfolio, several performance measures (described in the methodology subsection) are calculated. The procedure is repeated 1,000 times, generating 1,000 random portfolios for each type of firm. Averaging the results from the procedure provides the measures reported in the table. The return mean in panel A is the average of 1,000 return means calculated from the above 1,000 random portfolios. Other measures are estimated similarly.

Measures	Portfolios of single-segment firms	Portfolios of two-segment firms	Portfolios of three-segment firms	Portfolios of four-segment plus firms
(1)	(2)	(3)	(4)	(5)
Return, mean	0.124	0.134***	0.136***	0.128***
Return, median	0.047	0.081***	0.083*	0.052***
Return, std	2.318	2.105***	2.095	2.341***
Sharpe	0.048	0.057***	0.058***	0.049***
Jensen alpha	0.082	0.084**	0.092***	0.084***
Beta	1.025	1.109***	1.122***	0.994***
Treynor	0.108	0.109	0.109	0.116***

\*\*\*, \*\* and \* indicate a significant difference to the numbers on the left of each column, of 1%, 5% and 10%, respectively. T-test statistics are used.

The outcomes shown in the table are largely consistent with the previous results. They demonstrate that investing in portfolios of diversified firms provides higher returns and lower risk than investing in portfolios of single-segment firms.

<sup>83</sup> This table presents a different analysis to that in the previous table (table 5.4). While the previous table shows the performance of average individual firms, this table shows the performance of portfolios of firms.

More importantly, the table indicates that the returns and risk of portfolios of firms do not consistently correlate with the level of a firm's diversification. Among the portfolios of firms with less than three segments, generally the level of returns of portfolios increases and the level of risk decreases with the degree of a firm's diversification. Nevertheless, investing in portfolios of firms with four or more segments offers a lower level of returns with a higher level of risk compared to investing in portfolios of three-segment diversified firms. A similar pattern can also be observed in panel B with the portfolios' abnormal return (Jensen alpha). The results are partly consistent with Beattie (1980) who finds that the average returns of diversified firms do not systematically relate to the firms' structures. The results do not, however, totally support the argument given by Mitton and Vorkink (2010) that a higher diversification level necessarily increases the returns of portfolios of firms.

Collectively, the results in this extended analysis imply that investing in portfolios of firms with a higher degree of diversification (i.e., a larger number of segments) does not always lower the level of risk or increase the rates of return for investors. Practically, this suggests that investing in portfolios of three-segment diversified firms will provide the best outcome (highest returns and lowest risks) for investors.

### **5.7. Conclusions**

A conventional perception in diversification literature is that diversified firms are traded at a discount, compared to the equivalent portfolio of specialised firms (Lang and Stulz, 1994; Berger and Ofek, 1995, among others). The first research question of the chapter, which emerges from this perception, is: what induces investors to buy stocks of discounted diversified firms? Diversification literature widely documents a lower level



of risk in diversified firms. Consistent with the literature, the present research finds that portfolios of diversified firms, on average, offer higher rates of return with lower levels of risk than do portfolios of specialised firms. Importantly, the findings suggest that the conventional perception that corporate diversification reduces shareholder value may not be wholly appropriate from the point of view of investment.

The extension of the question further shows that the performance of portfolios of diversified firms is not improved monotonically with an increasing level of firm diversification (i.e., higher number of segments). Specifically, investments in portfolios of firms with less than three segments or portfolios of firms with four or more segments will result in a lower rate of return and a higher level of risk than will investments in portfolios of three-segment diversified firms. These results also complement the findings of a U-shape relationship between firm value and number of segments detailed in the previous chapter. Put together, these findings suggest an inverse relationship between firm value and returns. Investing in portfolios of firms with a lower value will provide better returns for investors. From a practical point of view, the study importantly suggests that investing in portfolios of three-segment firms will be highly likely to generate the best result for investors.

The benefit of from firm diversification is, however, challenged by the argument that investors will have the option of self-diversifying his investment portfolio. Thus, the second question of the present research asks whether a self-diversified portfolio is able to provide stock investors with returns and risk characteristics that are comparable to investments in diversified firms. The self-diversified portfolio is constructed by simulating the asset structure of a diversified firm. The results from the research indicate that, on average, investing in portfolios of simulated diversified firms provides

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lower levels of risk and lower levels of return than does investing in portfolios of diversified firms.

The findings in the last analysis clearly suggest that investors can achieve lower levels of risk by investing in their self-diversified portfolios. Thus, if risk reduction is identified as the major motivation for a firm's diversification, corporate diversification may not be necessary from the shareholders' point of view. The third question of the research investigates the hypothesis that firm diversification is motivated by managers' private benefits. The results from the research largely support this hypothesis. They show that managers expect diversification to lower the level of risk and to raise the percentage of systematic risk in a firm's total risk. There is no evidence that managers expect to increase level of returns following firm diversification.

The study significantly contributes to diversification literature in a number of different ways. First, it contributes to an important line of research on the value of diversified firms by adopting a novel and unique portfolio simulation approach to show that investing in portfolios of diversified firms can provide better risk-adjusted rates of return than can investing in portfolios of specialised firms. Thus, even if a diversification discount does exist, this may not necessarily imply wealth destructions with respect to investors. Second, the study extends the understanding of the motivations of corporate diversification. The study evidently shows that corporate diversification may not be necessary from an investors' standpoint as investors can achieve more efficient diversification by investing in self-diversified portfolios. Following this finding, the study finds evidence that corporate diversification is motivated by managerial risk preferences.

The first two empirical studies in the thesis have provided evidence of the value effect of diversification by directly comparing firm value. A large literature attempts to

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explain the causal link between diversification and firm value by exploring the ways that diversification may affect a firm's operations. Commonly, diversification discount is tied to inefficient financial management in diversified firms. The third study of the thesis investigates financial management in diversified firms, particularly by looking at firms' cash flow management.

## **6. Corporate diversification, liquidity and financial management**

### **6.1. Introduction**

Recent studies of the relationship between corporate diversification and liquidity (see, e.g., Duchin, 2010; Subramaniam, Tang, Yue and Zhou, 2011) widely show that diversified firms hold significantly less cash than specialised firms. It is, however, unclear how this lower cash reserve is achieved. It is possible that the lower cash holdings observed in diversified firms are the outcome of the firms' sequence of lower net cash flows (i.e., diversified firms frequently save less cash from their annual cash in). This study aims to investigate how diversified firms manage their cash flows to achieve this lower cash balance. Two hypotheses are developed which are, respectively, consistent with the more-money effect and smarter-money effect (Stein, 2003) described in the literature review in Chapter 2.

The first hypothesis is consistent with the smarter-money effect and the arguments made by Duchin (2010) and Subramaniam et al. (2011). Duchin (2010) argues that the optimal amount of cash reserves in diversified firms is reduced because "investment can be financed using internally generated cash flows without the need to resort to costly cash holdings" (p.960). More specifically, it is argued that imperfect correlation of investment opportunities and cash flows among a diversified firm's

segments facilitates the coordination of this internal financing source and investment in this type of firm. Nevertheless, while diversification of cash flows and investment opportunities does increase the coordination, it does not equally mean that operating cash flow in diversified firms is sufficient to significantly cover investment demand. This research extends the argument by hypothesising that operating cash flow in diversified firms is sufficiently large to cover their investments.

More particularly, it is expected that diversified firms have larger free cash flow (i.e., the difference between operating and investing cash flow) so they can distribute most of this through financing cash flow and only use a small amount of it to accumulate cash reserves. The first hypothesis is that the lower net cash flow in diversified firms is the outcome of a larger free cash flow and lower net financing cash flow compared to specialised firms.

The alternative hypothesis is consistent with the more-money effect which suggests that cash holdings in diversified firms are lower since diversified firms benefit from greater access to external finance (Lewellen, 1971; Stulz, 1990)<sup>84</sup>. More specifically, operating cash flow in diversified firms may not be sufficient to cover investments so they have to rely on external sources to meet financing demand and to save cash. Lower net cash flow in diversified firms is, therefore, the outcome of lower free cash flow and higher financing cash flow compared to specialised firms.

Using a large sample of US firms from 1990 to 2009, the chapter finds that the mean and median of net cash flows in diversified firms is about half of those in specialised firms and the differences are statistically significant, at 1%. The research also shows that this lower level of net cash flow is the outcome of higher free cash flow (due

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<sup>84</sup> Lewellen (1971) argues that coinsurance effects from imperfect correlations between divisions' cash flows may increase debt capacity by reducing default risk. Stulz (1990) provides a theoretical model in which lower cash flow volatility due to diversifications may reduce information asymmetry between managers and shareholders and consequently moderate frictions in issuing equity

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to lower investing cash flow) and lower financing cash flow in diversified firms compared to those in specialised firms. More specifically, by examining the drivers behind the difference between diversified and specialised firms, the results indicate that diversified firms can, on average, fully cover their investment with operating cash flow, leading to insignificant free cash flow. By contrast, for specialised firms, free cash flow is negative - suggesting that the firms cannot support their investment demand with operating cash flow and need to rely on external finance to cover the deficit. The average (median) ratio of financing cash flow to total assets in specialised firms is 6% (0.3%), compared to 0.8%(-1.2%) for diversified firms. Overall, the results support the first hypothesis, indicating that diversified firms maintain their lower cash balance by keeping lower net cash flows which are the outcome of larger free cash flows and lower financing cash flows.

The research extends the analysis of financial management in diversified firms by investigating the role of internal capital markets. Stein (1997) argues that managers of diversified firms may ease credit constraints by efficiently allocating a given amount of funding across segments. Duchin (2010) shows that lower cash holdings in diversified firms are associated with efficient internal capital market allocation. Altogether, this indicates the role of internal capital markets in firm financial management. The extension of the study examines whether activities of internal capital markets are influenced by the level of free cash flow. Arguably, the workings of internal capital markets may not be important in firms with a higher level of free cash flow and in firms with easy access to external capital markets. Internal capital transfers may be more relevant in financially constrained firms.

Using the measure of internal transfers proposed by Rajan et al. (2000) the chapter finds a negative relationship between internal capital market activities and the

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level of free cash flow in a sample of diversified firms. This suggests lower activities of internal capital transfers in firms with larger free cash flows. Notably, the negative relationship is only significant in a sub-sample of financially unconstrained firms. For the sub-sample of financially constrained firms, the relationship is insignificant implying that financially constrained firms rely on activities of internal capital markets even when they have larger free cash flows. Altogether, the analysis extends the understanding of how diversified firms utilise workings of internal capital markets in their financial management. It also suggests that the “smarter-effect” effect of diversification from workings of internal capital markets may be more valuable in financially constrained diversified firms

The research goes further to investigate several components of financing cash flow (i.e., net debt and net equity issues and dividends) considered by Dittmar and Duchin (2010) as the main channels through which firms adjust their cash balances. The chapter indicates that diversified firms maintain their lower cash balance by issuing less net debt and distributing more cash dividends than do specialised firms. The difference in net debt (dividends) between the firms is statistically significant, at 1%, and equivalent to 0.4% (0.12%) of total assets and 57% (13.3%) of average net borrowings (dividends) in specialised firms. Specialised firms issue more shares but also buy back more, leading to a less significant difference in terms of net equity issuances between these firms.

The contribution to the literature is significant. Firstly, the study provides a comprehensive analysis of the differences in financial management between diversified and specialised firms. More particularly, while a lower cash balance in diversified firms is documented as a stylised fact (Duchin and Subramaniam et al.), it is unclear how diversified firms manage their cash flows to maintain this level of cash. This study

suggests that diversified firms maintain their lower cash balance by regularly saving less cash and using less external financing.

The results shed further light on recent studies (Duchin, 2010; Subramaniam et al., 2011) on the connection between the smarter-money effect of diversification and liquidity demand. Duchin and Subramaniam et al. provide evidence that shows that diversified firms can hold less precautionary cash as diversification facilitates coordination of cash flows and investments in these firms. Underlying this argument is a very important assumption that diversified firms should generate sufficient operating cash flow to cover investments. This assumption is not, however, explicitly investigated in these papers.

The finding in the chapter that diversified firms can fully cover their investment with internally generated operating cash flow supports the assumption and the smarter-effect of diversification. More importantly, it extends the understanding of motivations behind cash holdings in diversified firms, by demonstrating that lower investment demand is also a factor which contributes to the reduced demand of precautionary cash in the firms.

Second, a number of studies (Lamont, 1997; Scharfstein, 1998; Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000; Jensen, 1986; Inderst and Muller, 2003, among others) in diversification literature provide various theoretical arguments and empirical evidence challenging the smarter-money effect of diversification. It is argued that, due to agency problems between headquarters and segment managers, or among segment managers, internal capital allocations tend to inefficiently allocate too great a level of funds to segments with lower potential. Also, overinvestment problems are manifested in diversified firms because of their larger free cash flows and ability to pool cash.



The evidence presented in the main analysis, of a similar level of operating cash flow, lower investing cash flow, lower cash holdings and higher dividends in diversified firms, does not, however, support the hypothesis that there are severe overinvestment problems at firm level. Furthermore, at segmental level, the reported negative relationship between the activities of internal capital markets and the level of free cash flow is also inconsistent with the existence of an overinvestment problem in diversified firms.

The chapter is constructed as follows: section 2 reviews the relevant literature and develops research hypotheses. Sections 3 and 4 describe the data sample and research methods, respectively. Section 5 reports the main results. Section 6 provides a robustness test. The extended analysis is conducted in section 7. The last section concludes.

## 6.2. Related literature and development of hypothesis

The research is motivated by the fact that has been recently documented, that diversified firms hold a lower level of liquid assets than do specialised firms (see e.g., Duchin, 2010; Subramaniam et al., 2011). The research asks how diversified firms manage their cash flows to maintain the lower cash balance. The research question is addressed by investigating the underlying link between cash balance, net cash flow and the several inputs of net cash flow (i.e., operating, investing and financing cash flows). The research hypotheses are developed from a very basic accounting formula which shows the relations between net cash flow and the other components of a firm's cash flows.

$$\text{Net cash flow}_{i,t} = \text{Operating cash flow}_{i,t} - \text{Investing cash flow}_{i,t} + \text{Financing cash flow}_{i,t} \quad (6.1)$$

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$$\text{Net cash flow}_{i,t} = \text{Free cash flow}_{i,t} + \text{Financing cash flow}_{i,t} \quad (6.2)$$

Operating cash flow  $_{i,t}$ , Investing cash flow  $_{i,t}$  and Financing cash flow  $_{i,t}$  are net cash generated from or used in operating, financing and investing activities in year  $t$  respectively<sup>85</sup>. The sum of these cash flows will be equal to Net cash flow  $_{i,t}$  which is also the change in a firm's cash reserve in year  $t$ . The difference between operating cash flow and investing cash flow is termed Free cash flow  $_{i,t}$  in the equation. During a given time period, firms with frequent lower net cash flows will subsequently end up with a lower cash balance than firms with higher net cash flows. It is, therefore, highly likely that diversified firms have lower net cash flows than specialised firms. Following the equations, two situations demonstrating the main hypotheses can be accordingly simulated.

In the first case, lower net cash flow in diversified firms is the outcome of a higher free cash flow and lower financing cash flow in these firms than those in specialised firms. In general, when the operating cash flow is stable and sufficient to cover investment, the precautionary saving theory introduced in Keynes (1936) and Kim et al. (1998) suggests that firms do not need to save cash as they can always finance investments with low-cost operating cash flow<sup>86</sup>. Accordingly, firms may use the surplus (i.e., free cash flow) to pay back debt, distribute to shareholders through stock repurchase or dividends (reducing financing cash flow) rather than to save cash<sup>87</sup>.

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<sup>85</sup> Negative sign of investing cash flow illustrates that the cash flow is normally cash outflow though it may also include cash received in the case of asset sales.

<sup>86</sup> Empirical evidence of the motivation for cash holding is documented in Kim et al. (1998), Opler et al. (1999), Bates et al. (2009), and others. Opler et al. (1999) find that firms with strong growth opportunities and riskier cash flows hold relatively more cash. Bates et al. (2009) show that during 1990 to 2009 firms held more cash as their cash flow was riskier.

<sup>87</sup> According to pecking order model by Myers (1984) and Myers and Majluf (1984), because of the higher cost of external financing relative to internal financial resources (e.g., information asymmetry with outside investors (Myers and Majluf, 1984) or agency conflicts between bondholders and stockholders (Jensen and Meckling, 1976), firms will choose to fund all projects using available internal finance before accessing outside sources. Empirical evidence of the negative relationship between internal and external financing is provided in Shyam-Sunder and Myers (1999), Frank and Goyal (2003), Fama and French

This situation is consistent with the explanation of lower cash saving in diversified firms proposed in Duchin (2010) and Subramaniam et al. (2011). The key argument is largely consistent with the smarter-money effect (Stein, 2003) in which lower volatility of cash flows and investment opportunities and imperfect correlation of cash flows and investment opportunities in diversified firms facilitates the usage of operating cash flow to self-finance investments. These papers do not, however, explicitly show that operating cash flow in diversified firms is sufficient to significantly cover investment demand.

Put together, it is hypothesised that free cash flow in diversified firms is larger than that for specialised firms. Consequently, net cash flow in diversified firms can be lower than that in specialised firms when a larger part of the free cash flow is distributed through financing cash flow. The hypotheses are as follows:

***Hypothesis 1:*** *Free cash flow in diversified firms is larger than free cash flow in specialised firms.*

***Hypothesis 2:*** *Financing cash flow in diversified firms is lower than financing cash flow in specialised firms.*

In the second hypothesis, lower net cash flow in diversified firms is the outcome of free cash flow that is lower and financing cash flow that is higher in these firms than those in specialised firms<sup>88</sup>. Generally, when operating cash flow is insufficient to cover investments, firms need to rely on external finance, either by increasing leverage, issuing equity, or by reducing stock repurchases and (or) dividends<sup>89</sup>.

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(2002), Acharya et al. (2007) and others. Frank and Goyal (2008) provide a comprehensive review of the literature.

<sup>88</sup> There may also be an extreme situation (consistent with Denis and Sibilkov (2009)) in which firms with low cash flow and limited access to external finance are forced to have less cash as they are either unable to accumulate cash reserves and (or) are forced to use previous cash savings (Riddick and White, 2009). This is, however, very less likely to be the case for diversified firms.

<sup>89</sup> This may be either because diversified firms generate extremely low operating cash flow or have massive investments. Nevertheless, the literature provides neither strong theoretical arguments nor clear

In this situation, diversified firms can still hold less cash as, according to the more-money effect (Stein, 2003), they have greater access to external sources of finance (Keynes, 1936; Kim et al., 1998)<sup>90</sup>.

It is widely argued that diversified firms are likely to have greater access to an external capital market than specialised firms (Stulz, 1990; Lewellen, 1971; Shleifer and Vishny, 1992; Stein, 2003). Stulz (1990) develops a theoretical model in which lower cash flow uncertainty due to diversification reduces the cost of underinvestment as shareholders will be more willing to provide new capital when their predicted and real cash flows are not significantly different<sup>91</sup>. Lewellen (1971) argues that the imperfect correlation between segment cash flows (coinsurance effects) may increase debt capacity of firms by reducing the probability of default<sup>92</sup>.

Following these arguments, it is expected that diversified firms have lower free cash flow than specialised firms, and need to rely on external financing. Diversified firms, however, can still save less cash as they have greater access to external capital markets. The alternative hypotheses are that:

**Hypothesis 1a:** *Free cash flow in diversified firms is lower than free cash flow in specialised firms.*

**Hypothesis 2a:** *Financing cash flow in diversified firms is larger than financing cash flow in specialised firms.*

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empirical evidence that diversified firms generate less operating cash flow than specialised firms (see e.g., Melicher and Rush, 1973; Weston and Mansinghka, 1972; Bettis and Mahajan, 1985). Recently, Hund, Monk and Tice (2010) even report that diversified firms have higher profitability than their focused rivals. It is more likely that diversified firms have excessive capital expenditure (Jensen, 1986).

<sup>90</sup> Miller and Modigliani (1958) similarly argue that under the conditions of a frictionless capital market where firms can always raise sufficient external finance (at a reasonable cost) to match investments in response to shortfalls of operating cash flow, firms have no motivation to hold any liquid assets. Opler et al. (1999) provide empirical evidence to show that firms with better access to a capital market, such as large firms and those with credit ratings, tend to hold a lower cash ratio. Kim et al. (1998) document lower cash balances in firms with lower costs of external financing.

<sup>91</sup> Hadlock, Ryngaert and Thomas (2001) support the argument by showing that equity issues of diversified firms are viewed less negatively than those of specialised firms.

<sup>92</sup> Dimitrov and Tice (2006) and Peyer (2002) provide empirical evidence supporting this argument.

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Taken together, the first part of the chapter proposes two hypotheses to investigate how diversified firms maintain their low cash balance: the first hypothesis which is consistent with the explanation of lower cash holdings in diversified firms proposed in Duchin (2010) and Subramaniam et al. (2011), suggests that diversified firms generate free cash flow that is larger than that for specialised firms, so they maintain their low cash balance by distributing most of it through financing cash flows. The second hypothesis, following the arguments of greater access to external financing in diversified firms given by Stulz (1990) and Lewellen (1971), suggests that diversified firms generate less free cash flow and need to mainly rely on financing cash flow to save cash.

The second part of the main analysis is to investigate the role of internal capital markets in diversified firms' financial management. Duchin (2010) shows direct evidence that diversified firms with more active internal capital markets hold less cash. This highlights the role of internal capital markets on which diversified firms can rely to coordinate cash flows and investments.

The interactions between activities of internal capital markets and level of free cash flow are examined. On the one hand, where internal capital markets are seen as being a benefit of diversification (Stein, 1997; Weston, 1970; Williamson, 1975), their workings may be less important for firms with a higher level of free cash flow and for firms with better access to external capital market. Therefore, there may be a negative relationship between the activities of internal capital markets and the level of free cash flow. On the other hand, if overinvestment and inefficient capital allocation are prevalent in diversified firms (Lamont, 1997; Scharfstein, 1998; Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000; Jensen, 1986; Inderst and Muller, 2003, among others) this will be more pronounced in firms with a larger free cash flow as these firms

will have more resources to waste and to cross-subsidise (Jensen, 1986; Berger and Ofek, 1995). Accordingly, firms with a larger free cash flow may use internal transfers to increase investment in unprofitable projects and to subsidise loss-making segments. Thus, the hypothesis is that

***Hypothesis 3:** There is a positive relationship between the activities of internal capital markets and the level of free cash flow.*

The analysis is extended by taking into account firms' access to external finance. Almeida et al. (2004) and Duchin (2010) argue and provide evidence to show that financially unconstrained firms have greater flexibility in financial management so they do not need to save cash. In line with these arguments, it is expected that overinvestment problems and inefficiency in internal capital markets will be more pervasive in financially unconstrained firms as these firms will have more flexibility and discretion in financing decisions (Jensen, 1986). The fourth hypothesis is that

***Hypothesis 4:** The positive relationship between the activities of internal capital markets and the level of free cash flow is stronger in financially unconstrained firms than in financially constrained firms.*

### **6.3. Empirical methods**

The first part of this section outlines the empirical methods used to examine the differences in cash and cash flow components between diversified and specialised firms. The operating, financing and investing cash flows are respectively measured using accounting items, i.e. net cash flow operating, net cash flow financing and net cash flow investing, from the cash flow statements reported in Thompson Financial. A benefit of using the items from the cash flow statements is that they provide a straightforward view of a firm's overall policy towards each activity. For instance, lower financing cash

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flow illustrates a firm's lower reliance on external finance which can be adjusted by either issuing less debt (equity), retiring more debt, repurchasing more equity or paying greater dividends. Nevertheless, there is a caveat: is that this method does not provide details of how the firms adjust these activities, e.g. lower financing cash flow can be adjusted by issuing less debt and (or) distributing more to outside investors.

**Table 6.1 Definition of variables used in the chapter**

Variable	Definition
Specialised firms	Firms with segment(s) operating in only one two-digit SIC code
Diversified firms	Firms with more than one segment operating in more than one two-digit SIC code
Firm diversification	Dummy variable that takes a value of zero if specialised firms and one if diversified firms
Number of segments	A count of the segments that represent 10% or more of firm consolidated sales
Cash/assets	Cash and short-term investments /total assets
Tobin's Q (Q)	Market value of assets (total assets+ market value of common equity – common equity – deferred taxes)/(0.9*total assets + 0.1* market value of assets)
Book leverage	(Debt in current liabilities + long-term debt)/ total assets
Payout/assets	(Cash dividends + purchase of common and preferred stocks)/total assets
Capex/assets	Capital expenditure / total assets
Net working capital (NWC)/assets	(Current assets – current liabilities – cash)/ total assets
Firm size	Natural logarithm of total assets
Net cash flow/assets	Change in cash and short-term investment from one year to the next/total assets
Net operating cash flow/assets	Net cash receipts and disbursements from operating activity representing the sum of cash flow, extraordinary items and other operating cash flow /total assets
Cash flow/assets	(Income before extraordinary items + depreciation and

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	amortisation)/total assets
Other operating cash flow/assets	Net cash flow from other operating activities/total assets
Net investing cash flow/assets	Net cash receipts and disbursements resulting from capital expenditures, disposal of fixed assets, increase in other assets and other investing activities /total assets
Acquisition/assets	Assets acquired from acquisitions or mergers/total assets
Assets sale/assets	Amount received from the sale of property, plant and equipment /total assets
Net financing cash flow/assets	Net cash receipts and disbursements resulting from changes in long or short term debt, proceeds from sale of stock, stock repurchased, dividends paid and other financing activities/total assets
Net debt issuance/assets	(Long-term debt issuance – long-term debt reduction)/total assets
Gross equity issuance/assets	Sale of common and preferred stocks/ total assets
Net equity issuance/assets	(Sale of common and preferred stocks - purchase of common and preferred stocks)/total assets
Stock repurchases/assets	Purchase of common and preferred stocks/total assets
Dividends/assets	Cash dividends for common stocks/total assets
ROA	(Net income/ total assets)*100
Sales growth	(Sales in year t – sales in year t-1)/sales in year t-1
D/E	Total debt/total common equity
PPE/assets	Gross plant, property and equipment/total assets
Inventory/assets	(Total inventory + account receivables)/total assets

First, the chapter follows the cash modelling proposed by Duchin (2010) to check whether the lower cash balance in diversified firms holds in the sample. Then, the methods to estimate the differences in other cash flows components are also described.

The model used to estimate cash balance is as follows:

$$\begin{aligned}
 \text{Cash holdings}_{i,t} = & \alpha + \beta_1 * \text{Firm diversification}_{i,t} + \beta_2 * \text{Firm size}_{i,t} + \beta_3 * Q_{i,t} \\
 & + \beta_4 * \text{Cashflow}_{i,t} + \beta_5 * \text{Net working capital}_{i,t} + \sum \text{Industry} + \sum \text{Year} + U_{i,t}
 \end{aligned}
 \tag{6.3}$$



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Cash holdings is the ratio of cash and short-term investment to total assets.

Firm diversification is a dummy variable that equals 1 for diversified firms and 0 for specialised firms.

U is regression error.

Firm size is the natural log of total assets. I control for the firm size following the standard arguments of economies of scale in respect of cash management. It is also argued that cash policy is influenced by the attractiveness of a firm's future investment opportunities which are captured in Tobin's Q (Q in the regression). Cashflow is the ratio of earnings before extraordinary items, plus depreciation and amortisation, to total assets. Net working capital is current assets less current liabilities and cash normalised by total assets. These two variables (cash flow and net working capital) represent the sources and competing uses of funds. Industry and Year absorb industry and time-specific effects, respectively.

Following the insights of Denis and Sibilkov (2009) and Gatchev et al. (2010) the first specification to model the relationship between free cash flow and firm diversification is as follows:

$$\begin{aligned} \text{Free cash flow}_{i,t} = & \alpha + \beta_1 * \text{Firm diversification}_{i,t} + \beta_2 * \text{Firm size}_{i,t} + \beta_3 * Q_{i,t} \\ & + \beta_4 * \text{ROA}_{i,t-1} + \beta_5 * \text{Sales growth}_{i,t-1} + \beta_6 * \text{Debt/equity}_{i,t-1} \\ & + \sum_t \text{Industry} + \sum_t \text{Year} + U_{i,t}. \end{aligned} \tag{6.4}$$

Free cash flow is the difference between Operating cash flow and Investing cash flow normalised by total assets.

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I control for the firm size as larger firms are more profitable (Opler et al., 1999). A firm's lagged ROA, lagged sales growth (Sales growth) and lagged capital structure (Debt/equity) are also included as additional determinants of free cash flow.

To model financing cash flow, the study strictly follows the empirical specification given by Almeida and Campello (2010).

$$\begin{aligned} \text{Financing cash flow}_{i,t} = & \alpha + \beta_1 * \text{Firm diversification}_{i,t} + \beta_2 * \text{Firm size}_{i,t} + \beta_3 * Q_{i,t} \\ & + \beta_4 * \text{Cashflow}_{i,t} + \beta_5 * \text{Cash holdings}_{i,t-1} + \beta_6 * \text{Inventory}_{i,t-1} \\ & + \beta_7 * \text{PPE}_{i,t-1} + \beta_8 * \text{Debt/equity}_{i,t-1} + \sum \text{Industry} + \sum \text{Year} + U_{i,t}. \end{aligned} \quad (6.5)$$

Financing cash flow is net financing cash flow from cash flow statements standardised by total assets.

Cashflow is the ratio of earnings before extraordinary items, plus depreciation and amortisation, to total assets. Cash holdings are beginning-of-the-year stock of cash and liquid assets. Other variables include lagged inventory items (Inventory), lagged gross plant, property and equipment (PPE) and lagged capital structure (Debt/equity). All these variables are normalised by firm total assets. Industry and Year absorb industry and time-specific effects, respectively.

Following Almeida and Campello (2010), the model is also used to estimate the link between net debt and equity issuance and firm diversification.

The investing cash flow specification is constructed follow the literature on investment demand (Fazzari et al., 1988; Fazzari and Petersen, 1993; Denis and Sibilkov, 2009).

$$\begin{aligned} \text{Investing cash flow}_{i,t} = & \alpha + \beta_1 * \text{Firm diversification}_{i,t} + \beta_2 * \text{Firm size}_{i,t} + \beta_3 * Q_{i,t} \\ & + \beta_4 * \text{Cashflow}_{i,t-1} + \beta_5 * \text{Cash holdings}_{i,t-1} + \beta_6 * \text{Sales growth}_{i,t-1} \\ & + \sum \text{Industry} + \sum \text{Year} + U_{i,t}. \end{aligned}$$

(6.6)

Investing cash flow is net investing cash flow from cash flows statements standardised by total assets. Other variables are as defined above.

To capture the differences in dividend distribution between diversified and specialised firms, the present research follows the insights of studies on dividend policy (Fama and French, 2001; Grullon and Michaely, 2002; Petrasek, 2012). The empirical model is as follows:

$$\begin{aligned} \text{Dividends}_{i,t} = & \alpha + \beta_1 * \text{Firm diversification}_{i,t} + \beta_2 * \text{Firm size}_{i,t} + \beta_3 * Q_{i,t} \\ & + \beta_4 * \text{Cashflow}_{i,t-1} + \beta_5 * \text{Debt/equity}_{i,t-1} + \beta_6 * \text{Cash holdings}_{i,t-1} \\ & + \beta_7 * \text{Sales growth}_{i,t-1} + \sum_t \text{Industry} + \sum_t \text{Year} + U_{i,t}. \end{aligned}$$

(6.7)

The second part of this section describes measure of the activity of the internal capital markets which is the measure of unobserved cross-segmental capital transfers. In the present research, transfers are measured following Rajan et al. (2000) by assuming transfers of funds across segments correspond to changes in segment investments. A transfer is accordingly approximated as the difference between an investment a segment makes as part of a diversified firm and the imputed investment it would have made if it operated as a specialised firm. The imputed investment is approximately calculated as the average ratio of capital expenditures to assets of specialised firms in the same two-digit SIC code industry. As noted by Rajan et al. (2000) the industry-adjusted investment may not correctly measure the cross-segmental transfer as diversified firms may generally have more funds because of a lower cost of capital, so the industry-adjusted investment must be corrected by subtracting the industry-adjusted investments averaged across the segments of the firm. The industry and firm-adjusted investment ratio is used as a proxy for the transfer a segment makes (if negative) or receives (if positive). More specifically, the cross-segment transfers are constructed as:

$$\text{Transfers} = \frac{\text{Capex}_j}{\text{Assets}_j} - \left( \frac{\text{Capex}}{\text{Assets}} \right)_j^{\text{ss}} - \sum_{j=1}^n w_j \left( \frac{\text{Capex}_j}{\text{Assets}_j} - \left( \frac{\text{Capex}}{\text{Assets}} \right)_j^{\text{ss}} \right) \quad (6.8)$$

$j=1\dots n$  denotes segment  $j$ ,  $ss$  refers to average single-segment firm in the same industry of segment  $j$  and  $w_j$  is segment  $j$ 's share of the firm's total assets.

Following Duchin (2010), the level of activity in an internal capital market is defined as the sum of the absolute values of cross-segmental transfers across segments (equation (6.8)). Further to the overall level of internal capital market activity, the chapter also investigates whether changes in free cash flow affect efficient or inefficient transfers. To calculate the efficient (inefficient) transfers, first I categorise segments as high (low) productivity segment, based on whether the segment's  $Q$  is higher (lower) than the firm's average  $Q$ . Efficient transfers are measured as transfers made to high productivity segments or transfers made from low productivity segments (negative cross-segmental transfers). Inefficient transfers are calculated as transfers made from high productivity segments (negative cross-segmental transfers) or transfers made to low productivity segments.

To create a sub-sample of financially unconstrained firms, the research takes a similar approach to that of Duchin (2010), Denis and Sibilikov (2009) and Almeida (2004), among others, to sort the sample into financially constrained and financially unconstrained firms. More specifically, the present research uses three different measures of financial constraint:

1. Firm size: following arguments made by Gilchrist and Himmelberg (1995), Almeida et al. (2004), and Denis and Sibilikov (2009) that smaller firms are generally less known and have less tangible assets, and hence will be more vulnerable in their access to capital markets, I rank firms according to their book total assets every year. Firms in

the top (bottom) quartile are designated as unconstrained (constrained) firms. Following Duchin (2010), I estimate the breakpoints that classify unconstrained (constrained) firms, using only specialised firms.

2. Pay-out ratio: following Fazzari, Hubbard and Petersen (1988) and Denis and Sibilkov (2009), I designate firms paying (not paying) dividends (calculated as dividends plus stock repurchases) as unconstrained (constrained) firms.

3. KZ index: following Kaplan and Zingales (1997), Lamont, Polk and Saa-Requejo (2001) and Almeida et al. (2004), I construct an index of the likelihood that a firm will face financial constraint as<sup>93</sup>:

$$\begin{aligned} \text{KZindex} = & -1.002 * \text{Cashflow} + 0.283 * \text{Q} + 3.139 * \text{Book leverage} \\ & - 39.368 * \text{Dividends} - 1.315 * \text{Cash holdings} \end{aligned} \quad (6.9)$$

The index is calculated on an annual basis which allocates firms in the top (bottom) three deciles of the index to the constrained (unconstrained) firm groups.

## 6.4. Data sample

The sample includes all US firms contained in the WorldScope database, covering a 20 year period from 1990 to 2009. All the sample data is CPI-adjusted into 2000 dollars. The segment data (including segment assets, capital expenditures, depreciation, operating income and SIC code) and firm financial data are extracted from the WorldScope database while the Thompson Financial database is used to retrieve data on cash flow statements.

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<sup>93</sup>All the variables used to calculate KZ index are normalised by total assets and defined in table 6.2.

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Following the literature, financial and utility firms are excluded. Furthermore, all firm-year observations with missing segment SIC codes or less than ten million US dollars market capitalisation are eliminated from the sample. It is also required that firms included do not have cash holdings, any cash flow components, or total long-term debts larger than the value of the firm's total assets. To ensure the integrity of the segment data, only firm-year observations with a sum of segment sales within 1% of a firm's total sales are kept in the sample. The final sample includes 34,869 firm-year observations for 4,560 firms covering the 20-year period from 1990 to 2009.

**Table 6.2 Summary statistics**

This table contains summary statistics for the sample, which includes non-financial and non-utility US firms from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms and firms with any cash flow components, cash holdings or total long-term debts larger than total assets are excluded from the sample. Variable definitions are included in table 6.1.

Variable	Mean	Median	Std	Number of observation
Cash/assets	0.192	0.096	0.225	34,869
Net cash flow/assets	0.016	0.003	0.132	34,836
Net operating cash flow/assets	0.059	0.083	0.156	34,832
Net investing cash flow/assets	0.088	0.066	0.150	34,832
Free cash flow/assets	-0.028	0.006	0.192	34,829
Net financing cash flow/assets	0.044	0.000	0.197	34,830
Firm diversification	0.296	0.000	0.456	34,869
Firm size	5.655	5.546	1.899	34,869
Tobin's Q	1.853	1.514	1.095	34,869
Capex/assets	0.063	0.042	0.076	34,850
Cash flow/assets	0.048	0.086	0.182	34,869
Book leverage	0.198	0.159	0.193	34,846
Payout/assets	0.028	0.003	0.068	34,366
NWC/assets	0.097	0.085	0.196	34,674
Number of segments	2.062	2.000	1.454	34,869
Inventory/assets	0.308	0.287	0.201	33,431
PPE/assets	0.268	0.206	0.224	33,817
D/E	0.544	0.264	1.188	33,855
ROA	2.827	6.166	16.320	26,885
Sales growth	0.147	0.093	0.553	21,489

Table 6.2 presents the summary statistics of the core variables for the whole sample used in the study. Broadly, it shows that - in line with previous studies (Duchin, 2010; Bates et al., 2009) - firms in the sample keep a considerable proportion (19%) of their total assets in cash and liquid assets<sup>94</sup>. Positive average net cash flow notably indicates that, consistent with Bates et al. (2009), this level of cash holdings has

<sup>94</sup> Duchin reports a ratio of 19% cash to total assets for all firms available in Compustat's North America Industrial Annual file and Compustat's Segments file from 1990 to 2006. Bates et al. (2009) sample all firms appearing on Compustat during 1980 to 2006 and show a dramatically increased ratio from 10.5% in 1980 to 23.2% in 2006.

accumulated during the period. Negative free cash flow and positive financing cash flow reveal that the average firm in the sample has to rely on operating cash flow as well as financing cash flow for its investment demand. Furthermore, if a firm saves cash for their investment demand (Keynes, 1936) it is illustrated from the table that firm has not yet spent their growing cash reserve. Further analysis of the possible differences in saving trends, as well as in cash flow components, between diversified and specialised firms will be discussed in the next section.

## **6.5. Diversified and specialised firms: differences in cash and cash flow components**

### **6.5.1. A univariate analysis**

Looking at cash flow components in diversified and specialised firms may provide an overview of the differences in these firms' financial management policies should the firms have adjusted their cash flows to maintain their cash position. Accordingly, table 6.3 is constructed by adopting the structure of the firms' cash flow statements so that each cash flow component from the sub-sample of 1,886 diversified firms (10,309 firm-year observations) can be directly compared to the sub-sample of 3,930 specialised firms (24,560 firm-year observations).



**Table 6.3 Specialised and diversified firms – differences in cash flow statements**

The sample contains of all US firms included in the WorldScope database from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms are excluded. The table provides a comparison of core items from cash flow statements of diversified and specialised firms. Positive (negative) items in (A) and (C) represent cash inflow (outflow). Positive (negative) pay-out/assets represents cash outflow (inflow). Positive (negative) items in (B) except for Asset sale /assets represent cash outflow (inflow). Positive (negative) Asset sale /assets represent cash inflow (outflow). Wilcoxon p-value is the probability value of a two-sample Wilcoxon test of the hypothesis that the two samples have the same underlying distribution. Variable definitions are included in the table 6.1.

Variable names	Specialised firms		Diversified firms		T- statistics of difference in means	Wilcoxon P-value
	Mean	Median	Mean	Median		
<b>Cash/assets</b>	0.221	0.126	0.124	0.060	39.140***	<.0001***
<b>Net cash flow/assets</b>	0.019	0.004	0.008	0.002	7.180***	<.0001***
<b>Net operating cash flow/assets (A)</b>	0.051	0.079	0.080	0.088	-15.940***	<.0001***
Cash flow/assets	0.036	0.083	0.075	0.091	-18.390***	<.0001***
Other operating cash flow/assets	-0.015	-0.010	-0.013	-0.009	-2.180**	0.071*
<b>Net investing cash flow/assets (B)</b>	0.091	0.068	0.080	0.063	6.550***	<.0001***
Capex/assets	0.065	0.041	0.060	0.043	5.410***	<.0001***
Acquisition/assets	0.025	0.000	0.029	0.000	-5.380***	<.0001***
Asset sale/assets	0.010	0.000	0.014	0.001	-5.820***	<.0001***
<b>Free cash flow/assets</b>	-0.040	0.000	0.000	0.019	-18.180***	<.0001***
<b>Net financing cash flow/assets (C)</b>	0.060	0.003	0.008	-0.012	22.590***	<.0001***
Net debt issuance/assets	0.007	0.000	0.009	0.000	-1.390	0.602
Gross equity issuance/assets	0.081	0.007	0.031	0.004	25.250***	<.0001***
Net equity issuance/assets	0.061	0.002	0.012	0.000	23.910***	<.0001***
Stock repurchases/assets	0.018	0.000	0.019	0.000	-1.040	<.0001***
Dividends/assets	0.009	0.000	0.012	0.001	-8.040***	<.0001***

\*\*\*, \*\* and \*, indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

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The lower cash holdings in diversified firms, compared to specialised firms, documented by Duchin (2010) and Subramaniam et al. (2011) are clearly observed in the table, in which the mean (median) of the ratio of cash reserve to total assets for specialised firms is approximately double the corresponding number for diversified firms. Interestingly, the annual “speed” of accumulating cash in specialised firms is also two times that for diversified firms. Indeed, the mean (median) ratio of net cash flow to total assets in specialised firms is 1.9% (0.4%), compared to 0.8% (0.2%) for diversified firms.

**Table 6.4 Specialised and diversified firms – differences in cash balance by year**

The sample contains of all US firms included in the WorldScope database from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms are excluded. The table provides a comparison cash balance between diversified and specialised firms by year from 1990 to 2009.

Year	Cash/assets			
	Specialised firms		Diversified firms	
	Mean	Obs	Mean	Obs
1990	0.118	839	0.079***	151
1991	0.148	643	0.096***	414
1992	0.145	676	0.093***	439
1993	0.158	733	0.102***	378
1994	0.163	1,022	0.107***	568
1995	0.167	1,163	0.095***	566
1996	0.191	1,321	0.105***	505
1997	0.193	1,439	0.119***	508
1998	0.185	1,451	0.118***	668
1999	0.209	1,496	0.109***	631
2000	0.215	1,379	0.132***	644
2001	0.222	1,306	0.175***	324
2002	0.239	1,230	0.128***	568
2003	0.258	1,295	0.141***	624
2004	0.276	1,351	0.143***	625
2005	0.286	1,413	0.147***	646
2006	0.280	1,469	0.140***	651
2007	0.275	1,568	0.137***	624
2008	0.250	1,362	0.125***	612
2009	0.271	1,404	0.180***	163

\*\*\*, \*\* and \*, indicate that estimates of t-statistics of difference in means are significant at the 1%, 5%, and 10% level respectively.

The table shows that the average ratio of net cash flows to total assets in specialised firms is larger than that in diversified firms in every year during the period 1990-2009. Additionally, during this period of 20 years, net cash flow is positive for both specialised and diversified firms. Some important conclusions can be drawn from the analysis. First, consistent with a recent study of cash holdings by Bates et al. (2009) the analysis indicates that both kinds of firms have built up their cash reserves in recent years (1990-2009). Second and more importantly, the higher rate of cash building in

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specialised firms, which is not driven by any individual year, suggests possible systematic differences in financial policies adopted in diversified and specialised firms to manage their cash balance. I further investigate the possibility of differences in financial management between diversified and specialised firms by looking at other cash flows components.

First, based on means, diversified firms generate enough operating cash flow to fully cover their investments (more than enough based on medians) which results in insignificant free cash flow in the firms. Meanwhile, specialised firms invest more than their internally generated cash flow, leading to negative average free cash flow; such firms have to rely on external financial sources to fund their activities<sup>95</sup>. The average (median) ratio of financing cash flow to total assets in specialised firms is 6%(0.3%), compared to 0.8%(-1.2%) for diversified firms. Taken together, these preliminary results support the first hypothesis in the research.

Second, the table suggests that diversified firms maintain their lower cash balance by reducing their financing cash flows, particularly by issuing significantly less equity and distributing greater dividends. On average, the gross equity issuance is 8.1% of total assets for specialised firms, while it is just 3.1% of total assets for diversified firms. The table also shows that the average net equity issuance and dividend pay-out in diversified firms are equal to 1.2% of total assets, suggesting that diversified firms do not need access to funds from their shareholders. Specialised firms, in contrast, rely heavily on financing sources from equity issuing. The net equity issuance in specialised firms is, on average, equal to 6.1% of total assets, while the firms only pay out dividends equal to 0.9% of their assets.

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<sup>95</sup> Unreported t tests are conducted. The test shows that free cash flow in specialised firms is statistically different to zero (significant at 1%). The free cash flow in diversified firms is not statistically different to zero.

Overall, the results of the analysis essentially suggest that: (1) during the period 1990-2009, both diversified and specialised firms in the US have regularly and continuously hoarded cash. This trend is largely similar to that recently documented in Bates et al. (2009) and Duchin (2010); (2) The rate of cash building in specialised firms, which is shown to be double that in diversified firms, indicates that firms actively adopt a distinct financial policy to manage their cash balance. More specifically, a higher level of operating cash flow, lower level of investing and financing cash flows in diversified firms suggests that diversified firms maintain their lower rate of cash building (and therefore level of cash stocks) by using less external financing. The preliminary evidence, therefore, supports hypotheses 1 and 2, and is consistent with the arguments of Duchin (2010) and Subramaniam et al. (2011) that diversified firms can hold less cash because they are in a better position (than specialised firms) to internally finance investments with operating cash flow.

### **6.5.2. Regression evidence**

The univariate analysis in the previous subsection suggests that diversified firms hold significantly less cash than specialised firms. The difference in cash balance between firms can be further investigated in a multivariate regression setting, as described in the section on methodology. The unreported result is largely consistent with the finding of Duchin (2010) and Subramaniam et al. (2011) and shows that, in the sample, cash balance is significantly lower in diversified firms than in specialised firms.

To address the research question of how this lower cash balance in diversified firms is achieved, differences in respect of cash flow components between diversified and specialised firms are examined in a multiple regression setting. All these models use OLS regressions with industry and year-fixed effects and are heteroskedasticity consistent.

**Table 6.5 Diversification and cash flows components**

The sample contains all US firms included in the WorldScope database from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms are excluded. Cash flow components, including free cash flow (difference between operating and investing cash flows), net financing, operating and investing cash flows, are dependent variables in models 1 to 4 respectively. These models use OLS regression with year and industry-fixed effect and standard errors are heteroskedasticity consistent. Variable definitions are included in table 6.1.

Dependent Variable	Model1		Model2		Model3		Model4	
	Free cash flow/assets		Net financing cash flow/assets		Net operating cash flow/assets		Net investing cash flow/assets	
	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	-3.636	-1.640	-1.356	-0.870	-7.520	-3.530***	-2.506	-1.870*
Firm								
Diversification	0.744	3.540***	-0.756	-3.900***	0.021	0.130	-0.784	-4.390***
Q	-0.552	-3.250***	2.361	14.920***	1.392	8.780***	1.919	15.260***
Firm size	1.196	8.530***	-0.533	-9.110***	1.647	8.740***	0.273	5.280***
Lagged								
Inventory/assets			1.833	2.400**				
Lagged								
PPE/assets			4.048	5.600***				
Lagged DE	0.004	3.170***	-0.003	-2.090**	0.004	2.970***		
Lagged ROA	0.116	1.900*			0.160	1.800*		
Lagged Sales growth	-0.266	-4.400***			-0.228	-4.740***	0.040	0.860
Lagged								
Cash/assets			-0.320	-0.360			-0.775	-1.090
Cash								
flow/assets			-37.203	-28.840***				
Lagged Cash								
flow/assets							12.536	12.990***
Year F.E.	Y		Y		Y		Y	
Industry F.E	Y		Y		Y		Y	
R-Square	0.110		0.210		0.220		0.130	
N Obs	21,969		21,969		21,969		21,969	

\*\*\*, \*\* and \* indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

The results of the regressions are mostly consistent with the outcomes of the preceding univariate analysis. They show, in model 1 and model 2, that (at a 1% level of statistical significance) free cash flow in diversified firms is larger than free cash flow in specialised firms, while financing cash flow in diversified firms is lower than the

financing cash flow in specialised firms. The larger free cash flow suggests that operating cash flow can, on average, cover relatively more investments in diversified firms than in specialised firms. Meanwhile, the lower financing cash flow in diversified firms illustrates that the firms need to rely less on external finance than do specialised firms.

The differences are also economically significant. Following the models, the average difference in free cash flow (financing cash flow) between diversified and specialised firms is equal to as much as 0.74% (0.75%) of a firm's total assets. Compared to the means in specialised firms, these differences are equivalent to 14.5% of average operating cash flow and 12.5% of average financing cash flow in these firms<sup>96</sup>.

The research further suggests that the higher free cash flow in diversified firms is driven by lower investment demand in these firms. Indeed, it shows that operating cash flow is not statistically different across these firms, while the investing cash flow in diversified firms is significantly lower (at 1%) than the corresponding cash flow in specialised firms. The difference in respect of investing cash flow between these firms is also non-trivial in economic terms, being equivalent to 0.78% of the value of total assets and 8.5% of the investing cash flow of average specialised firms<sup>97</sup>.

Taken together, the research shows that diversified firms have higher free cash flow as they generate the same level of operating cash flow but need to invest less than specialised firms. Diversified firms maintain the lower cash balance by using less external financing. The results, thus, support hypotheses 1 and 2, and the arguments made by Duchin (2010) and Subramaniam et al. (2011) that diversified firms are in a better position to finance investments with operating cash flow. The results

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<sup>96</sup>14.5%=(0.74/5.1)\*100% and 12.5%=(0.75/6)\*100%.

<sup>97</sup>8.5%=(0.78/9.1)\*100%.

complement Duchin (2010) and Subramaniam et al. (2011) by showing that lower investment expenditure (in addition to greater coordination of cash flows and investments) in diversified firms is also a factor that, according to the precautionary motivation of saving cash (Kim et al., 1998; Opler et al., 1999; Bates et al., 2009), contributes to reducing demand for cash saving in these firms.

## **6.6. Internal capital markets**

To evaluate the relationship between free cash flow and the activity of internal capital markets, the research adopts the empirical model used by Rajan et al. (2000): total transfers, efficient transfers and inefficient transfers are separate dependent variables in models 1, 2 and 3 of table 6.6 to regress against free cash flow and controlled for number of segments and firm size. The sample for this test only includes diversified firms. Only the coefficient returned for free cash flow is reported in the table for the full sample (panel A), and separately for the set of constrained (unconstrained) firms (panel B, C, and D). All the models use OLS regressions with year-fixed effects and are heteroskedasticity consistent.



**Table 6.6 Internal capital markets and free cash flow**

Total transfers measuring overall activity of internal capital markets are the sum of the absolute value of fund transfers across segments calculated following Rajan et al. (2000) as:

$$\text{Transfers} = \frac{\text{Capex}_j}{\text{Assets}_j} - \left( \frac{\text{Capex}}{\text{Assets}} \right)_j^{\text{ss}} - \sum_{j=1}^n w_j \left( \frac{\text{Capex}_j}{\text{Assets}_j} - \left( \frac{\text{Capex}}{\text{Assets}} \right)_j^{\text{ss}} \right)$$

$J=1\dots n$  denotes segment  $j$ ,  $\text{ss}$  refers to average single-segment firm in the same industry as segment  $j$  and  $w_j$  is segment  $j$ 's share of the firm's total assets.

Inefficient transfers are the sum of the absolute value of transfers made from high productivity segments and transfers made to low productivity segments. Efficient transfers are the sum of transfers made to high productivity segments and the absolute value of transfers made from low productivity segments. Segments are classified as high (low) productivity segments when their imputed  $Q$  is higher (lower) than the firm's average  $Q$ . Financial constraints are measured by (1) Firm size, (2) Payout, and (3) Kaplan and Zingales (1997) index. Estimates of the coefficient of free cash flow for the full sample is reported in panel A, and separately for the sub-sample of constrained (unconstrained) firms (panels B, C, and D). The sample contains all WorldScope diversified firm-year observations from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms are excluded from the sample. Variable definitions are included in the table 6.2. All regressions include year-fixed effect and standard errors are heteroskedasticity consistent. The number of observations is given in brackets.

Dependent Variable	Model1		Model2		Model3	
	Total transfers		Inefficient transfers		Efficient transfers	
	Est.	t Value	Est.	t Value	Est.	t Value
Panel A: Full sample						
Free cash flow/assets	-0.051 (10,298)	-5.290 ***	-0.012 (10,298)	-2.940 ***	-0.018 (10,298)	-4.160 ***
Panel B: Financial constraints measured by firm size						
Free cash flow/assets (Constrained firms)(C)	-0.021 (1,212)	-1.140 *	-0.000 (1,212)	-0.010	-0.007 (1,212)	-0.840
Free cash flow/assets (Unconstrained firms)(U)	-0.112(a) (5,118)	-5.790 ***	-0.037 (5,118)	-4.340 ***	-0.044 (5,118)	-4.370 ***
Panel C: Financial constraints measured by shareholder distribution						
Free cash flow/assets (C)	-0.028 (3,321)	-2.380 **	-0.006 (3,321)	-1.000	-0.010 (3,321)	-1.880 *
Free cash flow/assets (U)	-0.092(a) (6,977)	-5.840 ***	-0.025 (6,977)	-3.510 ***	-0.038 (6,977)	-5.110 ***
Panel D: Financial constraints measured by Kaplan and Zingales (1997) index						
Free cash flow/assets (C)	-0.081 (2,047)	-3.530 ***	-0.026 (2,047)	-2.420 **	-0.031 (2,047)	-2.980 ***
Free cash flow/assets (U)	0.002(b) (2,369)	0.130	0.002 (2,369)	0.280	0.001 (2,369)	0.060

\*\*\*, \*\* and \*, indicate that estimates are significant at the 1%, 5%, and 10% level respectively. (a) and (b) indicate that the significance of the difference between constrained and unconstrained firms is at a 1% and 5% level of confidence, respectively.

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The results in the table generally do not support the third and fourth hypotheses of overinvestment in diversified firms. Total transfers, efficient transfers and inefficient transfers are negatively related to free cash flow at a 1% level of statistical significance in the whole sample of diversified firms and the sub-sample of financially unconstrained firms. The magnitude of the effect of free cash flow on activity of internal capital market is also economically significant. According to panel A, with a standard deviation increase of free cash flow the total transfers, inefficient transfers and efficient transfer changes are reduced to 9%, 5% and 7.5% of the means, respectively. This suggests that diversified firms, and particularly financially unconstrained firms, reduce internal capital allocations in response to increasing levels of free cash flow.

For the constrained firms, the coefficients of free cash flow are only marginally significant or insignificant. The economic effects are also more sizable in the group of unconstrained firms. Following panel C, one standard deviation increase in free cash flow may cause a reduction equal to 12.4% of average total transfers in unconstrained firms and only 7.4% in financially constrained firms. Overall, the results suggest that financially constrained diversified firms do not reduce internal transfers with increasing levels of free cash flow.

The reversed results obtained in panel D, where KZ index is used to split the sample, is not surprising as the same pattern is also reported in the study by Almeida et al. (2004). As suggested by Almeida et al. (2004) the reason for the reversed results is that sample splits generated by the KZ index are negatively correlated with those generated by other measures (i.e., firm size and pay-out ratio).

Taken together, the results do not provide evidence that diversified firms will rely on the workings of internal capital markets to wastefully spend their excess cash flow, as suggested by Jensen (1986), Lamont (1997), Rajan et al. (2000), among others.

Interestingly, the findings of a negative relationship between free cash flow and the activities of internal capital markets among financially unconstrained firms suggest that internal capital markets may be less important in firms with better access to an external capital market. The insignificant relationship for financially constrained firms indicates that these firms do not reduce the activities of their internal capital markets with an increasing level of free cash flow. Overall, it suggests that diversified firms may actively resort to the operations of internal capital markets for their financial management.

### **6.7. Robustness test**

I further check the robustness of empirical results from table 6.5 (subsection 6.5.2) using alternative measures of cash flow components and firm diversification. Accordingly, I replace operating cash flow by total net income and depreciation (cash flow), investing cash flow by capital expenditures, thus free cash flow by the difference between cash flow and capital expenditure, financing cash flow by total net equity and debt issuances (following Almeida and Campello (2010)), and diversification dummy by number of segments (as in Lang and Stulz (1990)). Table 6.7 replicates all the regression methods used in table 6.5. Panel A applies the dependent variables from table 6.5 and uses number of segments as a proxy for firm diversification. Panel B uses new dependent variables as described above and diversification dummy as in table 6.5. In panel C these new dependent variables are regressed on number of segments. Only results for the proxy of firm diversification are presented.

**Table 6.7 Robustness test for different measures of cash flow components and firm diversification**

The sample contains all US firms included in the WorldScope database from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms and firms are excluded. This table uses the same regression methods as table 3, though only results relating to the proxy for firm diversification are presented. Panel A uses the same dependent variables defined in table 3 while panels B and C uses alternative measures of the variables. I replace net operating cash flow by total of net income and depreciation (cash flow), net investing cash flow by capital expenditures (Capex), net financing cash flow by total of net equity and debts issuances (External finance), and free cash flow by the difference between cash flow and capital expenditure (Free cash flow 1). Variable definitions are included in table 6.1.

	<b>Model1</b>		<b>Model2</b>		<b>Model3</b>		<b>Model4</b>	
<b>Panel A</b>								
<b>Dependent Variable</b>	<b>Free cash flow/assets</b>		<b>Net financing cash flow/assets</b>		<b>Net operating cash flow/assets</b>		<b>Net investing cash flow/assets</b>	
	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>
Number of segments	0.494	6.140***	-0.270	-4.520***	0.481	5.660***	-0.097	-1.840*
<b>Panel B</b>								
<b>Dependent Variable</b>	<b>Free cash flow 1 /assets</b>		<b>External finance/assets</b>		<b>Cash flow/assets</b>		<b>Capex/assets</b>	
	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>
Firm Diversification	0.571	2.890***	-0.661	-3.470***	0.210	1.140	-0.408	-4.470***
<b>Panel C</b>								
<b>Dependent Variable</b>	<b>Free cash flow 1 /assets</b>		<b>External finance/assets</b>		<b>Cash flow/assets</b>		<b>Capex/assets</b>	
	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>	<b>Est.</b>	<b>t Value</b>
Number of segments	0.722	7.340***	-0.184	-3.220***	0.591	5.890***	-0.172	-6.550***

\*\*\*, \*\* and \*, indicate that estimates are significant at 1%, 5%, and 10%, respectively.

Results in the table are overwhelmingly consistent with the results in table 6.5. In panel B, where the dummy firm diversification is used, the coefficients of the all the cash flow variables are similar, in terms of significance level and magnitude, to those reported in table 6.5, suggesting that diversified firms have higher free cash flow and lower investing cash flow and financing cash flow. In panel A and panel C, where alternative measures of firm diversification (number of segments) are utilised, all the results are consistent with table 6.5, except in respect of the coefficients for operating cash flow/cash flow which are positive and statistically significant at 1%. It indicates that firms with more segments will have higher cash flow. These differences, however,

do not alter the main conclusions. They even provide stronger evidence confirming that more diversified firms (i.e., firms with more segments) are in a better position to use internal cash flow to finance their investments as they have higher cash flow and lower capital expenditure.

### **6.8. Additional analysis: differences in financing cash flow between diversified and specialised firms**

The previous part of the research shows that diversified firms maintain their cash balance by adjusting financing cash flow. This subsection goes a step further to examine several components of financing cash flow, including net debt and equity issuance, dividends, gross equity issuance and repurchase which are identified by Dittmar and Duchin (2010) as channels for firms to adjust their cash ratio.

The previous subsection has produced results from a univariate analysis showing that diversified firms issue less equity and distribute more dividends than do specialised firms. This subsection investigates the differences in financing cash flow components in a multivariate format. Specifications used are detailed in the methodology subsection. All these models use OLS regressions with industry and year-fixed effects and are heteroskedasticity consistent. Table 6.8 represents the results obtained from estimations of these models.

**Table 6.8 Distributions of financing cash flow**

The sample contains all US firms included in the WorldScope database from 1990 to 2009 with complete segment SIC code and total market capitalisation of more than \$10M. Financial and utility firms are excluded. Net debt issues, net equity issues, cash dividend, gross equity issues and repurchase are dependent variables in models 1 to 5 respectively. These models use OLS regression with year and industry fixed effect and standard errors are heteroskedasticity consistent. Variable definitions are included in table 6.1.

Dependent Variable	Model1		Model2		Model3		Model4		Model5	
	Net debt issue/assets		Net equity issue/assets		Dividends/assets		Gross equity issue/assets		Repurchases/assets	
	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value	Est.	t Value
Intercept	-3.673	-2.803***	2.851	2.720***	0.046	0.180	-0.055	-0.070	-4.055	-9.470***
Firm diversification	-0.402	-2.800***	-0.246	-1.710*	0.120	3.060***	-0.432	-3.580***	-0.162	-2.040**
Q	0.117	1.560	2.470	16.660***	0.403	12.910***	3.143	22.540***	0.750	11.990***
Firm size	0.506	12.700***	-0.913	-20.490***	0.104	6.720***	-0.571	-14.840***	0.391	17.510***
Lagged Inventory/assets	2.163	4.020***	0.074	0.130			-1.218	-2.330**		
Lagged PPE/assets	2.176	4.010***	2.126	3.920***			0.876	1.790*		
Lagged DE	-0.003	-2.230**	0.000	0.160	-0.001	-1.380	0.001	0.800	0.001	0.720
Lagged Cash/assets	2.115	3.940***	-2.262	-2.970***	0.297	2.100**	-0.135	-0.200	2.986	10.840***
Cash flow/assets	-5.352	-8.080***	-27.351	-24.020***			-19.981	-18.720***		
Lagged Cash flow/assets					3.213	14.570***			6.676	17.610***
Lagged Sales growth					-0.036	-5.030***			-0.071	-4.230***
Year F.E.	Y		Y		Y		Y		Y	
Industry F.E	Y		Y		Y		Y		Y	
R-Square	0.120		0.310		0.120		0.2		0.1	
N Obs	21,291		21,291		21,291		21,291		21,291	

\*\*\*, \*\* and \*, indicate that estimates are significant at the 1%, 5%, and 10% level respectively.

Overall, it is shown that diversified firms issue less debt and equity, and at the same time distribute more dividends to their investors. More specifically, the difference in net debt issuance (model (1)) and dividend distribution (model (3)) between diversified and specialised firms are all statistically significant, at 1%. The differences are also critical in economic terms. The difference in respect of net debt issue is equivalent to 0.4% of total assets while it is equal to 0.12% of total assets for dividend pay-out. Compared to the means for specialised firms, these differences are equivalent to 57% of average net debt issuance and 13.3% of average dividend pay-out for these firms.

The difference in respect of net equity issuance is not as pronounced as the difference in respect of net debt issuance and dividends. The difference in net equity issuance is only significant at 5%, and equal to 0.25% of total assets and 4% average net equity issuance in specialised firms. Further examination of components of net equity issuance (i.e., gross equity issuance and stock repurchases) can partly explain why the difference in respect of net equity issuance is not so significant. The models 4 and 5 reveal that diversified firms issue a statistically significant (at 1%) lower level of gross equity (0.43% of total assets) and also buy back less stock (0.16% total assets) than do specialised firms. Notably, the finding that specialised firms repurchase more shares than diversified firms is consistent with arguments made in several studies on pay-out policies (see e.g., Jagannathan, Stephens and Weisbach, 2000; Grullon and Michaely, 2002; and Brav et al., 2005): stock repurchases are viewed as a more suitable way (than cash dividends) of distributing profits in firms with less stable earning streams.

The research suggests that diversified firms maintain their lower cash balance mainly by issuing less debt and distributing more cash as dividends than do non-diversified firms. The lower level of gross equity issue in diversified firms and the higher

level of share repurchases in specialised firms add up to a less significant difference in net equity issuing activities between firms.

## **6.9. Conclusions**

This paper studies the link between corporate diversification, corporate liquidity and firm financial management by investigating the differences in respect of cash flow components between diversified and specialised firms. While recent studies (Duchin (2010) and Subramaniam et al. (2011)) document significantly lower cash holdings in diversified firms, this paper asks how diversified firms adjust their cash flows to maintain this lower cash balance.

Using a sample of 34,869 US firm-year observations during the 1990-2009 period, the study shows that diversified firms generate the same level of operating cash flow while investing less than do non-diversified firms. The operating cash flow in diversified firms can fully cover their investment demand, leading to insignificant free cash flow. Diversified firms have lower cash balances as they use less external financing than do specialised firms. More specifically, this shows that diversified firms issue significantly less debt and distribute more cash dividends.

The results evidently support the important assumption underlying the studies by Duchin (2010) and Subraman et al. (2011) that find that diversified firms have a lower optimal level of cash holdings because they are in a better position to internally finance investments with their operating cash flow. It also complements Duchin (2010) and Subramaniam et al. (2011) by showing that lower investment expenditure (in addition to greater coordination of cash flows and investments) in diversified firms is a factor that, according to the precautionary motivation of saving cash (Kim et al., 1998; Opler et al., 1999; Bates et al., 2009), contributes to lower cash demand in these firms.



## CHAPTER 6

The research extends the understanding of the relationship between diversification and financial management, by investigating the activities of internal capital markets. The finding of a negative relationship between the activities of internal capital markets and the level of free cash flow, particularly in the sub-sample of financially unconstrained firms, is not consistent with the arguments of inefficient cross-subsidy and overinvestment problems in the multi-segment structure widely documented in the field (Matsusaka and Nanda, 2002; Rajan et al., 2000; Scharfstein and Stein, 2000; Jensen, 1986; Inderst and Muller, 2003, and others). The negative relationship in financially unconstrained firms and the complementary relationship in financially constrained firms indicate that diversified firms actively reallocate funds in internal capital markets for their financial management.

## **7. Conclusions**

### **7.1. Introduction**

This thesis has conducted three empirical researches into two important lines of study in the literature on corporate diversification, including the effects of corporate diversification on (1) firm value, and (2) financial management. The link between corporate diversification and firm value is a long-standing and important topic in the literature which has seen a substantial development in two recent decades, particularly in the influential discovery of a diversification discount by Lang and Stulz (1994) and Berger and Ofek (1995). The discovery, instead of providing a conclusive result, has raised an intensive discussion among financial scholars about the value effect of corporate diversification.

The second line of study, on the effect of corporate diversification on financial management, has been recently advanced in studies by Duchin (2010) and Subramaniam et al. (2011) which show that multi-segment firm structures lower the precautionary cash holdings of diversified firms. The finding highlights the importance of research on the influence of corporate diversification on financial management at a time when the business environment is increasingly riskier, financial constraints are more pronounced and financial management is central to firms' policies.

This chapter presents a summary of the key findings of the thesis, the thesis limitations and potential research directions. The chapter proceeds as follows: section 2 provides a summary of the findings. Section 3 discusses limitations and suggests future research avenues.

## **7.2. Summary of findings**

### **7.2.1. Diversification experience, organisation learning and value of diversified firms**

Chapter 4 of the thesis adopts perspectives from organisational learning literature to study the effects of learning from diversification experience on the value of diversified firms. Drawing on the theoretical arguments of organisational learning literature, which are mostly applied in an acquisition context, the chapter develops and examines three main hypotheses in respect of the relationship between diversification value and the level, similarity and timing of diversification experience. First, in line with the arguments of Halebian and Finkelstein (1999), it was expected that diversification value varies with level of diversification experience in a U-shaped pattern. In more detail, within a firm's diversification sequence, the value of the first diversification may be considered as a baseline, when the firm does not have any experience to learn from. The value of a second diversification tends to be lower than the first as the firm is still a novice in diversifying and tends to inappropriately generalise its experience (compared to having no experience to generalise, as in the case of the first diversification). As a firm gains more diversification experience and gradually becomes an expert, the tendency to inappropriately generalise experience will reverse, to appropriate generalisation. Put together, the initial negative effect of experience on the value of diversification may reverse to a positive one following a point where a firm becomes expert enough to correctly learn from experience: this will result in a U-shaped curve.

Second, as argued in Haleblan and Finkelstein (1999) and Finkelstein and Haleblan (2002), it is more likely that firms can successfully learn from their experience when a new acquisition is similar to the previous one. This study adopts the argument and places it in a diversification context and hypothesises that the value of diversification into an industry that is the same as the previous one will be higher than the value of diversification into a new industry.

Finally, several studies argue that the process of learning and inferring experience (Brown and Eisenhardt, 1999; Gersick, 1994; Hayward, 2002) may be varied with the temporal interval between acquisitions. On the one hand, firms may not have sufficient time to generate meaningful inferences from too recent an acquisition. On the other hand, the inferences may become inaccessible, forgotten or irrelevant if the time elapsing between acquisitions is too long. Bringing these arguments to the subject of diversification, the research hypothesised that the value of a diversification relates to the temporal interval between diversifications in an inverted U-shaped pattern.

Using a sample of US firms in the 1990 to 2009 period, the chapter found evidence supporting all the hypotheses. More specifically, for the first hypothesis, the research found a U-shaped relationship between the value of diversification and the amount of experience, in which learning from experience may improve the value of diversification after a point where a firm has conducted two diversifications. Supporting the second hypothesis, the value of diversification is higher when the diversification is in a similar industry to the previous one. Finally, diversification timing affects value in an inverted U-shape, with a reflection point at seven years, suggesting that diversification value increases (decreases) with the temporal interval between diversifications when the interval is less (more) than seven years.

In addition to the main analysis investigating the effect of internal learning from a firm's own experience on the value of a diversified firm, the chapter also examined whether and how external learning from others' experience in industry (i.e., industry experience) may affect the value of diversification. It was shown that external learning from industry experience affects the value of diversification in a cubic pattern.

Altogether, the chapter showed that learning from experience is an important determinant of the value of diversification. This suggests that diversification creates more value (or the value of diversified firms is higher) when firms can appropriately learn from their own experience with previous diversifications as well as from the experience of others in the same industry.

### **7.2.2. Value of diversified firms, self-diversification and managerial motivation of diversification**

Chapter 5 of the thesis included three main research questions. First, it asked what characteristics or potentials of stocks of diversified firms attracts investors given the conventional wisdom among financial economists and practitioners during recent years that diversification destroys shareholder wealth. The chapter addressed the research question by adopting a novel portfolio approach to compare performances of portfolios of diversified and specialised firms. Using a random sampling procedure, the research constructed and compared the performance of 1,000 portfolios of diversified and specialised firms. It clearly showed that, generally, portfolios of diversified firms are characterised by a higher level of return and a lower level of risk compared to portfolios of specialised firms. It also suggests that investments in portfolios of diversified firms will, on average, result in better risk-adjusted returns than investments in specialised firms' portfolios.

While the results from the first question suggested that investing in (portfolios of) diversified firms provides higher risk-adjusted rate of return to investors compared to investment in specialised firms, the second question investigated a widely-held notion in the literature that investors have the option of self-diversifying their investment portfolio rather than holding the stocks of diversified firms. More specifically, it was asked whether investments in self-diversified portfolios can provide investors with a level of returns and risk that is comparable to investments in diversified firms.

The chapter used the empirical methods in the literature to simulate a self-diversified portfolio by replicating the asset structure embedded in each diversified firm. This self-diversified portfolio was accordingly termed simulated diversified firm. Comparing these returns and risk measurements across 1,000 randomly selected portfolios of diversified firms and portfolios of simulated diversified firms revealed that the portfolios of simulated firms had, on average, lower risk and lower returns than the portfolios of diversified firms. Two out three risk-adjusted returns measures indicate better risk-adjusted returns for portfolios of simulated diversified firms compared to portfolios of diversified firms. This suggests that in a perfect capital market, shareholders can invest in their own self-diversified portfolios and may attain higher risk-adjusted returns than by investing in diversified firms<sup>98</sup>.

The results from the second question led to the third question of the research which aimed at investigating why firms still diversify if a self-diversified portfolio can provide better returns for investors. The chapter investigated two possibilities: that diversification strategy is used by a firm's manager as a means of lowering and/or altering the composition of the firm's risk, rather than to increase shareholder wealth.

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<sup>98</sup> From the point of view of a private investor who may not be able to invest in a well-diversified portfolio, Sharpe ratio which takes into account of both systematic and idiosyncratic risk is more appropriate to measure risk-adjusted returns. Treynor ratio and Jensen alpha which are calculated based only on market risk are more appropriate to measure performance of well-diversified portfolios.

The results from the chapter supported both the hypotheses. It showed that managers expect diversification to lower the level of total risk and to raise the percentage of systematic risk in the firm's total risk, but not to increase the level of return.

Overall, the chapter presented three main findings: first, investing in portfolios of diversified firms provides better rates of returns for investors than investing in portfolios of specialised firms. This, thus, directly challenges the standard knowledge in the literature that diversification destroys shareholder value. Second, shareholders can invest in their own self-diversified portfolios and attain more efficient diversification than can be obtained by investing in stocks of diversified firms. The finding supports the argument in the literature that corporate diversification may be an unnecessary strategy from the standpoint of shareholders. Third, managers expect to reduce the level of total risk and to alter proportion of the risk rather than to increase the level of return upon undertaking corporate diversification. This evidence is, therefore, consistent with the view that considers diversification as an agency problem which is mostly driven by the private interest of firm managers.

### **7.2.3. Corporate diversification, liquidity and financial management**

Chapter 6 of the thesis complements the line of study on the effect of corporate diversification on financial management. Following the important findings of Duchin (2010) and Subramaniam, Tang, Yue and Zhou (2011) in respect of lower cash holdings in diversified firms, the main objective of the chapter was to investigate how diversified firms manage their cash flows (i.e., operating, investing and financing cash flows) to maintain this lower cash balance.

Using a large sample of US firms from 1990 to 2009, the research found a higher free cash flow and lower financing cash flow in diversified firms compared to those in

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specialised firms. The results also indicate that diversified firms can, on average, fully cover their investment with operating cash flow, leading to insignificant free cash flow. For specialised firms, free cash flow is negative and significantly different to zero, suggesting that these firms cannot support their investment demand with operating cash flow and need to rely more on external finance. The average (median) ratio of financing cash flow to total assets in specialised firms is 6% (0.3%), compared to 0.8%(-1.2%) for diversified firms.

The research has gone further, investigating several components of financing cash flow (i.e., net debt and net equity issues and dividends) considered by Dittmar and Duchin (2010) as the main channels through which firms adjust their cash balance. The research suggests that diversified firms maintain the lower cash balance by issuing less net debt and distributing greater cash dividends than do specialised firms. The difference in respect of net debt (dividends) between the firms is statistically significant at 1% and equivalent to 0.4% (0.12%) of total assets and 57% (13.3%) of average net borrowings (dividends) in specialised firms. Specialised firms issue more shares but also buy back more, leading to less significant differences in respect of net equity issuances between these firms.

The research extended the analysis of financial management in diversified firms by investigating the operation of internal capital markets. Using the measure of internal transfers proposed by Rajan et al. (2000) it showed a negative relationship between internal capital market activities and the level of free cash flow in the whole sample and in the sub-sample of financially unconstrained firms. Importantly, the relationship, which is insignificant, in the sub-sample of financially constrained firms implies a complementary relationship between the operations of internal capital markets and the free cash flow in financial management.



Overall, the results of the chapter suggest that diversified firms maintain their lower cash balance by distributing most of their larger free cash flow through financing cash flow. More particularly, it shows that diversified firms issues less net debt and distribute greater cash dividends than do specialised firms. The findings are consistent with the smarter-money effect of diversification and the argument that diversified firms are in a better position to coordinate the low-cost internal cash flows with investment demands. The chapter also found evidence of the active role of internal capital markets in a firm's financial management.

### **7.3. Contributions and implications of the study**

The most important contributions the thesis makes are those to diversification literature. First, it shows that learning from both internal and external diversification experience has a significant effect on the value of diversification. Second, investing in portfolios of diversified firms generates better results than investing in portfolio of specialised firms. Thus, the conventional wisdom in the literature that diversification destroys shareholder wealth may not be wholly correct, from an investment point of view. Third, the findings of a similar operating cash flow, lower investing cash flow, higher dividends and lower cash holdings in diversified firms do not suggest overinvestment problems in these firms.

The study also has some practical implications. First, it suggests that managers can learn from previous diversifications to improve the performance of new diversifications. Nevertheless, it is noticeable that the most important thing is to select the appropriate lessons to learn. Learning need not be limited to a firm's own experience: appropriate lessons can also be gained from the experience of other firms.

Second, the study provides practical suggestions to stock investors. From the second study, it is shown that portfolios of diversified firms are characterised by higher returns and lower risk than are portfolios of specialised firms. Firms with a different level of diversification also provide various returns and risk profiles. For instance, portfolios of three-segment diversified firms may provide the best risk-adjusted returns for investors. Altogether, the calculation of returns and risk characteristics of different types of firms in this study can be used by investors to select the most suitable investment vehicle for the achievement of various investment objectives. The results from the third study further suggest that diversified firms are financially healthier than specialised firms. As diversified firms can fully cover their investment with internal finance, they borrow less and pay out more dividends. Thus, investors may consider diversified firms as less risky investments, compared to specialised firms.

### **7.4. Limitations and potential research directions**

This subsection identifies the limitations of the research and suggests some research avenues which may potentially contribute to the field.

First, a limitation of the thesis as well as of the literature is its excessive focus on a US context. On the one hand, this makes the results in this thesis comparable to various important studies in the literature which are also conducted in the US context. On the other hand, it also reduces the generalisation of the results. For instance, as the US environment is one where “the legal, auditing, and contracting environment is highly evolved” (Stein, 2003), the findings of trivial agency problems in financial management in diversified firms (as in chapter six of this thesis) may not generalise to other contexts where the legal framework and other mechanisms are much weaker. It, therefore, would

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be interesting to extend the research into other contexts with different settings and standards.

Second, the results in chapter 5 are generated by applying the assumption of a perfect capital market (i.e. there are no taxes, brokerage fees or management fees). The results may change if all the transaction costs are taken into account. For instance, investing in portfolios of industries must be more costly than investing in stocks of diversified firms, thus the rate of returns from self-diversified portfolios may be deducted when these costs are included. Therefore, incorporating different transaction costs into the calculation of portfolio performance may be necessary, to better reflect the value of diversification.

Finally, it would be possible to extend the analysis of chapter 6, to investigate the time variations in respect of cash flows patterns in diversified and specialised firms. It is widely shown in the literature that behaviour and the manner in which firms perform financial management may vary as a result of a firm's financial constraint. Accordingly, it is possible that as specialised firms rely more on external financing, a squeeze in an outside supply of capital (e.g. during a financial crisis) will have a more profound effect on their financial activities. As such, the sample could be categorised by stock market, credit market or economic conditions to further examine the differences in respect of financial management between diversified and specialised firms in various situations.

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