# INFLUENCE ACTIVITY, INCENTIVES AND VALUE OF THE FIRM: AN AUSTRALIAN PERSPECTIVE

A thesis submitted for the Degree of Doctor of Philosophy

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*Dedicated to my parents and Rajabrata*

*This is possible because of you.*

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# Abstract

The majority of Australian firms listed on the Australian Stock Exchange are multi-segment rather than single-segment organisations. Relative to focused firms, multi-segment firms have advantages such as potential intra-firm synergies and flexibility in capital budgeting through the use of their internal capital markets. On the other hand, it is often argued that multi-segment firms are more prone to agency problems such as divisional rent-seeking, which could render their internal capital markets inefficient. On balance, it is an empirical question as to whether or not the benefits of multi-segment structure outweigh its costs. Compared to multi-segment firms in other developed economies, Australian firms have been doing quite well recently. Can one take this as evidence in favour of the multi-segment structure in Australia and, if so, what is special about multi-segment firms in Australia? Or is their relatively superior performance largely due to exogenous factors? This thesis empirically examines these issues by studying corporate diversification in Australia.

Multi-segment firms can be subject to more influence activities by influential division managers, who may be able to affect the capital budgeting process. This thesis first analyses how influence activities in the form of signal jamming affect the capital budgeting process in corporate organisations in Australia. Following Wulf (2002), the specific focus is on how corporate headquarters allocates capital budget to a small division based on two types of information. The first type of information is the past performance of the small division, which is a noisy, public signal of its future performance, but which is not subject to manipulation. The second type of information is the private report about the small division's future prospects made by the manager of a large division, which may be more informative than the public signal but also subject to influence by the large division manager. Investment sensitivity is defined as how capital budget allocated to the small division depends on its past performance. The main findings are as follows. First, investment sensitivity is found to be positive, indicating that headquarters invests more in the small division as its past

performance improves. Second, investment sensitivity decreases as influence problems become more severe, where the severity of influence problems is measured by several firm-level proxies. The second finding, which is counter-intuitive, may be due to the fact that, as influence problems become more severe, headquarters may proactively counter influence activities through explicit incentives given to the manager of the large division. In that case, headquarters can rely on a more informative private signal. This is examined by studying how compensation incentives for the large division manager are related to investment sensitivity. A negative relationship is found between short-term incentives and investment sensitivity, which indicates that firms that provide large short-term incentives rely more on managerial recommendations than on noisy accounting measures. Finally, the empirical analyses are repeated using five new measures of diversification that are constructed based on information such as relatedness between segments, number of segments in the firm, and Herfindahl indices constructed from sales and assets. Estimations using these new measures also show similar results.

The second theme of this thesis is the Australian evidence on diversification discount/premium. It examines whether the existence of diversification discount/premium is a measurement issue. First, the existing methodologies (Lang and Stulz, 1994; Berger and Ofek, 1995) are followed and mixed evidence is found: diversified firms in Australia trade at a discount in some cases and at a premium in others. Second, new and more informative measures of diversification are constructed as compared to the existing measures, based on which the diversification discount/premium is re-estimated. Mixed results are found when using industry adjusted *q* and the sales multiplier as dependent variables. When the asset multiplier is used as a dependent variable, however, a significant premium is found throughout. This premium obtained using the asset multiplier as the dependent variable is robust to standard control variables such as firm size, profitability and growth opportunity. Collectively, these results may imply that diversified firms in Australia trade at a premium and the existence of diversification discount may be a measurement issue. Finally, compensation incentives, which have not been explicitly considered in existing studies, are

incorporated into the study. Incorporating compensation incentives for CEOs and division managers, long-term versus short-term in particular, shows that the diversification premium is robust after controlling for long-term incentives. However long-term incentives do contribute to the diversification premium. Indeed, effective long-term incentives positively affect this premium. In the sample of Australian firms in this study, such effective long-term incentives are shown to be 30% or more of total remuneration. Short-term incentives, on the other hand, are shown to be at best neutral and in some cases reduce the size of the diversification premium. In particular, the diversification premium switches to a discount in firms paying 90% or more as short-term incentives to division managers. Overall, the results suggest that at least part of diversification discount/premium can be explained by compensation incentives; without explicitly incorporating compensation incentives, the reported diversification discount/premium can be either over- or under-estimated.

# Declaration

I hereby declare that this thesis contains no material that has been accepted for the award of any other degree or diploma in any other university or equivalent institution, and that to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of this thesis.

**TANIA DEY**

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*"There is no such thing as a 'self-made' man. We are made up of thousands of others. Everyone who has ever done a kind deed for us, or spoken one word of encouragement to us, has entered into the make-up of our character and of our thoughts, as well as our success."- George Matthew Adams*

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# Chapter 1

## INTRODUCTION

This thesis empirically examines and analyses various issues related to corporate diversification in Australia. Corporate diversification is a business strategy by which a firm seeks to increase value by establishing or acquiring new businesses. Such diversification can occur either at the business unit level or at the conglomerate level. In the case of corporate diversification at the business unit level, firms typically expand their operations to new segments in related lines of business. In contrast, conglomerate diversification takes place when the company markets new products or services that have no technical and commercial synergies with the existing businesses. Conglomerates diversify in order to increase their customer base and profitability, and build greater credibility in capital markets owing to their larger size.

The objective of this thesis is to study the effects of corporate diversification in Australian firms. First, an exhaustive survey of the literature on the value effect of diversification and other associated issues is provided. This literature survey is an integral part of this thesis since it helps to indicate the shortcomings of the existing literature and provides guidance for future research. Second, the effect of influence activity on the allocation of firm's internal capital in diversified firms is examined. Unproductive influence activities in the form of rent-seeking by division managers may exist in diversified firms such in that division managers spend valuable time and resources in order to influence headquarters to divert more of the capital budget to their respective divisions. Scharfstein and Stein (2000) provide a formal model of influence activities to show how division managers spend their time in increasing outside options to strengthen their bargaining position with CEOs. Wulf (1999, 2009) provides theory and evidence of influence activities in the form of signal jamming and shows that investment

behavior in firms depends on influence activities in internal capital markets. A diversified firm may lose value if influence activities by division managers lead to misallocation of valuable company resources. Third, the issue of whether diversified firms in Australia trade at a higher or lower value as compared to single segment firms in similar industries is investigated. The evidence from existing studies on the value effect of diversification is at best mixed. Some studies (Lang and Stulz, 1994; Berger and Ofek , 1995) show that diversification leads to loss of value while others (Schoar, 2002; Khanna and Palepu, 2000) report that it creates value for the firm. Yet other studies (Villalonga, 2004) show that the value loss of the diversified firm is a methodological issue rather than a direct consequence of diversification.

Section 1.1 of this chapter provides the motivation behind the research conducted in this chapter. Further, brief discussions of the issues that are analysed in this thesis are also provided. Section 1.2 puts forward the main contributions of this thesis and Section 1.3 briefly discusses its structure. Section 1.4 summarises the main findings: Section 1.4.1 reports the results on influence activity and the allocation of internal capital in diversified Australian firms; Section 1.4.2 presents the results on the value effect of diversification for Australian firms.

## 1.1. Issues Addressed in this Thesis

Diversification discount/premium can be defined as the difference between the market value of a diversified firm operating in several business segments and the market value of a portfolio of single segment firms operating in corresponding businesses. When the market value of the diversified firm is greater than the market value of corresponding single segment firms, the diversified firm is said to trade at a premium; otherwise, it trades at a discount. If corporate diversification is value-enhancing through, for example, utilising synergies or cost reductions, one may expect a diversification premium. On the other hand, diversification may reduce value if it is driven purely by CEO hubris or empire-building tactics or if it exacerbates agency problems. In this case, diversification discount is more likely.

Martin and Sayrak (2003), Stein (2003) and Maksimovic and Phillips (2007) provide a survey of the literature on corporate diversification and issues associated with it. Martin and Sayrak (2003) survey corporate diversification following two different bodies of literature; cross-sectional studies of the link between corporate diversification and firm value and longitudinal studies in patterns of corporate diversification through time. Their survey suggests that diversification discount may not be the result of corporate diversification after all. On the contrary diversification discount may result from measurement issues or even sample bias. The survey by Maksimovic and Phillips (2007) sheds light on some different theoretical aspects. They contend that the early literature on corporate diversification attributes the diversification discount to inefficient capital allocation in internal capital markets. They also survey the more recent empirical literature on corporate diversification and in summary, state that that diversification discount can be explained through self-selection of firms with different investment opportunities. Again, their survey indicates that diversification discount may not be the result of diversification per se but due to the inefficient capital budgeting process of diversified firms. In this respect it is worth mentioning the survey of related literature by Stein (2003). He studies the strand of literature which questions the efficiency of corporate investment in the presence of asymmetric information and agency problems. He not only focuses on the literature which addresses the issue of efficient capital allocation across firms through external capital markets but also addresses the widely discussed issue of within-firm allocation of capital through its internal capital market. These surveys cover separate issues related to corporate diversification.

Following up on these articles, in this thesis a more exhaustive survey of the literature on corporate diversification is provided, covering most of the prominent theoretical and empirical literature in this area. This survey of the literature is an adaptation of the approach followed by Villalonga (2003). First, detailed discussion of the theories put forward to justify diversification discount/premium is provided along with examples which offer evidence in support of those theories. For example, agency theory predicts that managerial agency problems lead to lower firm value. Inefficient internal capital market theory predicts that rent-

seeking activities by division managers lead to misallocation of resources among different divisions of the firm, leading to inefficient investment and hence lower value for the firm.

Li *et al.* (2010) examine the relationship between executive compensation and corporate investment decision using Australian data. They find that executives and directors focus on their equity based compensation while taking investment decisions for the firm. This result supports the presence of agency problems in Australian corporate organizations. While the implications of agency theory have been empirically examined in the Australian context, those from inefficient internal capital market theory have not been studied for diversified firms in Australia. Existing empirical literature on influence activities in internal capital markets is confined primarily to the large U.S. and European firms. Thus this thesis examines how influence activities in the form of signal jamming (Fudenberg and Tirole, 1986) affect the capital budgeting process of corporate organisations in Australia.

Moreover, while the Australian corporate governance system shares certain features of the Anglo-American and German-Japanese systems, it also has differences[1] . First, the CEO and chairman are mostly separated in Australia (Kiel and Nicholson, 2003) unlike in many firms in the U.S. and the U.K. where the CEO plays a dual role. This may make CEOs less powerful in Australia, which in turn may imply that they are more easily influenced by managers of large divisions. If this is the case, then one may expect a larger distortion in the allocation of the capital budget. Second, Suchard *et al.* (2001) report that poor performance has a lagged effect on CEO turnover in Australia as compared to the U.S. and the U.K. where CEO turnover often follows immediately after poor performance. This may provide lower performance incentives to CEOs in Australia. Finally, compared to the US and the UK, stock-based compensation for Australian CEOs is smaller both in size and as a fraction of their total pay (Kerin, 2003). This again may imply that Australian CEOs have lower performance

[1] Buchanan (2004) provides a comparison of different corporate governance systems and the differing roles of the CEO and the chairman for all these countries.

incentives compared to their Anglo-American counterparts. Given these differences, one may conjecture that influence activities might be more severe in Australia. If this is the case, then diversified firms in Australia may be expected to have less efficient internal capital markets, hence a larger diversification discount, other things held constant. The main objective of this thesis is to put these issues under rigorous empirical scrutiny.

Next, the empirical literature on corporate diversification is surveyed. In particular, focus is on the data and methodology used in existing studies in explaining diversification discount and premium. More recent studies argue that the existence of diversification discount may be a measurement issue. The majority of the empirical research on corporate diversification has used measures of diversification, such as the number of segments, Herfindahl indices constructed from sales and assets, and two different types of diversification dummies to examine whether diversified firms trade at a discount or premium. These conventional measures are a very crude way of measuring diversification. There is scope for further development in this area by constructing more informative, discrete and continuous measures. For example, the number of segments in the firm might not be a very meaningful measure of diversification on its own. A firm may have multiple segments but they might operate in related businesses such that the firm cannot be called truly diversified. This suggests that if measures such as relatedness between segments and the number of segments are combined in a meaningful way, they might provide more informative, discrete measures of diversification. Similarly continuous measures like Herfindahl indices should be combined with information such as the number of segments or relatedness between segments in the firm to provide a more meaningful continuous measure of diversification. This thesis proposes several new measures of diversification.

In the second part of the survey of the literature, various explanations for the existence of diversification discount/premium that are proposed in the literature are discussed. This demonstrates that none of the existing studies have incorporated compensation incentives to division managers and CEOs as a possible explanatory variable. Wulf (2002) shows that if compensation incentives

are based on firm performance then compensation and investment incentives can be used as substitute mechanisms to mitigate influence activities by highly influential division managers. However, her study is not directly related to diversification discount/premium. Aggarwal and Samwick (2003) establish the relationship between diversification and agency problems by incorporating risk reduction and private benefits, which are two agency explanations for diversification, into a single model. They use pay for performance sensitivity as a compensation incentive to CEOs and top five executives in a firm. Even though they study the relationship between firm performance, diversification and compensation incentives, their analysis do not focus on explaining diversification discount/premium through compensation incentives to CEOs and division managers.

Agency problems affect the efficiency of internal capital markets, which in turn affects the overall performance of the diversified firm. Thus it is necessary to focus on the relationship between firm performance and remuneration both at the level of the CEO and at the level of division managers. CEOs and division managers receive various short-term and long-term incentives in their remuneration packages. Short-term incentives often depend on both firm and division performance while long-term incentives depend on firm performance only. Thus long-term incentives can be more successful than short-term incentives in aligning the incentives of these executives with those of shareholders. However the efficacy of short-term incentives in goal alignment would depend on the weight placed on firm performance vis-a-vis division performance. In this thesis, various long-term and short-term compensation variables are constructed to investigate the problem of influence activities as well as the value effect of diversification on diversified Australian firms.

## 1.2. Contribution of this Thesis

The effect of influence activities on the functioning of internal capital markets, in particular the capital budgeting process remains largely an unexplored issue in Australia. First, this research contributes to the literature by filling this

gap. The empirical estimations are based on the theory proposed by Wulf (2002). In this context three related issues are examined. First, whether investment in the small division depends positively or negatively on its past performance is examined. If past performance is a good indicator of future performance, then a positive relation between the two can be expected. Following Wulf (2002) the relation between investment in the small division and its past performance is defined as investment sensitivity. Second, how investment sensitivity varies as influence problems become more severe is examined. If headquarters proactively counters the large division manager's influence activities by using compensation incentives that depend on the performance of the firm as a whole, then the large division manager has less incentive to engage in influence activities. In this case, his private signal becomes more informative of the small division's investment opportunities. Thus the investment sensitivity may be expected to decrease in the severity of influence problems. On the other hand, if headquarters does not rely much on compensation incentives, then the large division manager's influence activities would result in less informative private signals. In this case, the investment sensitivity may be expected to increase in the severity of influence problems. Based on this observation, the third empirical analysis is on how compensation incentives for the large division manager are related to the investment sensitivity.

Lagged value of segment profitability is used as a proxy for the public signal while the severity of influence problems are proxied by relatedness between segments, the number of segments in the firm, and capital constraints. Both long-term and short-term incentives to the manager of the large division are used as compensation incentives. Another contribution of this thesis with regard to influence activities is to identify the underlying contradiction in existing studies in using relatedness between segments and the number of segments to proxy both the severity of influence activities and the degree of corporate diversification. This contradiction is explained in detail and five new measures of diversification are constructed that can rectify it.

This thesis also contributes to the empirical literature on corporate diversification by showing that the existence of diversification discount is indeed a methodological issue. First, Australian firm level data are used to test existing methodologies and to investigate whether diversified firms in Australia trade at a discount or premium. The methodologies proposed by Lang and Stulz (1994) and Berger and Ofek (1995) are used respectively to examine whether the difference between existing methodologies yields different results while using the same data. In other words, Tobin's *q*, industry-adjusted *q* and the asset and sales multiplier are used alternatively to measure firm performance whereas, multi-segment dummies are used as measures of diversification. Second, diversification discount/premium is re-estimated using the new measures of diversification constructed in this thesis by incorporating information such as relatedness between segments in the firm, the number of segments in the firm, and Herfindahl indices. Finally existing studies have not explicitly incorporated remuneration incentives in explaining diversification discount/premium so far. This thesis incorporates remuneration incentives as an additional explanatory variable for diversification discount/premium, where both long-term and short-term incentive payments for CEOs and division managers are used.

## 1.3. Structure of this thesis

The remainder of this thesis is organised in four chapters. Chapter 2 provides a comprehensive survey of the theoretical and empirical literature on corporate diversification. One of the unique features of this chapter is presentation of case studies and examples relevant to the theoretical literature. Diversification discount or premium can be explained by various costs and benefits arising from corporate diversification. The costs can arise from agency problems, inefficient internal capital markets etc., whereas benefits can arise from the relaxation of budget constraint through internal capital markets, debt-coinsurance, economies of scope, market power etc. In reviewing the empirical literature, special focus is placed on the data and methodology used by different authors in explaining diversification discount or premium. Next, the factors that have been used in empirical studies on

diversification discount/premium are discussed. Based on this survey, the scope for further research is discussed.

Chapter 3 starts with the motivation behind this thesis and presents the problems it addresses. Testable hypotheses are developed based on the theoretical literature. The first set of hypotheses concerns how influence problems affect the capital allocation process in diversified firms in Australia, while the second set of hypotheses is related to diversification discount/premium. This is followed by the description of the data used in this thesis. Next, detailed discussions of the empirical methodology used in this thesis are provided, and extensive descriptions of new variables constructed for the analyses are presented. In doing so, hypothetical examples are provided to illustrate the new variables. Finally, Chapter 3 presents a sample study to compare these new measures of diversification with the existing measures, and to foreshadow the remaining content of the thesis.

Chapter 4 presents the empirical findings on the relation between influence activities and capital allocation. It provides the results for the effect of influence activities by the manager of a large influential division in allocating capital budget to the smallest segment of the firm. Three different issues are tested in this regard. First, the effect of influence activities when investment incentives are provided by the headquarters is studied. Second, how compensation incentives can affect the allocation of capital inside a diversified conglomerate is examined. Third, some issues related to how to proxy the severity of influence activities and the degree of corporate diversification are studied.

Chapter 5 investigates diversification discount/premium in Australia. First, Australian firm level data are employed to test existing methodologies and to investigate whether diversified firms in Australia trade at a discount or premium. The methodologies proposed by Lang and Stulz (1994) and Berger and Ofek (1995) respectively, are used to examine whether the difference between existing methodologies yields different results when using the same data. Second, diversification discount/premium is re-estimated using the new measures of diversification constructed in Chapter 3 by incorporating information such as

relatedness between segments in the firm, the number of segments in the firm, and Herfindahl indices. Finally, executive remuneration is used as an additional explanatory variable in an attempt to explain the results obtained by using these new measures of diversification.

## 1.4. Main Findings of this Thesis

### *1.4.1. Influence Activity and Allocation of the Firm's Internal Capital: An Australian Perspective*

Chapter 4 examines how influence activities by large division managers in multidivisional organisations affect the investment in their small divisions. First, the relation between the investment in the small division and its past performance is examined. If past performance is a good indicator of future performance, then a positive relation between the two can be expected. This relationship is known as investment sensitivity. This investment sensitivity is found to be positive in Chapter 4, indicating that headquarters invests more in small division as past performance increases.

Second, how the investment sensitivity varies as influence problems become more severe is studied. The severity of influence problems is proxied by conventional measures such as the relatedness between divisions or the number of divisions in the firm. As divisions become more related, influence problems can be more severe since the manager of large division has better information about the small division. The same is true as the number of divisions increases. However these two proxies have different implications as explained below. When relatedness is used as a proxy, it is observed that the investment sensitivity decreases. This implies that headquarters relies more on the private report from the large division manager than on the past performance of small division when allocating capital budget to the latter. An explanation for this is that when divisions are more related headquarters may increase the use of compensation incentives to reduce influence activities by the large division manager. As a result, the large division manager's private report, on which headquarters bases its capital allocation decision, becomes more informative. However, when the

number of divisions is used as a proxy for the severity of influence problems, it is found that investment sensitivity increases as influence problems become more severe. This is likely because the number of divisions does not capture the same informational aspect as the relatedness between divisions: a larger number of divisions simply increase the potential for influence problems without bringing in any informational benefits; hence compensation incentives are not likely to be effective. As a result, headquarters relies more on public signals such as the small division's past performance when allocating capital to it.

I further test the relation between compensation incentives for the large division manager and investment sensitivity. A negative relationship is found between short-term incentives and investment sensitivity. This negative relationship indicates that firms that provide larger short-term incentive payments rely more on managerial recommendations than on noisy accounting measures when allocating capital budget to small divisions. Thus it appears that short-term incentives such as bonuses are a main method of incentivising division managers in Australia.

Finally, the potential confusion in the existing literature in using both relatedness between divisions and the number of divisions in the firm as a proxy for severity of influence problems and also as a proxy for the degree of diversification is clarified. The relatedness between segments and the number of divisions in the firm are used to proxy the severity of influence problems. In the literature on corporate diversification, these proxies have been used to measure the degree of diversification. For example, Berger and Ofek (1995) interpret increases in the number of segments in a firm as an increase in corporate diversification. They show that, as a firm becomes more diversified in this sense, it leads to a larger discount in firm value. They also show that, as the relatedness between segments of a diversified firm increases, such a diversification discount is ameliorated. Thus an increase in the number of divisions can be taken as an increase in corporate diversification as well as an increase in the severity of influence problems. On the other hand, an increase in the relatedness between

divisions implies an increase in the severity of influence problems but a decrease in corporate diversification.

Wulf (1999) provides some arguments as to why she chooses the relatedness between segments and the number of segments to proxy the severity of influence problems. While her argument that the large division manager's ability to distort the private signal depends on the degree of diversification is reasonable, the implications are different depending on how diversification is measured. When it is measured by the relatedness between segments, then less diversified firms are subject to more influence problems. When it is measured by the number of segments, then more diversified firms are subject to more influence problems. Thus one should be careful in measuring corporate diversification as well as finding suitable proxies for influence problems within the firm. An alternative method of capturing both influence problem and degree of diversification is provided in this thesis. The empirical results using these new measures of diversification suggest that as the value of these new measures of diversification increases the firm is considered to be less diversified. Based on earlier discussions, if a firm is less diversified then there will be less influence activities. Thus, headquarters can rely more on private information from the large division's manager as compared to a noisy public signal and hence investment sensitivity decreases. These new measures of diversification also support the results related to compensation incentives. Short-term incentives payments are found to be effective in offsetting influencing by the manager of the large division.

### *1.4.2. Diversification Discount or Premium: An Australian Perspective*

Chapter 5 examines two issues. First, it is studied whether the existence of diversification discount is a measurement issue. It is found that Australian firms in the sample trade at a discount in all years following Lang and Stulz' (1994) methodology of using Tobin's *q* and multiple dummy variables for different segments in a firm. However, after adjusting for industry effects, the discount decreases significantly and even turns into a premium in some cases. On the other hand, when following the Berger and Ofek (1995) methodology by using the excess value measure calculated from assets as a dependent variable, a significant

premium is observed for the same sample of firms. This suggests that the diversification discount or premium could be a measurement issue, necessitating better measures of corporate diversification. To this end, new measures of diversification constructed in Chapter 3 are used. Using these measures along with firm-fixed effects, a mixed result is found when industry-adjusted *q* and the sales multiplier are chosen as dependent variables; when the asset multiplier is used instead, a significant premium is found throughout. This premium obtained using the asset multiplier as the dependent variable is robust to standard control variables such as firm size, profitability and growth opportunity. Put together, these results may imply that diversified firms in Australia trade at a premium and the existence of diversification discount may be a measurement issue.

Second, compensation incentives are incorporated into the study in order to see whether they can explain diversification discount or premium. Rent-seeking activities by CEOs and division managers may lead to misallocation of resources which in turn may have a negative impact on the value of the firm. However offering appropriate compensation incentives can mitigate such unproductive rent-seeking activities. Thus diversification discount/premium can be a function of the extent to which the firm is susceptible to rent-seeking and how it controls rent-seeking through compensation incentives. Two types of compensation incentives can be provided to mitigate such rent-seeking activities: long-term incentive payments and short-term incentive payments. A higher long-term incentive payment would lead to lower rent-seeking activities and hence higher firm value since long-term incentives are often based on the performance of the firm as a whole: long-term incentive payments can have the potential to align the incentives of the division managers and CEOs with those of the shareholders. On the other hand, short-term incentive payments depend on both firm performance and division performance. Therefore a higher short-term incentive payment may lead to either higher or lower rent-seeking depending on how it is structured.

My first finding is that the diversification premium found above is robust to long-term incentive payments. Long-term incentives do contribute to diversification premium, however; indeed, effective long-term incentives

positively affect the diversification premium. In the sample of Australian firms in this study, such effective long-term incentives are shown to be 30% or more of total remuneration. Short-term incentives, on the other hand, are shown to be at best neutral and in some cases reduce the diversification premium. In particular, the diversification premium turns to a discount in firms paying 90% or more as short-term incentives to division managers. Overall, the results suggest that at least part of diversification discount/premium can be explained by compensation incentives; without explicitly incorporating compensation incentives, the reported diversification discount/premium can be either over- or under-estimated.

# Chapter 2

# DIVERSIFICATION DISCOUNT OR PREMIUM: A SURVEY

## 2.1. Introduction

Diversification was the underlying trend for many corporations in the US during the 1950s and 1960s. Many large corporations that chose to diversify became prominent during the late 1960s implying that diversification enhances firm value. This trend towards diversification continued until the 1980s and then it reversed dramatically when corporations started specialising (Comment and Jarrell, 1995; Leibeskind and Opler, 1993). The underlying reason for this could be that diversification lead to loss of firm value. Corporate diversification can either create or destroy firm value and thus can give rise to either diversification premium or discount. Diversification discount or premium can be defined as the difference between the aggregate market value of diversified firms operating in several business segments and the market value of a portfolio of single segment firms operating in similar businesses. When this aggregate value of diversified firms is greater than the market value of corresponding single segment firms the diversified firm is said to have a premium and discount otherwise.

Martin and Sayrak (2003), Stein (2003) and Maksimovic and Phillips (2007) provide a survey of the literature on corporate diversification and issues associated with it. Martin and Sayrak (2003) survey corporate diversification following two different bodies of literature; cross sectional studies of the link between corporate diversification and firm value and longitudinal studies in patterns of corporate diversification through time. Their survey suggests that

diversification discount may not be the result of corporate diversification after all. On the contrary diversification discount may result from measurement issues or even sample bias. The survey produced by Maksimovic and Phillips (2007) sheds light on different theoretical aspects. They find that the early literature on corporate diversification claims that diversification discount is the result of inefficient capital allocation in internal capital markets. They also survey the more recent empirical literature on corporate diversification and show that diversification discount can be explained through self-selection of firms with different investment opportunities. Again their survey indicates that diversification discount may not be the result of conglomerate diversification but due to capital budgeting process of profit maximising firms. In this respect it is worth mentioning the survey of related literature by Stein (2003). He studies the strand of literature which questions the efficiency of corporate investment in the presence of asymmetric information and agency problems. He not only focuses on the literature which addresses the issue of efficient capital allocation across firms through external capital markets but also addresses the widely discussed issue of within firm allocation of capital through its internal capital market. These surveys, even though comprehensive, cover separate issues related to corporate diversification.

Following up on these survey articles a more exhaustive coverage of the literature on corporate diversification is provided which touches upon most of the prominent theoretical and empirical literature in this area. This survey of the literature is an adaptation of the approach followed in Villalonga (2003). Section 2.2 provides a detailed discussion of the theories put forward to justify either diversification discount or premium. Examples are provided wherever applicable to provide evidence in support of the theories discussed in Section 2.2 and Section 2.3. In particular, focus is placed on the data and methodology used by different authors in explaining diversification discount or premium. In both Section 2.2 and Section 2.3 another upcoming issue is referred to. A survey of the literature is provided which studies executive compensation and firm performance and tries to explain diversification discount as the rent collected by higher paid executives.

Section 2.4 discusses the further scope of research in this area and Section 2.5 concludes the discussion on the value effect of diversification.

## 2.2. Theoretical Background

Diversification discount or premium can be explained by various costs and benefits arising from corporate diversification. Several theories are put forward to explain these costs and benefits of corporate diversification. The costs arising from corporate diversification are theoretically justified by agency arguments (Amihud and Lev, 1981; Jensen, 1986; Shleifer and Vishny, 1989; Jensen and Murphy, 1990), inefficient investment due to rent-seeking activities (Scharfstein, 1998; Scharfstein and Stein, 2000; Rajan *et al.* , 2000; Choe and Yin, 2009), and several recent theories which suggest that the existence of a discount is consistent with the value maximising behavior of the firm (Fluck and Lynch, 1999; Zuckerman, 1999; Burch *et al.*, 2000; Matsusaka, 2001; Gomes and Livdan, 2004).

Similarly the benefits of corporate diversification which give rise to diversification premium originate from the theories of an efficient internal capital market (Williamson, 1975; Williamson, 1970; Gertner *et al.* , 1994; Stein, 1997), debt coinsurance (Lewellen, 1971; Shleifer and Vishny, 1992), economies of scope (Teece, 1980; Teece, 1982) and market power (Scott,1982; Tirole, 1995; Villalonga, 2000).

### *2.2.1. Costs of Conglomerate Diversification: Diversification Discount*

This section provides a detailed discussion of the theoretical literature which supports the argument that corporate diversification leads to diversification discount. Real world examples from diversifying conglomerates are given where applicable in order to support the theoretical arguments in favor of the discount.

#### *2.2.1.1. Agency Theory*

The most widely discussed argument views diversification as the product of agency problems between managers and shareholders. Managers often

undertake activities to increase their own welfare at the cost of shareholders. Jensen (1986) argues that managers have a tendency to acquire and manage resources which are suboptimal in size. This is because managing such oversized resources gives them private benefits of control. These private benefits can be increased power and prestige of the manager. He provides evidence[2] from the oil industry to show that managers indeed undertook such activities which ultimately led to value loss of diversification. Drastic changes in the energy market since 1973 also led to large increases in free cash flow in the petroleum industry due to excess capacity generated in the latter. The crude oil reserves were very high so there was an urgent need for the industry to shrink and reduce its expenditure on exploration and development. Instead of giving out the excess resources to the shareholders the managers continued to spend heavily on exploration and development. They even undertook diversification projects by buying out companies in retailing, manufacturing, office equipment and mining industries. But these empire-building ventures turned out to be very unsuccessful due to a lack of experience in those industries and also a downturn in some of them.

**Box 2.1:** *An Example of Managerial Empire Building*

"1984 cash flows of the ten largest oil companies were $48.5 billion, 28 percent of the total cash flows of the top 200 firms in Dun's Business Month survey. Consistent with the agency costs of free cash flow, management did not pay out the excess resources to shareholders. Instead, the industry continued to spend heavily on E&D activity even though average returns were below the cost of capital. Oil industry managers also launched diversification programs to invest funds outside the industry. The programs involved purchases of companies in retailing (Marcor by Mobil), manufacturing (Reliance Electric by Exxon), office equipment (Vydec by Exxon), and mining (Kennecott by Sohio, Anaconda Minerals by Arco, Cyprus Mines by Amoco). These acquisitions turned out to be among the least successful of the last decade, partly because of bad luck (for example, the collapse of the minerals industry) and partly because of a lack of managerial expertise outside the oil industry. Although acquiring firm shareholders lost on these acquisitions, the purchases generated social benefits to the extent they diverted cash to shareholders (albeit to target shareholders) that otherwise would have been wasted on unprofitable real investment projects."- Jensen, 1986, pp. 326.

[2] Details are provided in Box 2.1

Managers have a tendency to 'entrench' themselves, i.e. to make themselves valuable to the shareholders or make themselves so indispensable to the firm that it becomes very costly to replace them. Shleifer and Vishny (1989) build a formal model for managerial entrenchment and show that managers have a tendency to invest valuable firm resources or shareholder wealth into manager specific assets even if such investments are not value maximising for the firm or its owners. Box 2.2 provides an example of managerial entrenchment. Shleifer and Vishny (1989) measure the degree of entrenchment by observing how specific the assets are to the existing manager's skills and knowledge. The managers can reduce the probability of getting fired or improve their bargaining position with regards to wages by undertaking such entrenchment activities. They further support their argument that managerial entrenchment is not always value maximising for the firms and provide evidence of managerial resistance to takeovers, wealth-decreasing investments in oil exploration and wealth decreasing acquisitions by managers with low ownership stakes.

**Box 2.2:** *An Example of Managerial Entrenchment*

"Consider a railroad with a large free cash flow. The CEO decides whether to commit this cash to upgrading the railroad or to raising dividends. If the CEO is the best available person to run the railroad, we argue that the railroad investments will be made, even if the value-maximizing strategy is to distribute the free cash flow as dividends. Once additional resources are committed to the railroad, the current CEO becomes more firmly entrenched. If, in contrast, he distributes the free cash flow, he will preside over a smaller total value of manager-specific assets. The resources he can extract from the shareholders once the firm upgrades the railroad ─ in the form of wages, perquisites, or latitude to allocate capital ─ are greater than what he could extract if he raised dividends. Raising the shareholders' commitment to the railroad raises their commitment to the manager as well."-Shleifer and Vishny, 1989, pp. 125.

#### *2.2.1.2. Inefficient Internal Capital Market*

Another way to explain diversification discount is through inefficiencies arising in corporate organisations owing to rent-seeking activities or influence activities by division managers. Rent-seeking activities refer to any actions that agents carry out that are designed to increase the likelihood of better ratings from supervisors, but that add less value on surplus than some other activity that they

could carry out (Prendergast, 1999). Often members of an organisation spend large amounts of time, effort and ingenuity in order to influence decision makers to partake in decisions that are in their favor. This is also a type of rent-seeking activity referred to as influence activity by Milgrom (1988) and Milgrom and Roberts (1988). Besides influence activities[3] the alternative expressions for rent-seeking activities are safeguarding activities (Williamson, 1985) and power-seeking activities (Rajan and Zingales, 2000). Rajan *et al.* (2000), Scharfstein and Stein (2000) and Wulf (1999) formalise the idea that division managers undertake wasteful rent-seeking activities in an internal capital market[4] to influence the CEO or headquarters to give them more funds or internal capital[5] than is optimal. This can lead to inefficient allocation of resources which destroys firm value.

Scharfstein and Stein (2000) explain the inefficient cross-subsidisation of resources in internal capital market with the help of a two-tiered agency model. Inefficient cross-subsidisation occurs when more than the optimal amounts of resources are allocated to some divisions of a conglomerate whilst less than required are provided to others. In their model the CEO of a multi-divisional firm is an agent of outside investors. His job is to hire and retain division managers. He also possesses the authority to re-allocate internal funds and resources across various divisions of the firm. The division managers on the other hand not only participate in productive activity but also engage in wasteful rent-seeking activity[6] to increase their bargaining power with the CEO for obtaining higher

[3]For examples on influence activities in the real world see Carroll (1993), Bower (1970), Mills and Friesen (1996).

[4] Suppose there are two lines of businesses A and B in a multi-segment firm which has both assets in place as well as future investment opportunities. Both the divisions are run by their respective division managers who can either derive private benefits from the assets under their control or might as well have private information about the value of either the assets in place or the future investment opportunities. The divisions A and B can be financed either as a standalone entity in which case they resort to external capital markets e.g. banks, a venture capitalist, or the public debt and equity market or divisions A and B can be financed in the internal capital market in which case the division managers of the respective divisions always approach the CEO of the conglomerate for funding.

[5] Internal capital can be cash flow generated by different divisions in a conglomerate, retained earnings of the divisions, excess surplus generated by the divisions, profits generated by the company as a whole or finance raised by holding assets of a division and redirecting it to another division.

[6] They can engage in improving their outside option or acquiring manager specific skills so that it becomes difficult to fire them.

compensation. Also the manager of the weaker division does more rent-seeking since his opportunity cost of time is lower than the manager of the stronger division. The outside investors would prefer the CEO to use the cash flows generated by different divisions of a conglomerate as extra compensation that has to be paid out to the division managers. But the CEO derives private benefits from the cash flows generated by the firm and prefers to pay the division managers with capital budget.

Inefficient cross-subsidisation occurs in internal capital market in two ways. Firstly the outside investors have no means to enforce the CEO to pay the extra compensation to division managers in the form of cash and hence investment can get distorted. Secondly, since the manager of the weaker division engages more in rent-seeking activity, the CEO diverts more capital budget towards the weaker division and less towards the stronger division which would subsequently generate lower value for the conglomerate. McNeil and Smythe (2009) find evidence that managers with more lobbying power represented by tenure, seniority and board membership always manage to get more capital even if they are in charge of a weaker division. This is consistent with the theory proposed by Scharfstein and Stein (2000).

Glaser and Sautner (2007) use panel data on ex-ante and ex-post capital allocations inside a very large European conglomerate. They show that the difference between the ex-post and ex-ante investment level in an organisation can be explained by the distribution of unexpected "windfall" cash flows inside the firm. They further show that division CEOs who have larger bargaining powers within the conglomerate are more successful in getting a larger part of these "windfall" cash flows for their own business units.

Xuan (2008) uses Standard and Poor's Executive compensation database to document investment inefficiency due to influence activities by CEOs. He finds that after CEO turnover, divisions that are previously not affiliated with the new CEO receive more capital expenditures than the divisions to which the CEO originally belonged. The evidence which he found also suggests that having a specialist CEO negatively affects division investment efficiency. This evidence

led him to conclude that new specialist CEOs use the capital budget as a bridge-building tool to elicit cooperation from powerful divisional managers in previously unaffiliated divisions.

Scharfstein (1998) conducts an empirical study of 165 diversified U.S. conglomerates in 1979 to examine the capital budgeting process in these organisations. He finds that investment in divisions which belong to high Tobin's *q* manufacturing industries are lower than divisions which belong to low Tobin's *q* manufacturing industries. This socialist cross-subsidisation i.e. underinvestment in divisions with good investment prospects and overinvestment in divisions with poor investment prospects is more pronounced in the smaller divisions of the conglomerate. They further find that this problem is particularly prevalent in firms where management has a smaller equity stake; which suggests existence of influence problem between corporate headquarters and investors.

Rajan *et al.* (2000) develop a new theory which supports the rent-seeking theory but in their paper rent-seeking takes on the form of power struggles[7]. Further they propose that the driving force behind inefficient allocation in a diversified conglomerate is the diversity of investment opportunities and resources among the divisions of the firm. Unlike Scharfstein and Stein (2000), here headquarters is the principal who has the power to transfer resources ex ante across divisions but has no power to distribute the surplus that is generated by the divisions ex post. The division managers on the other hand have the ability to distribute the ex post surplus through negotiations. They can also affect the amount of surplus they receive through their choice of investment. There can be two types of investment: Efficient investment which is the optimal investment and defensive investment which returns lower value but protects a division from being preyed upon by other divisions. The rules of the game are such that the surplus generated by a particular division has to be shared by the other divisions. If the divisions are similar in resources and opportunities then surpluses generated by them will not differ much. In that case self interested division managers will have

[7] See Box 2.3 for an example.

no incentive to deviate from choosing efficient levels of investment since the amount shared by the divisions would not be very different.

Inefficiencies arise in this model when the divisions are diverse in resources and opportunities. The division managers know that if the divisions are diverse in resources and opportunities then they will generate uneven surpluses. At least one division manager who generates a higher surplus will not be willing to share his surplus and hence he would undertake defensive investment. The headquarters cannot enforce the sharing rules on the division managers but it can make transfers to the division with poor opportunities in an attempt to make it less diverse so that the manager of the division with better opportunities will choose efficient levels of investment. Thus inefficient cross subsidisation of resources takes place in an attempt to prevent larger inefficiencies which can arise if defensive investment is chosen. Rajan *et al.* (2000) study U.S. firms from 1980 to 1993 and found evidence which supported their theoretical arguments. They use Tobin's *q* as a proxy for opportunity of a division. They find that allocation of resources to low *q* divisions of a conglomerate outweigh the allocation of resources to its high *q* divisions as the diversity between the divisions increases.

**Box 2.3:** An *example of the Influence of Politics on Investment Decisions*

Chandler (1966) describes the capital budgeting process at General Motors under Durant's management in the following way: "When one of them [Division Managers] had a project why he would vote for his fellow members; if they would vote for his project, he would vote for theirs. It was a sort of horse trading."

Another prominent work by Wulf (1999) uses a basic moral hazard model to show that influence activities in the form of signal jamming[8] lead to inefficient capital allocation across divisions. In her model the chief duty of the headquarters is to allocate capital across divisions in order to maximise the value of the firm. There are two types of divisions within the firm. One is a smaller less established division of unknown returns under the supervision of a manager with limited tenure within the firm. This division can be taken to represent newer businesses of the firm. The manager of the smaller division cannot influence the distribution of

[8] See Fudenberg and Tirole (1986)

capital by headquarters. The other division is a large established division with known returns. It could be the core business of the firm. The problem arises due to the varied objectives of the headquarters and the division managers. The Headquarters' objective is to maximise the value of the firm whereas division managers prefer a larger budget. The manager of the larger division has more power to influence the decision making process within the firm. Box 2.4 provides an example of influence activity in internal capital markets. The headquarters relies on the information given by the division manager of the larger established division i.e. private signals and the observable characteristics about the small division i.e. the public signal to decide how much capital to allocate to the smaller division. Influence activity by the larger division manager also involves a cost on the part of the headquarters.

The problem that originates between the headquarters and the division managers can be characterised as a standard moral hazard problem. The headquarters cannot observe whether the large division manager chooses to influence the private signal or not but it can design contracts which can either deter or allow influence activities by large division managers. The headquarters offers an ex ante contract to both divisions. A contract can comprise of any of the two types of investment rules: (a) a contract that deters influence activity or signal jamming by large division managers in which case the investment rule would be uncorrupted. (b) A contract that allows corruption by large division managers in which case the investment rule would be corrupt. In the next stage of the game the large division manager chooses whether to influence or not. If he faces a contract that deters influence activity then he chooses not to jam the private signal. But if he faces a contract that allows influence activity then he incurs a private cost and chooses signal jamming. After observing the private signal the headquarters implements the contract and invests in the small and large divisions. However both types of contract lead to investment distortions relative to the first best situation when there are no influence activities. Firms face a tradeoff between the value of the accurate signal and the cost of eliminating influence activities when they try to design an optimal contract for the large division's manager. This trade off and the investment sensitivity to both public and private signals depends on

how severe the influence problem is in the firm and also the quality of the public signal.

Wulf (1999) uses data on U.S. manufacturing firms to support her theoretical arguments and shows that capital allocation in smaller divisions of manufacturing firms are indeed suggestive of the fact that influence problems lead to inefficient capital allocation. Further she finds evidence that firms with operations in related or less predictable businesses, flatter organisational structures, and financially constrained firms appear to generate higher inefficiencies in their internal capital markets.

**Box 2.4:** An *example of Influence Activity in Internal Capital Markets: IBM's Personal Computer Business*

Mills and Friesen (1996) argue that, "it was mainframe-myopia that so severely damaged IBM in the 1990s" and that "division executives began to put the welfare of their own organizations above that of the corporation as a whole ... in the resistance of the mainframe division to introduction of new technology." Carroll (1993) documents that the manager of the general Products Division, "couldn't finance a personal computer because he had too many projects going"; Frank Cary (chairman) resolved the conflict with the remark "I'll finance it." The author argues that "as the mainframe profits disappeared, IBM squandered its opportunities to turn the PC or anything else into a business that would wax as mainframe waned." Based on these documents on IBM's history, it is evident that resistance by the mainframe division (large established division) about investment opportunities for the IBM PC division (smaller division operating in a less predictable business) was to be blamed at least to some extent for the inconsistent success in personal computers' business.

Schoar (2002) uses plant-level observations from the Longitudinal Research Database in 1987 and finds that conglomerates are more productive than their standalone counterparts in similar industries even though conglomerates are traded at an average discount. She suggests that this discrepancy could be the result of higher wages paid out by conglomerates. However this kind of mixed evidence on diversification discount calls for a theory which can analyse the costs and benefits of diversification and identify the conditions leading to diversification discount or premium. Choe and Yin (2009) provide such a theoretical framework by analysing the investment decisions in a multidivisional firm. In their model they show that if conglomerates are successful in breaking the

budget constraint of their divisions then efficiency of a conglomerate increases through its internal capital market. The CEO in their model has the authority to pool and reallocate resources across divisions but cannot do so independently. Their decision to allocate resources to a particular division depends on the information provided by the division manager about the state of that division. The division managers on the other hand derive private benefits from their own divisions. These private benefits are an increasing function of the revenues generated by that division. Higher investments in a division would mean higher revenues and higher private benefits for the division managers. So naturally the division managers have no incentive to reveal the true state of their division.

Choe and Yin (2009) propose that the only way to extract truthful information from the division managers is to reward them for truthful revelation in the form of information rents. Thus there exists a tradeoff between the benefits of internal capital markets such as pooling resources and reallocating them to best net present value projects and costs of operating internal capital markets in conglomerates, such as information rents which appear in the form of higher wages. They also show that information rents are generally larger in conglomerates than in single segment firms. Finally they argue that when the costs outweigh the benefits of internal capital markets then conglomerate firms trade at a discount and vice versa. The notable feature of their model is that here diversification discount is not the product of misallocation of resources in internal capital markets but due to information rents paid out to division managers which is again supportive of the earlier empirical findings by Schoar (2002).

#### *2.2.1.3. Does Diversification Destroy Firm Value?*

A different school of thought supports the argument that conglomerate discount may not destroy the value of the firm. Fluck and Lynch (1999) argue that often standalone firms have marginally profitable positive net present value projects which cannot be financed in the external capital market due to agency problems. They suggest that conglomerate merger is a technology which helps these kinds of projects to survive by funding them in an internal capital market. These positive net present value projects enhance the value of the conglomerates

by sending positive signals to shareholders about the ability of the manager to identify a potentially profitable project. But at the same time since these projects are marginally profitable they create less value than a comparable portfolio of single-segment firms i.e. they trade at a discount. Once the acquired firms overcome their distress period and become profitable so that they can be financed in an external capital market the acquiring firm chooses to divest the acquired firm if there are coordination costs involved in being a conglomerate. Other than supporting the efficiency of internal capital markets the theory proposed by Fluck and Lynch (1999) reconcile two contradictory empirical findings: (a) mergers increase the value of both the acquiring firm and the target firm, and (b) diversified firms are less valuable than stand-alone firms. Box 2.5 provides an example which Fluck and Lynch (1999) use to support their arguments.

**Box 2.5:** *Diversification does not destroy Value: An Example*

> "One recent *merger* that involved an existing company with marginally profitable projects is American Home Products (AHP), an acquisition of A. H. Robins, Inc. American Home Product's lack of new products made liquidation an attractive option for its investors since its existing products were only marginally profitable. A. H. Robins was a pharmaceutical developer and manufacturer with a respected research and development staff and a strong health-care product line including several well-known trademarks. Consistent with our model, their merger allowed AHP to continue financing its existing marginally profitable products."- Fluck and Lynch, 1999, pp. 321.

Burch *et al.* (2000) also support the argument that diversification does not destroy value of the firm even though it trades at a discount. They try to support their argument from an industry perspective. They argue that firms which belong to non-innovative industries are less adaptable to industry shocks or incorporation of new opportunities as compared to firms which belong to innovative industries. Hence it is best for non-innovative firms to diversify and form conglomerates in order to survive. Once these firms form into conglomerates then they can get funding through internal capital markets and survive industry shocks. The remaining firms which stay as single segment firms face less competition once conglomeration of more sensitive firms take place and hence they become more

profitable. Single segment firms comprise of both innovative and non-innovative firms whereas conglomerates comprise of non-innovative firms only. The value of a non-innovative firm is lower than the value of an innovative firm in the industry. Hence conglomerates are valued at a discount compared to more focused firms. They use panel data for fifty prominent industries from 1978 to 1997 and found evidence in support of their argument. Figure 1 and Figure 2 in Box 2.6 illustrates the main results obtained by Burch *et al*. (2000). Their empirical results show that industry conglomeration levels are higher for heavily discounted conglomerates whereas, investment opportunities for single segment firms in the same industry are lower.

**Box 2.6:** *Conglomeration Level and Excess Value of the Firm*

*Figure 1: Conglomeration levels and excess value through time*

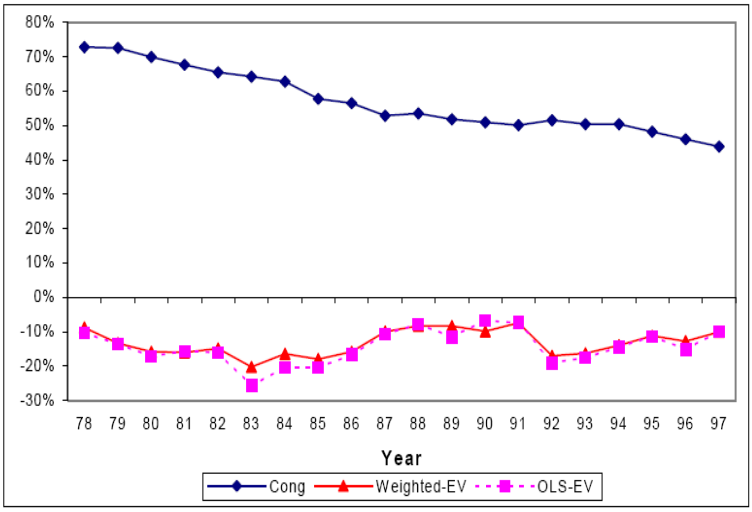


Figure 1 shows that the conglomerate merger wave of the 1970s was somewhat reversed during the 1980s and 1990s, as the median conglomeration levels of the 50 industries chosen by Burch *et al.* (2000) show a steady decline throughout this period, from 73% in 1978 to 44% in 1997.

*Figure 2: Detrended conglomeration and excess value relative to industry medians*

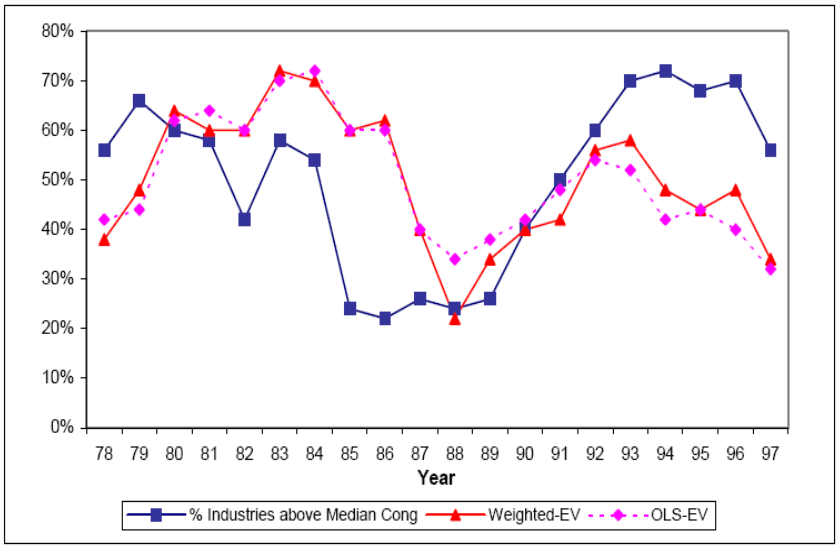


Figure 2 depicts the hypothesis by Burch *et al.* (2000) that when conglomeration is high excess value should be low.

*Source: Figures are taken from the original paper by Burch et al., 2000, pp.30, 32.*

A strand of literature is in favor of the argument that diversification enhances the value of the firm by providing evidence[9] that stock prices go up on announcement of corporate diversification. On the other hand empirical literature[10] on diversification shows that diversified firms trade at a discount compared to single-segment firms in the same industry. Matsusaka (2001) defines diversification as a 'search/match' process and tries to explain this puzzling phenomenon with the combination of organisational theory and historical evidence. Firms that have organisational capabilities, such as marketing, distribution skills and knowledge of senior and top management, can be transferred to other products and industries. When firms perform poorly and incur lower sales, then instead of liquidating the 'assets/resources' completely firms try to find other firms which are more suitable for their organisational capabilities. Matsusaka (2001) describes this process of identifying and observing the outcome resulting from such a 'search/match' process as diversification. He argues that diversification discount occurs because diversified firms do not find a good match for their organisational abilities rather than due to diversification itself. And firms continue to diversify until they find their suitable matches and in the process they often completely transfer their resources away from their core businesses into some other industry.

He further argues that diversification announcements raise stock prices because such announcements act as a positive signal which imparts the message to investors that the diversified firm is not so bad even if it trades at a discount or is making losses, since it is not liquidating. He also tracks the businesses of 63 conglomerates from 1958 to 1988 and finds that diversifying firms often exit their core businesses, which supports his argument that diversification is a 'search/match' process. Figure 3 in Box 2.7 provides evidence on five conglomerates. Figure 3 plots by year (1958 to 1988) the number of acquisitions as a positive number and the number of divestitures as a negative number. For example, Textron announced seven acquisitions and two divestitures in 1958. It

9 Schipper and Thompson (1983) found that the announcement returns for the conglomerate acquisition programs were positive. Matsusaka (1993) found that bidder announcement returns for diversifying acquisitions were positive in the 1960s.
10 See Berger and Ofek (1995), Lang and Stulz (1994)

can be observed that the structures of these organisations were always changing due to acquisitions and divestitures throughout the time period. Acquisition and divestiture were not exclusive events for these firms but rather an ongoing process.

**Box 2.7:** *Acquisition and Divestiture History of Five Conglomerate Corporations: 1958-1988*

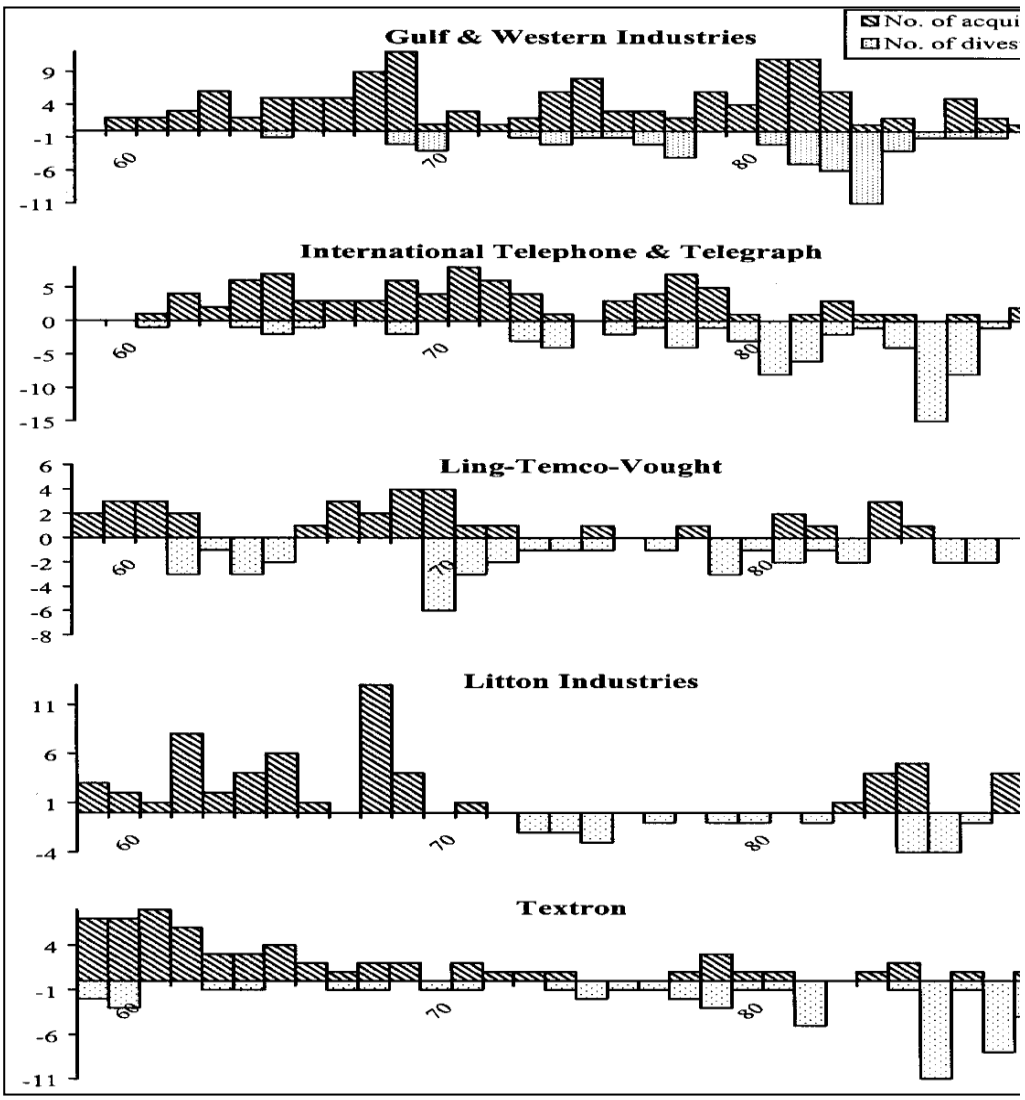


*Figure 3*

*Acquisition and divestiture history of five conglomerate corporations: 1958-1988*

*Source: Matsusaka, 2001, pp. 413.*

Gomes and Livdan (2004) explains diversification discount with the help of the neo-classical theory of profit maximisation by firms. They put forward two arguments behind a firm's decision to diversify. Firstly diversification allows firms to reap the benefits of economies of scope by lowering the cost of production and by eliminating unnecessary activities in various divisions. Secondly when a firm is mature its growth slows down. In that case firms diversify to reap the benefits of new productive opportunities. They characterise production as subject to diminishing returns to scale. Hence with higher production the firms experience diminishing returns which motivate the firms to search for other new productive opportunities. Their theoretical findings are supportive of the empirical findings by Lang and Stulz (1994) and Schoar (2002). First of all they found that diversified firms have a lower value of Tobin's $q$ as compared to single segment firms despite the fact that diversification was an optimal strategy for a firm and inefficiencies were absent from their models. They put forward the argument that diversified firms trade at a discount since only those firms which are less productive in their current activity diversify in search of better productive opportunities. Secondly their theory also predicts that firms undergoing diversification also experience loss in productivity.

### 2.2.2. *Benefits of Conglomerate Diversification: Diversification Premium*

#### *2.2.2.1. Efficient Internal Capital Market*

External capital markets are often imperfect and costly to operate in and that is why many firms choose to operate in an internal capital market. Williamson (1970, 1975) suggests that firms diversify to prevail over the imperfections that exist in external capital markets by gathering and channeling resources efficiently across their divisions through an internal capital market[11]. The external and internal capital markets also differ with respect to the residual control rights[12] over the respective firm's assets. The external financier (e.g. a bank) does not own the firm to which it is lending capital but the internal financier

[11] See Box 2.8 for examples on efficiency of internal capital markets.
[12] See Grossman and Hart (1986)

(i.e. the headquarters) owns the firm in the sense that it has residual control rights over the use of the firm's assets.

Gertner *et al.* (1994) show that this difference in control rights between an external financier and an internal financier has three very important consequences for the firm in question: (a) increased monitoring incentives, (b) decreased entrepreneurial incentives, (c) better asset redeployability. Unlike banks, headquarters have a stronger incentive to monitor the activities of the firm and its managers since better monitoring will ensure a higher return for the latter, owing to its control rights. The downside of the residual control rights of headquarters is that it lowers the incentives of the managers to work harder. Since the managers do not have control rights over the firm's assets they cannot appropriate all the rents pertaining to their managerial ability and are also exposed to opportunistic behavior from the headquarters. Another weakness of internal financing pointed out by Gertner *et al.* (1994) is influence activities by the managers which might create less value for the company. In an internal capital market there is a higher chance of interaction between managers and headquarters where the former might try to influence the latter with regards to investment decisions. The third consequence leads to better use of corporate assets. If a particular business unit performs poorly then its assets can be transferred to another unit where those assets can be used more efficiently. On the contrary if a single segment firm performs poorly it is often left with no other choice but to liquidate its assets at a lower value.

**Box 2.8:** *Efficiency of Internal Capital Markets: Some Examples*

1. General Electric allocates capital internally to business units as diverse as GE Appliances and GE Plastics, while comparable stand-alone operations such as Maytag (appliances) and A. Schulman (plastics) raise funds directly from the capital market. Maytag and A. Schulman both have a substantial amount of bank debt outstanding.

2. Alchian (1969) writes: The investment funds (capital) market within General Electric is fiercely competitive and operates with greater speed to clear the market and to make information more available to both lenders and borrowers than in the external "normal" markets. In fact, I conjecture that the wealth growth of General Electric derives precisely from the superiority of its internal markets for exchange and reallocation of resources-a superiority arising from the greater (cheaper) information about people and proposals.

*Source: Gertner et al., 1994, pp. 1211.*

The 'winner-picking' theory of Stein (1997) also supports the argument that diversified firms can create value. In his model the headquarters has the control rights to resources and it derives private benefit generated by projects that are under its control. The headquarters will receive a larger share of private benefit generated by a more profitable project. So the incentive of the headquarters is to undertake more profitable projects which will increase its private benefits. Owing to its control rights the headquarters can take the resources from one division and divert it to the most deserving division where the returns are higher or it can use one division's assets as collateral to raise finance and then divert it to a more profitable division. The main proposal by of Stein (1997) to prevent agency problems due to managers who engage in wasteful rent-seeking is to take control from them and give it to headquarters, which can create value for the firm owing to its control rights over the firm's resources.

*2.2.2.2. Debt Coinsurance*

Debt capacity adds value to the firm and diversification increases firm value by increasing overall debt capacity. Lewellen (1971) argues that diversified firms can have higher debt capacity because diversification reduces their variability in earnings and thus the creditors have greater confidence in the total cash-flow of all

the divisions of a multi-divisional firm compared to a focused firm. Their argument is based on 'lender diversification' and 'borrower diversification'. When a lender diversifies he spreads the risk by lending parts of his total portfolio to different organisations and thus ensures that his portfolio cannot all go bad at the same time. But he cannot ensure that a borrower will not default on his loan through this diversification. On the other hand when borrowing firms diversify by merging then the chances of loan repayment increases because if one of the merging partners is performing poorly the other merging partner can support him with his excess cash flow. The chance of defaulting on a loan decreases in the case of diversification by mergers. This in turn boosts the confidence of lenders, which leads to higher debt capacity for the diversified conglomerate.

Shleifer and Vishny (1992) argue that besides higher cash flows conglomerates have advantage in terms of liquidity of assets. Box 2.9 provides two examples cited in Shleifer and Vishny (1992) which demonstrate that conglomerates with more liquid assets have a higher debt capacity. Redeployable assets like commercial property can be more easily liquidated than growth assets like high technology firms and cyclical assets like steel and chemical firms. A conglomerate can sell its assets to several different industries. As long as conglomerates have sufficient assets in the liquid industry, they can avoid selling their assets to industries which are illiquid in terms of assets. A conglomerate also has the option of liquidating its assets in parts so that the value of the liquidated asset remains unaffected. Thus if a focused firm needs to sell its assets during a financial crisis it may find it difficult to do so since its industry peers are also facing the same crisis. On the other hand a diversified firm has the option of selling its assets to those industries which are least affected by the crisis. Thus diversified firms are more insured against market risk and hence have higher debt capacity.

**Box 2.9:** *Conglomerates with higher Liquid Assets have higher Debt Capacity: Some Examples*

1. *Illiquid Assets*: "More recently, when Eastern and Pan Am put their assets up for sale at a time when other airlines were themselves losing money, the potential buyers could not borrow money as easily and assets appeared to be selling at more "distressed prices." For example, in December 1991 United bought bankrupt Pan Am's Latin American routes for $135 million compared to the $215 million it had offered in late August and $342 million paid earlier to Eastern by American for similar routes. The institution of airline leasing seems to be designed partly to avoid fire sales of assets: airlines can stop their leasing contracts when they lose money rather than dump airplanes on the market which has no debt capacity. Even leasing companies, however, have a limited debt capacity and, therefore, cannot absorb all the planes put on the market when an industry suffers an adverse shock." - Shleifer and Vishny, 1992, pp. 1355.
2. *Asset liquidity and Debt Capacity*: "It is hard to know how big the illiquidity costs of distress are. Real estate appraisers typically assume that the rapid sale of real estate leads to price discounts of 15 to 25 percent relative to the orderly sale that might take several months. Kaplan (1989) cites Merrill Lynch estimates that the distressed sale of the Campeau retail empire would bring about 68 percent of what an orderly sale would bring. The New York Times reported that the rapid sale discount on the Trump Shuttle may be as much as 50 percent." - Shleifer and Vishny, 1992, pp. 1358.

#### *2.2.2.3. Economies of Scope*

Economies of scope often originate from the common use of proprietary knowhow or the common and recurrent use of some specialised and indivisible assets. Such economies of scope are often hard to generate in an external market owing to market imperfections, high costs of transfer and incomplete rules of transaction. Teece (1980) proposes that a diversified firm can reap the benefits of such economies of scope owing to its organisational form. A multi-divisional firm can transfer knowhow across its divisions and thus reap the benefits of economies of scope which in turn increases its value. Similarly assets which can be used to produce many related end products can be used more efficiently if they are owned by a single company. He explains his proposition in the context of diversification of the US oil industry. Teece (1982) argues that firms diversify in order to reduce the transaction cost involved in obtaining various assets and services from

different markets. Both papers argue that firms that can use similar knowhow and assets can reap various benefits owing to their organisational form and economies of scope can create value for a diversifying firm.

#### *2.2.2.4. Market Power*

Villalonga (2000) argues that firms diversify to acquire more market power. Her study offers three different anti-competitive motives for diversification. First of all, firms diversify so that they can use the profits generated by one division to support aggressive pricing in another division. The second reason is the mutual forbearance hypothesis of multi-market competition[13]. The third reason is that firms often diversify to engage in reciprocal buying with other large firms in order to drive small competitors out of business. Scott (1982) argues that when firms have high seller concentration and high multimarket contact, then this leads to higher profitability for the diversified firm. Diversified firms have a presence in several markets which helps them to reap the economies of multi-market operation. The economies of multi-market operation could be lowering of advertising costs or lower R&D expenditures. Also due to such multi-market presence the sellers often form interdependent groups such that resources cannot flow freely in the market outside the group. This gives them power and profitability. They use data on US manufacturing firms to show that conglomerates with high seller concentration and high multi-market contact reap higher profits.

[13] Edwards (1955) was the promoter of this theory. The mutual forbearance hypothesis of multi-market competition states that conglomerate firms that come in contact with each other in many markets will develop a 'live and let live' philosophy. This is because any action taken by a certain firm in one particular market might trigger retaliation in other markets where it is more vulnerable. As a result the prevalence of conglomerate firms might reduce rivalry among firms even in markets with relatively competitive structure. Firms in the banking industry as suggested by Solomon (1970) could be an example of developing a mutual forbearance hypothesis of multi-market competition.

## 2.3. Empirical Literature on Diversification Discount

The empirical studies produce mixed evidence on the issue of diversification discount versus premium. Lang and Stulz (1994) use the Business Information file of Compustat for the period from 1978 to 1990. They find that U.S. firms trade at an average discount of 27% to 54% from 1978 to 1990 as compared to the single segment firms in the same industry after controlling for industry effects. Berger and Ofek (1995) use data from the Compustat Industry Segment database from 1986 to 1991 for firms that have total sales of at least $20 million except those in utilities or financial services. They find that diversified U.S. firms have 13% to 15% lower values on average as compared to the focused firm in the same industry. Servaes (1996) conducts a study on U.S. firms from 1961 to 1976 and found a large diversification discount during the 1960s which eventually reduced to zero during the 1970s. The mean industry adjusted discount for 1961 to 1970 is found to be 59%, whereas it is only 6% for 1973 to 1976.

Lins and Servaes (1999) use a sample of publicly traded firms from Germany, Japan and the United Kingdom from the Worldscope database for 1994 and 1996. They find no significant discount in Germany, whereas there is 10% discount in Japan and 15% in the United Kingdom. Khanna and Palepu (2000) examined firm level data from the Centre for Monitoring the Indian Economy and Bombay Stock Exchange for 1993. Their study show that Indian firms which are affiliated to Indian Business Groups trade at a premium compared to unaffiliated firms. Lins and Servaes (2002) use the Worldscope database to study seven emerging markets (Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand) in 1995 and find that diversified firms trade at a discount of 7% compared to stand-alone firms. Fleming (2003) finds that multi-segment firms in Australia trade at 29% more discount than a comparable portfolio of single segment firms between the period 1988 and 1998. But when low performing firms are eliminated from the sample the discount is not significant anymore. Villalonga (2004) uses the Business Information Tracking Series instead of COMPUSTAT for U.S. firms between 1989 and 1996 and finds a diversification premium.

This section provides an extensive review of the empirical literature on diversification and supplies international evidence on both diversification discount and premium. Also various data and methodologies used in this literature are discussed and a comprehensive table is provided for ease of comparison in this regard. Furthermore the main findings of the significant contributors to this literature are discussed and a description of how different authors have explained their findings is presented.

### *2.3.1. Empirical Evidence*

Table 2.1 provides summary information on major works in this area and shows the time-period covered, the country of study, databases used to draw information and whether the diversified firms traded at a discount or premium during that period. Studies conducted on U.S. firms clearly provide mixed evidence. Lang and Stulz (1994), Berger and Ofek (1995), Bernardo *et al.* (2000), Anderson *et al.* (2000) and Graham *et al.* (2002) find that diversified firms in the U.S. were traded at a discount. They cover the period from 1978 to 1998 and use data from COMPUSTAT. Servaes (1996) studies 1961 to 1976 and finds a discount for the 1960s which vanished in the 1970s. Campa and Kedia (2002) and Mansi and Reeb (2002) also find a discount at the beginning of their period of study which either vanished eventually or turned into a premium. Schoar (2002) finds both discount and premium for two different measures using data from Longitudinal Research Database (LRD) at the U.S. Bureau of Census. Villalonga (2004) finds a premium using Business Information Tracking System but a discount using data from COMPUSTAT for 1989 to 1996. The evidence provided in Table 2.1 is inconclusive as to whether diversified American firms traded at a discount or a premium. The discrepancies in the results could stem either from methodological issues or from using different data sources. These issues will be discussed in detail in the following sections.

International studies also show that discount exists in some countries whereas others have premium. Lins and Servaes, 1999; Lins and Servaes, 2002) find that discount existed in Japan, United Kingdom, Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand whereas no discount

is found in Germany. Lins and Servaes (2002) find that diversified firms traded at a discount in India but Khanna and Palepu (2000) find a premium for Indian firms using a different data source. Fleming *et al.* (2003) find that Australian firms traded at a discount between 1988 and 1998, but the discount vanished when low performing firms are excluded from the sample. The international evidence suggests that the existence of discount or premium could result from institutional differences across countries, methodological issues, use of different data sources or sample selection bias. The following section provides a detailed discussion of methodologies, various measures and controls used by the above authors.

**Table 2.1:** *International Evidence on Diversification Discount/Premium*

| Author | Year | Country | Database | Discount/Premium |
|---|---|---|---|---|
| Lang and Stulz (1994) | 1978-1990 | U.S. | Business Information file of Compustat | Discount |
| Berger and Ofek (1995) | 1986-91 | U.S. | Compustat Industry Segment database | Discount |
| Servaes (1996) | 1961-1976 | U.S. | Compustat, Dun & Bradstreet's Million Dollar Directory | Large discount for the 1960s. No discount for the 1970s. |
| Lins and Servaes (1999) | 1994 and 1996 | Germany, Japan and the United Kingdom | Worldscope database | No discount in Germany. Discount in Japan and U.K. |
| Khanna and Palepu (2000) | 1993 | India | Centre for Monitoring the Indian Economy and Bombay Stock Exchange | Premium |
| Bernardo *et al.* (2000) | 1980-1998 | U.S. | Compustat, CRSP | Discount |
| Anderson *et al.* (2000) | 1985-1994 | U.S. | Compustat Industry segment database | Discount |
| Lins and Servaes (2002) | 1995 | Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand | Worldscope database | Discount |
| Graham *et al.* (2002) | 1978-1995 | U.S. | Compustat Industry segment files, Securities Data Corporation Mergers and Acquisition database | Discount |
| Campa and Kedia (2002) | 1978-1996 | U.S. | Compustat Industry segment database | Discount initially and Premium later. |
| Schoar (2002) | 1987 | U.S. | Longitudinal Research Database(LRD) at the U.S. Bureau of Census | Premium using profitability measure and Discount using excess value measure. |
| Mansi and Reeb (2002) | 1988-1999 | U.S. | Disclosure Worldscope database, Lehman Brothers Fixed Income Database | Discount initially but it vanishes later. |
| Fleming (2003) | 1988-1998 | Australia | AGSM annual report files, Connect 4 databases, Datastream | Discount initially but it vanishes later. |
| Villalonga (2004) | 1989-1996 | U.S. | Business Information Tracking Series, Compustat | Premium using BITS. Discount using Compustat. |

### *2.3.2. Methodology used in Measuring Discount/Premium*

In this section a detailed discussion of methodologies used by different authors to calculate diversification discount and premium is provided and then the discussion is summarised in Table 2.2 for ease of comparison. Lang and Stulz (1994) use Tobin's *q* as a measure of firm performance. Tobin's *q* is the ratio of market value of firm to the replacement value of its assets which measures the contribution of firm's intangible assets to its market value. Intangible assets (organisational capital, reputational capital, monopolistic rents, investment opportunities and even managerial entrenchment) of the firm can be directly affected by the action taken by managers. Hence management can either increase or decrease the value of the firm by their choice of portfolios. For example, if the value of a portfolio of unrelated businesses equals the sum of their values then the *q* ratio of diversified firms should not differ from the *q* ratios of comparable portfolios of specialised firms. This would mean that the management cannot add more value to the businesses by forming conglomerates. But if diversification creates or destroys value then the *q* ratio of diversified firms should be greater or less than the *q* ratio of a comparable portfolio of single segment firms.

They use three different measures of diversification to compare the *q* ratio of single segment firms with multi-segment firms for various levels of diversification. The first two measures are Herfindahl indices constructed from sales and assets. These indices are a sum of the squared values of sales per segment as a fraction of total firm sales. Thus the Herfindahl index would take the value of one for single segment firms and its value decreases as the number of segments increases. The third measure is the number of segments in the firm since more diversified firms have more segments.

Lang and Stulz (1994) use cross-sectional regressions for each year from 1978 to 1990. They use a dummy variable to estimate the statistical contribution to *q* of diversification. $D(j)$ is a dummy variable that takes the value of one if a firm has *j* segments or more and is interpreted as the marginal contribution to *q* of the *j*th segment in the cross-sectional regression. *q* is regressed on a constant and

these dummy variables. The coefficient on $D(2)$ gives the difference between $q$ for firms with two segments and $q$ for firms with one segment. The sum of the coefficients on $D(2)$ and $D(3)$ is the difference between $q$ of firms with three segments and $q$ of firms with one segment. However, Lang and Stulz (1994) point out the drawback of this method. They argue that since this method does not take into account the industry effects, a firm belonging to an industry with low-q will automatically have lower $q$ irrespective of diversification. This short coming is corrected for by using industry-adjusted measures of discount. Industry adjusted measures of discount is the difference between its pure-play $q$ and its $q$. The pure-play $q$ of a firm is an asset value-weighted average of division $q$s. The division $q$ proxies for the average of the $q$s of one-segment firms in the same three-digit SIC code as the division. After calculating this variable two different regressions were estimated. The first regression is estimated using a dummy variable $D(j)$ which accounts for the marginal contribution to $q$ of diversification. The second regression is estimated using dummy variable *D(Div),* which takes a value of one if the firm has two or more divisions. The coefficient of this second dummy variable reports the average diversification discount.

Berger and Ofek (1995) use asset and sales multiplier instead of Tobin's $q$ in order to measure the value effect of diversification. They use the natural log of the ratio of a firm's actual value to its imputed value as a measure of excess value. The imputed value of each segment is calculated by multiplying the median ratio of total capital, for single segment firms in the same industry by either segment sales, assets or earnings. Positive excess value means that the diversification leads to higher value for the diversified firm as compared to its stand alone counterparts and negative excess value denotes value loss from diversification. In order to show the possible association between value loss and diversification they estimate pooled regressions using multi-segment dummy and control for firm size, profitability and growth opportunity of the firm. The multi-segment indicator equals one in case of multi-segment firms and captures the percentage difference in average excess value between single-segment and multi-segment firms. This is similar to the dummy variable *D(Div)* used by Lang and Stulz (1994). They also

estimate separate regressions, first using the revenue-based Herfindahl index instead of the multi-segment dummy and secondly using numbers of segment and relatedness across segments. In addition they calculate the average dollar losses from diversification.

Khanna and Palepu (2000) use Tobin's *q* and rate of return on assets (ROA) as a measure of firm performance. Four different diversification measures are used in their analysis: (a) INDCNT: a count of industries represented in a group, (b) ENTROPY: sum of entropy index of related diversification and an entropy index of unrelated diversification, (c) CONCENTRIC: a weighted average of each firm's share of group sales and (d) HERFIDAHL: sum of squares of each industry's sales as a proportion of total group sales. Both Univariate comparisons and Multivariate regression analysis are performed using Tobin's *q* and ROA. They further use (a) the degree of access to international investors and joint venture partners, (b) monitoring/entrenchment by inside owners and (c) financing through internal capital markets to explain their results.

Graham *et al.* (2002) argue that if diversification discount is calculated using the Berger and Ofek (1995) methodology then that might not provide an accurate value due to sample selection bias. The single segment firms which are used as a benchmark for calculating the imputed value of the diversified firm may not be a true representative of a segment in a diversified firm. A diversifying firm may acquire a single segment firm which was already trading at a discount. So naturally any single segment firm belonging to the same industry cannot be a true representative of the acquired business which is already trading at a discount. If this is taken into account then diversification discount appears in diversifying firms due to acquiring businesses which are already trading at a discount but not due to the act of diversification itself.

They used two types of samples of firms to find out whether sample selection bias is responsible for diversification discount. The first sample consists of firms which are involved in mergers and acquisitions and for which the market value of the target and the acquirer can be identified prior to acquisition. The second sample comprises of firms that begin as single-segment firms and then

increase their number of segments. Nearly two-thirds of the firms in the second sample increase their segments via acquisitions and one-third of the firms increase their segments because of internal expansion or reporting changes. The excess value measure is calculated using the methodology used in Berger and Ofek (1995). However Graham *et al.* (2002) use diversification measures which are based on relatedness between segments and number of segments. If the acquiring firm and the target have any similar four-digit SIC codes then they are related, otherwise the acquisition is unrelated. Secondly firms are also classified based on whether or not they report increase in business segment following acquisitions. In order to provide preliminary evidence on the expected valuation effects of the acquisitions they compute event study returns over the three day period covering the announcement date of acquisitions as reported in the Securities Data Corporation Mergers and Acquisitions database.

Campa and Kedia (2002) use instrumental variables and also control for the self-selection of firms that diversify by using Heckman's (1979) two stage procedure. They also use Berger and Ofek (1995) excess value and diversification measures to account for diversification discount. They use both industry specific and firm specific instruments. Industry specific instruments include (a) PNDIV: Industry attractiveness which is captured by the fraction of all the firms in the industry which are conglomerates. A Higher value of PNDIV would mean that the industry factors are very attractive for diversification, (b) PSDIV: Fraction of sales by other firms in the industry accounted for by diversified firms. (c) MNUM: number of merger/acquisition announcements in a given year. If the market for merger/acquisition is higher, then there will be a higher probability of that firm diversifying. (d) MVOL: annual value of announced merger/acquisitions, in billions of U.S. dollars. (e) GDP: real growth rates of gross domestic product and its lagged value (GDP1). These two capture the time trends in the macroeconomic conditions and business cycles. (f) CONTRAC: number of calendar months that the economy was in recession and also its lag value (CONTRAC1).

The firm specific instruments include (a) MAJOREX: a dummy that takes the value 1 when the firm is listed on NYSE, Nasdaq or Amex and 0 otherwise. Listed firms are more likely to diversify compared to unlisted firms owing to greater visibility, lower information asymmetry, greater analyst coverage and higher liquidity. (b) SNP: a dummy that takes the value of 1 if the firm belongs to the S&P industrial index or the S&P transportation index and 0 otherwise. Firms belonging to the S&P index have higher liquidity which affects both relative firm value and the decision to diversify. (c) FOREIGN: a dummy variable that takes the value 1 if the firm is incorporated abroad and 0 otherwise. Foreign firms are more likely to engage in diversification and refocusing, hence it is essential to capture this effect. Besides these instrumental variables they control for firm size and profitability like Berger and Ofek (1995). Finally they estimate the Berger and Ofek (1995) model, the extended Berger and Ofek (1995) model, regression with firm-fixed effects and year-fixed effects, model with instrumental variable and model with self-selection. They use Probit estimation to calculate the probability of diversifying using the instrumental variables and the control variables. They use these estimation results in the models with instrumental variable estimation and self-selection.

Schoar (2002) adopts a different methodology to address the issue of whether diversification destroys value or not. He uses micro level data for manufacturing firms from the Longitudinal Research Database from the U.S. Bureau of the Census. Instead of using market valuation measures such as excess value of the firm he uses productivity measures of firm performance like total factor productivity (TFP). TFP measures of firm performance are obtained at the plant level by estimating a log-linear Cobb-Douglas production function for each industry and year. Number of segments and Herfindahl index are used as measures of diversification. He also controls for firm size and segment size in his regressions. Schoar (2002) tests several different hypotheses in his paper and uses different dummies to do so. AFTER is a dummy variable equal to one in each of the three periods after the acquisition and zero in the three periods before the acquisition. DIVERSE takes the value of one for a move from a less to a more

diversified firm and zero for a move in the other direction. He also uses hourly wages of workers to explain his results.

Lins and Servaes (2002) use the Berger and Ofek (1995) methodology to estimate their model. But they also use excess profitability along with excess value measure of Berger and Ofek (1995). They also control for geographic diversification since international diversification might reduce firm value. Hence they use a dummy variable which takes the value of one if the firm has foreign sales and zero otherwise.

Villalonga (2004) points out three criticisms of using segment level data from COMPUSTAT. She argues that diversification discount could be the manufactured product of segment data that is reported in COMPUSTAT. COMPUSTAT provides disaggregated financial information for business segments that represent at least 10% of a firm's sales, assets or profits and also determines diversified and non-diversified firms and the industries in which each firm operates. Unless this information is accurate the excess value measures will be affected, since the aggregation of imputed values of each segment will not represent the true market value of the firm.

The use of segment data from COMPUSTAT poses certain problems. First of all, according to the Financial Accounting Standards Board firms need to report disaggregated information for segments that meet the 10 percent materiality condition. Hence the maximum number of industries that can be observed for any firm is 10. Again due to managerial discretion often the actual number of segments is not reported. This happens even more when industries are defined at the four-digit SIC code level of precision as in COMPUSTAT. The second problem relates to the way segment is defined in the Statement of Financial Accounting Standards (SFAS). Accordingly a segment can be an aggregation of two or more activities which are either horizontally or vertically related. It is often found that firms report segments which operate in sometimes totally unrelated activities. Hence comparing such segments might not provide a true picture about the relatedness of these segments. Lastly firms often change the segments they

report even when there is no real change in their operations. So instances of diversification or refocusing in COMPUSTAT are often simply reporting changes.

These three problems can have serious implications for the excess value measures of diversification. This is because the firms can often get misallocated to industries and vice-versa. Firms which belong to more than one industry might often be misrepresented which can affect the industry mean or median *q*s. The single segment firms which are reported in COMPUSTAT might often have operations in different businesses. Hence calculations of pure play *q*s using segment data from COMPUSTAT might not be accurate. Villalonga (2004) uses a new data source, Business Information Tracking Series (BITS), which can correct the problems in COMPUSTAT.

BITS provide establishment-level panel data between 1989 and 1996 for all U.S. private sector establishments with positive payroll in any of these years, from both public and private firms. A business establishment is the basic unit of analysis in BITS and is defined as "a single physical location where business is conducted or where services or industrial operations are performed". She further sites three reasons as to why BITS is better than COMPUSTAT. First, disaggregation at the establishment level allows for a breakdown of firm's activities by industry in a consistent way across firms. Second, the establishments are linked longitudinally. Third, BITS covers all sectors of the economy. Comparisons of the BITS, COMPUSTAT and a combined data show that BITS has a greater coverage and hence use of BITS leads to greater information gain. Villalonga (2004) uses the methodology used by Lang and Stulz (1994) and Servaes (1996). While calculating Tobin's *q* using BITS they use information on business units to calculate pure play *q*s and business unit size is measured by employment. All single business firms are taken as single segment firms while using BITS.

Villalonga (2004) uses varied measures of diversification in order to calculate the diversification discount/premium. She uses the multi-segment or the multi-business dummy as a primary measure of diversification like several other studies before her. But she uses five other measures to check the validity of her

results. Besides using a discreet measure like number of business units in the firm she uses four continuous measures where higher levels of diversification lead to them having higher values. These continuous measures are: 1 minus Herfindahl index and three measures of entropy. The three entropy measures include total entropy, unrelated entropy and related entropy. Total entropy measure is very similar to Herfindahl index and is computed at a four-digit SIC level. Unrelated entropy is calculated at a two-digit SIC level and related entropy is the difference between total entropy and unrelated entropy.

**Table 2.2:** *Variables used to study Value Effect of Diversification*

| Author | Excess value measure | Diversification measure | Independent variables & Control variables |
|---|---|---|---|
| Lang and Stulz (1994) | Tobin's *q* | Dummy variables for number of segments, Herfindahl index | Size, R&D, ability to access financial markets. |
| Berger and Ofek (1995) | Asset and sales multiplier, profitability | Multi-segment indicator, number of segments, Related segments | Firm size, profitability, growth opportunity. |
| Servaes (1996) | Tobin's *q*, sales multiplier | Diversification dummy, Dummy variables for number of segments | Firm size, dividend payments, profitability, leverage, investment policy. |
| Lins and Servaes (1999) | Sales multiplier | Diversification dummy | Firm size, profitability, growth opportunity, insider ownership, corporate ownership, bank ownership, diversification dummy interacted with each of insider ownership, corporate ownership, bank ownership variables, Keiretsu membership, different ratings given by Keiretsu, diversification dummy interacted with Keiretsu membership and different ratings given by Keiretsu. |
| Khanna and Palepu (2000) | Proxy for Tobin's *q* and ROA to calculate excess value measure | Number of different industries in group, total entropy measure of diversification, concentric measure of diversification, Herfindahl measure of diversification | Firm size, age, industry affiliation, dummy indicating group affiliation. |
| Bernardo *et al.* (2000) | asset multiplier | | Proxies for real options- R&D/Assets, Age and standard deviation of the market return, PPE/Assets, Cash Flow/Assets, Size |
| Anderson *et al.* (2000) | Revenue multiplier | Diversification dummy | CEO compensation, inside ownership, information on board structure, ownership of outside block holders, age and tenure of CEO, firm size, dummy for regulated firms, leverage, growth opportunities, ROA, market return, firm risk. |
| Lins and Servaes (2002) | Sales multiplier, excess profitability, Tobin's *q* | Diversification dummy | Firm size, profitability, growth opportunity, geographic diversification dummy, country dummies, industry dummies, group membership dummy, group membership interacted with diversification dummy, ownership dummies with respect to control rights, ownership dummies with respect to cash-flow rights. |

| Author | Excess value measure | Diversification measure | Independent variables & Control variables |
|---|---|---|---|
| Graham *et al.* (2002) | Asset and sales multiplier | Relatedness between acquiring firms and target firms, whether or not an acquisition leads to increase in number of segment | |
| Campa and Kedia (2002) | Asset and sales multiplier | Diversification dummy | Firm size, profitability, investment, lag values of firm size, profitability and investment, ratio of long-term debt to total assets, squared value of firm size, instrumental variables to capture industry and firm characteristics, dummy for S&P index. |
| Schoar (2002) | Total factor productivity | Number of segments, one minus Herfindahl index based on segment size | Segment size, firm size, plant age, dummy down to account for plant which is downstream segment in a vertically integrated firm, dummy up to account for plant which is upstream segment in a diversified firm, AFTER and DIVERSE dummy to denote period after diversification and type of diversification, hourly wage. |
| Mansi and Reeb (2002) | Asset and sales multiplier, excess value measure based on the market values of both debt and equity. | Diversification dummy | Firm size, profitability, growth opportunity, leverage, leverage interacted with diversification dummy. |
| Fleming (2003) | Earnings before tax and sales multiplier | Diversification dummy | Firm size, profitability, growth opportunity, excess profitability, excess profitability interacted with diversification dummy. |
| Villalonga (2004) | Tobin's *q*, Asset and sales multiplier | Diversification dummy, number of business units in the firm, one minus Herfindahl index, three measures of entropy: total, related, unrelated. | Firm size, profitability, growth opportunity. |

Table 2.2 summarises the different methodologies used in the literature to calculate diversification discount or premium. The majority of studies in this area use Tobin's *q* and asset or sales multiplier as excess value measure after its introduction by Lang and Stulz (1994) and Berger and Ofek (1995). The exception is Schoar (2002) who uses total factor productivity. Diversification dummy, number of segments and Herfindahl index are the most common

measures of diversification. However some authors have used different measures as well. Berger and Ofek (1995) also use related segments. Khanna and Palepu (2000) use number of different industries in group, total entropy measure of diversification, concentric measures of diversification other than Herfindahl index. Graham *et al.* (2002) use completely different diversification measures like relatedness between acquiring firms and target firms, whether or not an acquisition leads to increase in number of segments. Villalonga (2004) uses entropy measures along with the conventional measures of diversification.

Besides controlling for firm size, profitability and growth opportunity following Berger and Ofek (1995), different studies have used different variables. These variables have often been specific to the way they have tried to explain their results. Lins and Servaes (1999) use Keiretsu membership to explain how group memberships affect the value of the firm. Bernardo *et al.* (2000) use proxies for real options to show how real options to diversify affect the value of the diversified firm. Anderson *et al.* (2000) use CEO compensation and other CEO characteristics to see whether corporate governance structures destroy firm value.

### *2.3.3. Main Results*

The previous section discussed the various methodologies employed in order to study the debate regarding corporate diversification versus premium. This section discusses the results that are obtained after using the methodologies discussed in the previous section. The various evidence provided by Lang and Stulz (1994) show that diversified firms trade at a discount compared to focused firms throughout the 1980s. They find a positive correlation between the average Tobin's *q* and the Herfindahl indices. As the Herfindahl index decreases (higher diversification) Tobin's *q* decreases as well which supports the implication that diversification leads to diversification discount. On the other hand there is a negative correlation between number of segments and Tobin's *q*. As number of segments increases (higher diversification) Tobin's *q* decreases, which again lends support for diversification discount. Moreover comparison of Tobin's *q* across different number of segments and various values of Herfindahl indices show that mean and median Tobin's *q* were higher for single segment firms as compared to

multi-segment firms. The regression results without adjusting for industry effects show that *q* drops as one goes from one-segment firms to firms with more segments and over the years the *q* of multi-segment firms is lower than the *q* of single segment firms by 10% to 50%. After adjusting for industry effects the discount decreases but is still significant. The coefficient on *D(Div)* which captures the percentage difference in average excess value between focused and diversified firms report a discount of .27 to .54 over the period. Alternatively, the lost value from diversification ranges from 27% to 54% from 1978 to 1990.

The various tests conducted by Berger and Ofek (1995) again lends support to the view that diversification leads to loss in firm value. They find negative differences in mean and median excess values between stand-alone and multi-segment firms which show that diversification leads to value loss. The results from the pooled regression after using the multi-segment dummy show that the value loss due to diversification is 12.7% using the asset multiplier, 14.4% using the sales multiplier and 15.2% using the EBIT multiplier. The regression coefficient on Herfindahl index is found to be significantly positive which implies that higher diversification leads to larger loss of firm value. The coefficient on number of segment is found to be significantly negative implying that a greater number of divisions means higher diversification and hence loss in firm value. The coefficient on the relatedness variable is found to be significantly positive which means that more related segments or firms which are more focused can lower the value loss from diversification. All the above regression results hold when regressions are estimated for each year in the sample. They also calculate the average dollar loss per firm using the asset multiplier for the period 1986 to 1991 to be $235.1 million, which amounts to a total loss of $200 billion dollars for a sample of 850 multi-segment firms.

Servaes (1996) uses both Tobin's *q* and sales multiplier and control for firm size and access to capital markets. He also uses the multi-segment dummy in a similar manner to Lang and Stulz (1994) and Berger and Ofek (1995) to account for the estimated value of the discount from cross sectional and time series regressions. The cross-sectional regressions using Tobin's *q* show that the

industry adjusted discount is 56% from 1961 to 1970 whereas the discount reduced to 10% and is insignificant from 1973 to 1976. These results do not change much even after using controls for firm size, profitability, access to capital markets, return on sales and leverage ratio. The results remain consistent to time-series analysis and regressions using sales multiplier instead of Tobin's *q*.

Lins and Servaes (1999) use the excess value measure and the control variables proposed by Berger and Ofek (1995) and estimate cross sectional regression models for Germany, Japan and the U.K. Their results show that there is no discount in Germany for both 1992 and 1994. There is a discount of 8.3% in Japan in 1992 which increased to 10% in 1994. However the discount remained the same at 15.5% for both the years in the U.K. When they compared their results with simulated results from the U.S. they find that diversification discount is smaller in Japan and larger in the U.K. as compared to the U.S.

Khanna and Palepu (2000) compare the performance of group affiliated Indian firms with those of unaffiliated firms. Univariate comparison of Tobin's *q* shows that firms which are affiliated to most diversified business groups outperform unaffiliated firms. Using both Tobin's *q* and ROA in the Univariate comparisons they find a quadratic relationship between firm performance and affiliated group diversification. Multivariate analysis using both the performance measures show that as groups become more diversified, the performance of firms which are affiliated to groups decreases compared to unaffiliated firms, up to a certain level of diversification. After this threshold level of diversification even marginal increases in group diversification lead to increase in firm performance of affiliated firms. Further the multivariate regression analysis shows that the Tobin's *q* of affiliated firms of highly diversified business groups is greater than more focused and unaffiliated firms. A comparison of group level performance with the performance of industry-matched unaffiliated firms reveals no evidence of a "group discount".

Graham *et al*. (2002) calculates excess values for different categories in their sample for both the year before the acquisition and the year after the acquisition. Their results show a -6.93% change in excess value following the

acquisition for all the firms in his sample. However when the sample is split into related and unrelated acquisitions the results show that firms that undergo related acquisitions exhibit higher changes in excess value as compared to firms that undergo unrelated acquisitions. Firms which report increase in segment show a larger decline in excess value as compared to firms which do not report increase in business segments following an acquisition.

The excess value of the target firms prior to acquisition are reported as well. These excess values are calculated using the market value of equity based on the last stock price available prior to delisting. This measure includes the valuation effects of the acquisition announcement. The results show that the target firms are poor performers compared to other stand alone firms. The target firms in related acquisitions are more highly discounted compared to unrelated targets. So naturally the acquiring firms which are acquiring such related targets suffer from larger changes in their excess values compared to unrelated acquisitions. The target firms with no segment increase have higher discount compared to target firms with increase in segment.

They have used projected excess value to explain the loss in excess value due to acquisitions. They have calculated actual and projected changes in excess values for acquiring firms. The difference between the actual and projected changes have been interpreted as the value created or destroyed by acquisition that has not been accounted for by the effect of adding a low value target. These differences are found to be very close to zero which indicates that the addition of a discounted target explains most of the decline in excess value for the acquirer. The regression results also show that projected change in excess value is an unbiased predictor of the actual change and the intercept term indicates that if the characteristics of the target firm are accounted for then there is no additional value loss for the acquiring firm owing to diversification. Also regressions using relatedness indicator and segment increase indicator show the same results that are that value loss is due to the characteristics of the target firm.

Excess value measures are also calculated based on the year before and after the increase in number of segments. The results show that the firms are not trading

at a discount prior to increase in segments for various types of acquisitions. Also firms which increased their number of segments through internal expansion created less discount compared to firms which engaged in acquisitions. Firms which increase their number of segments through related acquisitions create more discounts as compared to firms with unrelated acquisitions. Regression results also show that among all the firms which increase their number of segments the discount generated by only half of those firms are due to diversification.

Campa and Kedia (2002) also got a discount of 13% when they tested the Berger and Ofek (1995) model using samples from 1978 to 1991. However when they tested an extended version of Berger and Ofek (1995) they find that the discount is reduced to 11%. After controlling for the firm-fixed effects and year-fix effects the discount is reduced to only 6% which shows that firm characteristics and year fixed effects do indeed affect the diversification discount. However the models with IV and self-selection eliminate the discount completely and report a premium of 30% and 18% respectively.

Schoar (2002) links stock market performance to firm productivity. He finds a strong correlation between market values and productivity. He regresses plant-level TFP on different measures of diversification and control variables. He finds a productivity premium of 7% on the one hand and on the other a diversification discount of around 10%. This productivity premium means that plants in diversified firms are on average 7% more productive than plants in comparable single-segment firms. However as firms became more diversified their productivity declines. He finds that while newly acquired plants increase their productivity by 3%, the incumbent plants show a decrease in productivity by about 2%. But as there are more incumbent plants than acquired plants the total effect on firm productivity is negative. He describes this phenomenon as “new toy” effect where the focus of management shifts towards new segments at the cost of the existing divisions. His results indicate that diversified firms have productivity advantages over their stand alone counterparts since diversification increases the productivity of the acquired plant. However as diversification increases some of the productivity advantage is lost.

Lins and Servaes (2002) find that diversified firms trade at a discount of 7% even after controlling for growth opportunity and geographic diversification. They find a positive relationship between firm value and geographic diversification. But after controlling for profitability the discount reduces to 5.9%. This can be because the diversified firms are less profitable than single-segment firms. To explore this result they compare the industry-adjusted profitability of diversified firms to that of single-segment firms. They find that the industry adjusted operating income of diversified companies is 1% below that of single segment firms. Even after controlling for profitability the difference is found to be about 6.4%.

Villalonga (2004) uses data from both COMPUSTAT and BITS in her estimations. COMPUSTAT data report mean discount in the range -0.09 and -0.29 over the sample period and an average discount of -0.18. However the results with BITS data are completely different from the COMPUSTAT data. The BITS data report a mean premium in the range 0.11 and 0.43 and an average premium of 0.28. These results are found to be robust to variations in the sample, business unit definition and measures of excess value and diversification.

### *2.3.4. How can Diversification Discount/Premium be Explained?*

It is not sufficient to calculate whether diversified firms trade at a discount or premium. It is important to delve deeper into the problem to understand the factors which are driving the results. If it is possible to identify factors which are responsible for diversification discount then that might enable firms to take measures to increase their firm value. On the other hand, if factors generating a diversification premium can be identified then they can be applied to firms which are trading at a discount. This section discusses how different authors have tried to explain their results.

Lang and Stultz (1994) explain this diversification discount through industry effects, size, access to capital markets and intensity of research and development and theories of internal capital market. Industry effects may be able to explain the negative relation between Tobin's *q* and degree of diversification. It

can be that diversified firms are concentrated in industries with fewer growth opportunities. They account for industry effects by constructing portfolios of specialised firms that match the industry composition of diversified firms. Industry effects reduce the magnitude of the diversification discount but even after correcting for the industry effects diversification discount turns out to be positive and significant. Since industry effects fail to explain this discount they made another attempt to explain it through variables which are known to affect Tobin's *q*, such as size, access to capital markets and intensity of research and development.

First, since diversified firms are larger it may be the case that a firm's efficiency depends on its size rather than its degree of diversification and that diversification simply proxies for size. Second when R&D is not capitalised then firms that have heavy investments in R&D have larger *q*s because the replacement costs of assets do not include the capitalised value of R&D. Also it may be that if diversified firms are less R&D intensive than specialised firms, then they have lower *q*s for reasons that are unrelated to diversification.

Third if financial markets are imperfect then specialised firms face greater obstacles exploiting investment opportunities, so that a specialised firm with a high *q* cannot raise enough capital to equate its marginal *q* to one. Even after controlling for size, access to capital markets and intensity of research and development and measuring *q* as the ratio of firm market value to book value the discount is always found to be positive.

Finally they attribute the source of this discount to diversification itself under the assumption that stand alone *q*s of a division of a conglomerate is on average equal to the average *q* of the specialised firm in the same industry. Since division *q*s are not observable, it could be that diversified firms have divisions with lower *q*s as compared to their stand alone counterparts in the same industry. It can also be the case that firms that perform poorly diversify in search of growth opportunities. Then it will mean that diversification does not change good firms into bad firms but the discount can be partly attributed to low *q* segments of the diversified firms. They find that their sample lends support to the view that firms

that diversify have lower performance relative to firms that do not diversify, which will again mean that only poorly performing firms diversify. At the same time though there is weak evidence that firms that diversify have lower *q*s than firms in the same industry that do not diversify, suggesting that firms that diversify are not poorly performing firms within their industry.

They assume that diversified firms do a better job of capital allocation through an efficient internal capital market. This market enables the various divisions of a diversified firm to invest up to the point at which the marginal return on capital equals the cost of capital and ensures that their cost of capital is lower relative to their stand-alone cost of capital because of the lesser impact of informational asymmetries. Hence, relative to stand-alone specialised firms, the conglomerates invest more and may therefore have lower *q*s since their marginal return to capital will be lower. With the above findings of Lang and Stultz (1994), one will expect average *q* to exceed one for conglomerates because their market value will capitalise the contribution to shareholder wealth of the reduction in informational asymmetries if there is no error in computing *q*. One may therefore conclude from the low average and median *q* of firms with five segments or more that the benefit from the reduction in informational asymmetries for conglomerates is dominated by inefficiencies such as influence costs and agency costs.

Berger and Ofek (1995) argue that overinvestment and cross-subsidisation contribute towards the value loss of diversification. They further show that this loss is reduced by the tax benefits of diversification. Overinvestment is measured as a sum of the depreciation-adjusted capital expenditures of all segments of the firm operating in industries whose median Tobin's *q* is below 0.76 and scaled by total sales. Calculation of this variable is restricted to un-related multi-segment firms. Higher values of the overinvestment variable will imply more unprofitable investment. The negative sign on the coefficient of overinvestment will imply that, higher overinvestment means lower excess values for multi-segment firms with unrelated segments. The regression estimates predict that the difference in

overinvestment of 3.6% of sales will imply an excess value loss of 1.4% to 3.3% for low investment opportunity segments of diversified firms.

Another explanation put forward in favor of value loss from diversification is cross-subsidisation. It is often argued that cross-subsidisation of poorly performing segments in a multi-segment firm often leads to value loss for diversified firms. Berger and Ofek (1995) use negative cash flow as a proxy for poor performance irrespective of the fact that this would be a noisy measure of poorly performing segments if managers had a tendency for falsely reporting the poorly performing segments. They try to examine whether the presence of negative cash flow has more negative impact on diversified firm value as compared to value of a focused firm. This will capture whether poorly performing segments of diversified firms draw resources from other segments in a diversified firm. They find that diversified firms with negative cash flow segments have significantly lower excess values than diversified firms without such poorly performing segments.

They also argue that increased debt capacity and reduced tax payments may lower the value loss from diversification. If firms diversify in businesses which have uneven returns then that increases the debt capacity of the firm. As a result diversified firms can borrow more which leads to higher interest tax shields. Diversified firms can offset the losses of some segments through gains in other segments and hence can create tax advantage for the firm as a whole.

Servaes (1996) finds that during the period 1961 to 1970, when diversification discount was high, single segment firms have higher insider ownership than multi-segment firms. This also suggests that firms which have low insider ownership choose to diversify more as compared to firms with higher insider ownership. However from 1970 onwards level of ownership also increased in multi-segment firms and diversification discount declined. It can be concluded that firms with higher insider ownership choose to diversify when they do not suffer from financial problems. The study conducted by Servaes (1996) can partially explain why firms became more diversified over the period of his study

but cannot explain why there is diversification discount at the beginning and what causes it to decline over time.

Lins and Servaes (1999) try to explain the existence of diversification discount in Germany, Japan and the U.K. through ownership structure and industrial group membership. Ownership concentration is highest in Germany and lowest in the U.K. Lins and Servaes (1999) try to examine the relationship between ownership concentration and diversification discount. Diversification discount is present in Germany only when insider ownership is below 5%. On the contrary insider ownership does not affect the diversification discount in Japan and the U.K. One distinguishing feature of Japanese firms is their link to industrial groups known as *keiretsu* organisations. Studies are conducted for Japanese firms to see whether industrial group membership affects diversification discount. Their results show that diversified firms trade at a discount of 30% when they have strong links to an industrial group. Their results establish the fact that corporate governance structures indeed play a role in determining diversification discount but there is no fixed pattern present for different countries.

Indian business groups possess features of both conglomerates and LBO associations. There are both costs and benefits associated with group affiliation. However group affiliation can be advantageous in emerging markets like India. Emerging markets are characterised by market failures caused by information and agency problems and intermediary institutions such as financial analysts, mutual funds, investment bankers, venture capitalists, and financial press are well developed. Under these circumstances an enterprise which is a part of a large diversified business group can act as an intermediary between individual entrepreneurs and imperfect markets.

Khanna and Palepu (2000) cite some examples in this context. They indicate that groups can use their track record and reputation in their established lines of business to gain credibility for new ventures among suppliers and customers. The scale and scope of groups can allow business groups to internally replicate the functions provided by stand-alone intermediary institutions in advanced economies. Firms affiliated with business groups can reap the benefits

of these internal intermediaries and hence can ward off the disadvantages of an external market failure. Even though business groups are highly diversified, individual firms in these groups are very independent. Since Indian business groups are collections of public companies, flow of funds from company to company is limited and hence can avoid misallocation of resources through internal capital market operations. The role of a group's internal capital market is to launch new ventures and the role of group headquarters is to monitor performance through board memberships and family connections, recruiting management talent, and interfacing with the national government.

They examine three potential sources of performance effects of group affiliation: (a) the degree of access to international investors and joint venture partners, (b) monitoring/entrenchment by inside owners and (c) financing through internal capital markets to explain their results. Business groups are found to have better access to international capital markets which is consistent with the fact that these organisations provide an extrajudicial mechanism for property rights enforcement, either by investing in reputation or due to close relationship with the bureaucracy. They find mixed evidence from the joint venture data. Providers of technology are more unwilling to deal with groups, though partial evidence shows that larger groups appear to facilitate member's access to international joint venture markets. Insider ownership is found to be positively related to performance of both affiliated and unaffiliated firms. Internal capital market is found to exhibit the same investment sensitivities for both affiliated and unaffiliated firms. So these findings suggest that the results are driven not only by institutional context but also by differences in organisational structure.

Bernardo *et al.* (2000) explain diversification discount through real options. Their conjecture is based on the argument that the market value of single segment firms still includes the real options to diversify and expand in other segments whereas multi-segment diversified firms have already exhausted their options to diversify and expand into more segments. They use variables like R&D/assets and age of single segment firms to proxy for real options. They use three different methods to test their argument. First of all if it is true that single-

segment firms include the value of real options to diversify and expand into future lines of businesses then there should be a positive relationship between a measure of the firm's real options and the future number of segments in which the firm operates. The evidence which they obtain supports this argument. Secondly they generate some firms by adding up single segment firms which operate in similar segments as multi-segment firms. They find that multi-segment firms have smaller real options compared to these synthesised firms. This is because they find that diversified firms spend less on R&D, have larger fractions of assets that are tangible, generate larger cash flows and are bigger in size compared to the equivalent synthesised firms. Finally they perform some tests which examine the relationship between diversification discount and the proxy for real options. They find that diversification discount increases with the proxy for real options. More specifically they find that diversification discount is increasing with R&D expenditures of single-segment firms, decreasing with the age of the single segment firms, and increasing with market volatility.

Anderson *et al.* (2000) examine whether corporate governance structures have any role to play in creating the loss of value for diversified firms. They argue that diversification discount can be the product of inefficient corporate governance structures which enable managerial entrenchment and help managers to reap private benefits at the cost of shareholders. They try to find out the differences between focused and diversified firms and whether these differences are compatible with the agency cost explanation of diversification. They examine the relationship between firm diversification and (a) both the level and sensitivity of CEO compensation, (b) firm ownership structure, including holdings of the CEO, officers and directors, and outside block holdings, (c) the sensitivity of CEO turnover to firm performance, and (d) the size and composition of the board of directors.

They find that CEOs in multi-segment firms receive compensation that is less sensitive to firm performance and have lower stock ownership than CEOs in focused firms. This can lead to increase in agency problems in a diversified firm. So multi-segment firms employ alternative measures in the form of corporate

governance mechanisms that can reduce agency problems. Their findings suggest that on average diversified firms have a higher fraction of outsiders on their board of directors, similar ownership by outside block holders, and similar sensitivity of managerial turnover to performance relative to their single-segment counterparts. Their paper also examines whether changes in diversification over their sample period can be explained by the ownership and governance characteristics of the firm. Contrary to the managerial agency arguments of diversification they find that firms that increase their level of diversification over the sample period have governance and performance characteristics that are similar to firms that retain their focus. More specifically firms that reduce their level of diversification are observed to have lower insider ownership but more equity based compensation compared to more focused firms. There is no systematic relationship between diversification and choice of governance structure. Further, the evidence is suggestive of a positive role of equity based compensation in increasing firm value. Higher equity based compensation may motivate the low ownership CEOs to reduce value decreasing activities and undertake activities that leads to higher value for the firm. But their overall results cannot find a significant relation between corporate governance characteristics and diversification discount.

Graham *et al.* (2002) show that diversification discount is not due to diversification itself but rather due to acquisition of low performing businesses. The discount arises due to the characteristics of the acquired units. When a firm increases its number of segments without acquisitions its excess value is not reduced but when there is increase in number of segments through acquisitions huge discounts are created for the diversifying firm. The problem in the literature is that the valuation methodologies treat the divisions of conglomerates as similar to benchmarked stand-alone firms. But the divisions of the conglomerate have several characteristics which are different from these stand-alone firms which are generally not accounted for while calculating excess value. Unless these characteristics are accounted for the effects of corporate diversification on firm value will show erroneous results due to sample selection bias.

Campa and Kedia (2002) argue that firms choose to diversify when the benefits of diversification outweigh the costs of diversification. The benefits from diversification can arise from managerial economies of scale, increased debt capacity, efficient allocation of resources through internal capital markets, ability of diversified firms to internalise market failures and many other factors. The costs from diversification can arise from inefficient allocation of resources through internal capital market, difficulty in providing optimal incentive contracts, information gap between the central management and division managers, rent-seeking activities by division managers, and so on. These costs and benefits of diversification may create diversification discount. So it is important to take into account such characteristics which can affect both the firm value and the firm's decision to diversify. They control for the endogeneity of the diversification decision of the firm and find a strong negative correlation between a firm's decision to diversify and firm value. After controlling for the endogeneity of diversification decision and certain firm characteristics the discount turned into a premium.

Theoretical literature on diversification discount argues that firms diversify in order to reduce risk. Mansi and Reeb (2002) argue in their empirical paper that diversification discount arises due to the risk-reducing tendencies of the conglomerates. They further argue that diversification reduces shareholder value on the one hand but increases the bondholder value due to the reduction in risk. As a result it may be expected that more diversification discount exists in firms with debt as compared to all equity firms. After using the Berger and Ofek (1995) methodology they find a discount of 4.5% in firms with more than average debt levels whereas no discount is found for all equity firms. This result suggests that debt is an important factor in determining firm diversification. They also show that using book values of debt instead of market values of debt for calculating excess value undervalues diversified firms. Finally they try to examine the joint impact of diversification on debt and equity holders. Their results show that diversification reduces shareholder value, increases bondholder value but has no impact on total firm value.

Schoar (2002) identifies two sources of value loss for diversified firms. The first is the "new toy" effect as explained in the previous section. The second is rent dissipation by conglomerates. He finds that diversified firms pay their workers 8% more in the form of fringe benefits or supplementary labor costs as compared to similar stand-alone firms. This wage gap can account for 30% of the discount. He translates the 7% higher productivity as 10% higher annual profit for the diversified firm, whereas a discount of 10% is interpreted as 10% lower annual profit. If a firm earns 10% higher profits annually then for that firm to show a reduction in profit of 10% it must dissipate 20% of its profits. Given this scenario, even if rent dissipation is the only source of inefficiency, then 8% higher wages can explain at least a part of the discount. Thus rent dissipation in the form of higher wages can explain why diversified firms trade at a discount in spite of their higher average productivity.

Lins and Servaes (2002) explain the discount through (a) membership in industrial groups and (b) ownership concentration. In order to study the relationship between diversification and group membership they have created a group dummy and have it interact with measure of diversification. They found that diversified firms that are a part of an industrial group trade at a discount of about 15%. This supports the argument that when firms which belong to some group diversify they do so in the interest of the managers or controlling shareholders and not the minority shareholders. Their findings also suggest that unless the firm belongs to some industrial groups diversification is not harmful for shareholders. Secondly they study the consequences of ownership concentration on diversification. They suggest that discount would be most severe in a situation where for a certain ownership range the insiders will have enough power to exploit minority shareholders but won't have to bear the cash flow consequences of this opportunistic behavior. Firms that have a management group ownership concentration of 10%-30% have a high possibility of managerial entrenchment and hence these firms can be expected to have low valuations owing to diversification. Firms in this ownership range are found to trade at a discount of 16%. They examine the effect of pyramid ownership structure. They find that the diversification discount is more severe when control rights owned by insiders

exceed their cash flow rights by 25% or more. The empirical study by Lins and Servaes (2002) show that diversified firms have lower value in emerging markets as compared to single-segment firms and the discount created by diversified firms can be explained by the ability of the controlling managers to exploit minority shareholders.

Fleming (2003) uses Berger and Ofek (1995) methodology and finds that Australian firms trade at a discount of 29% compared to a portfolio of single-segment firms. In order to separate performance and diversification he extended the Berger and Ofek (1995) model by using excess profitability measure and interaction effects of profitability and diversification. If profitability interferes with the valuation discount then superior performing multi-segment firms shall be valued at a higher premium or a lower discount than poor-performing multi-segment firms. His results show that multi-segment firms which had a superior performance are not trading at a discount between 1988 and 1998. So he concludes that the diversification discount is due to the poorly performing multi-segment firms rather than multi-segment firms as a whole.

Villalonga (2004) provides two explanations behind diversification premium obtained using BITS database: (a) relatedness and (b) strategic accounting. The first explanation suggests that the two databases COMPUSTAT and BITS provide different but complementary measures of diversification. His findings provide evidence in support of the argument that unrelated diversification leads to a discount whereas related diversification leads to a premium. In BITS all diversification types are pooled together. Thus when such a pooling occurs related diversification is likely to dominate unrelated diversification and hence the overall effect on the firm value is a premium. The second explanation i.e. the strategic accounting explanation, is based on how firms define their segments. Diversification discount can arise if firms aggregate their activities into segments such that the segment falsely appears as a low performing division of the firm as compared to single-segment firms in the same industries. Villalonga (2004) compares the segment SIC codes of single-segment firms in the sample and the

SIC codes of those same firms in BITS and confirms that the above two explanations justify the discrepancy in results between the two databases.

**Table 2.3:** *Explanations for Diversification Discount/Premium*

| Author | Explanation for diversification discount/premium |
|---|---|
| Lang and Stulz (1994) | Discount arises due to industry effects, size, access to capital markets and intensity of research and development and theories of internal capital market. |
| Berger and Ofek (1995) | Overinvestment and cross-subsidisation leads to diversification discount. |
| Servaes (1996) | Lower insider ownership can lead to higher discount in diversified firms. |
| Lins and Servaes (1999) | Discount has been explained through industrial group membership and ownership structure. |
| Khanna and Palepu (2000) | Premium has been explained by performance effects of group affiliation (a) the degree of access to international investors and joint venture partners, (b) monitoring/entrenchment by inside owners and (c) financing through internal capital markets to explain their results. |
| Bernardo *et al.* (2000) | Discount can be explained through lower real options to diversify for multi-segment firms. |
| Anderson *et al.* (2000) | They tried to explain diversification discount through corporate governance structures. |
| Lins and Servaes (2002) | Discount occurs due to membership in industrial groups and ownership structures. |
| Graham *et al.* (2002) | Discount arises if characteristics of acquiring firms which are different from typical single segment firms in the industry are not accounted for. |
| Campa and Kedia (2002) | If endogeniety of diversification decision are taken into account then firms trade at a premium. |
| Schoar (2002) | Value loss occurs due to "new toy" effect and rent-dissipation by conglomerates. |
| Mansi and Reeb (2002) | Discount arises due to risk reducing efforts of diversified firms. If market value of debt is considered instead of book value of debt then firms do not trade at a discount. |
| Fleming (2003) | Discount arises due to low performing firms in the industry. |
| Villalonga (2004) | Premium can be explained through relatedness and strategic accounting. |

Table 2.3 summarises the discussions conducted so far on various explanations put forward to justify the existence of diversification discount or premium. These explanations range from firm characteristics, agency theory arguments, CEO characteristics, corporate governance structures to endogeneity problem and sample selection bias. However there is still scope for further research in this area. Schoar (2002) touches upon the issue of CEO compensation but it is yet to be seen whether CEO compensation plays a role in creating diversification discount or premium. Another interesting issue will be to examine

how the long-term and short-term component of CEO remuneration affects the firm performance. The agency theory arguments and theories of internal capital markets also call for studying the relationship between remuneration at the division manager level and firm performance.

## 2.4. Scope for Future Research

The theoretical and empirical literature on diversification has focused mostly on the conglomerate merger wave of the 1960s and the period of corporate refocusing thereafter. Most empirical studies concentrate on the period from 1978 to 1998. However, many new corporate reforms have taken place all over the world since then[14], such as the Sarbanes-Oxley Act, which was introduced in America in July 2002. The New York Stock Exchange and SEC have also revised their corporate governance system. In U.K. the Higgs Report and Smith Report have been introduced in January 2003 for better corporate governance practices. CLERP9 Proposals have been introduced in Australia in September 2002 and the Australian Stock Exchange also updated its guidelines in March 2003. It is important to find out whether the conglomerates trade at a discount or a premium in the post-reform period. If discount is still prevailing in diversified firms then that would mean that diversified firms have failed to reap the benefits of diversification following the period after 1998. In that case new theories have to be developed and new reforms have to be implemented.

The above discussions show that COMPUSTAT is the most widely used database in America. But when different data sources are used the discount turned into premium. So it is important to use alternative data sources to verify the robustness of the results. Number of segments in a firm or a multi-segment dummy is a very crude measure of diversification. There is scope for building better discrete measures of diversification by combining both relatedness and number of segments. Instead of using measures like Herfindahl index different continuous measures of diversification may be constructed which incorporate relatedness across segments.

[14] See Buchanan (2004)

The existence of diversification discount or premium has been explained in various ways as discussed above. However if agency theory and internal capital market plays an important role in determining the overall performance of the firm as documented above then it is necessary to focus on the relationship between firm performance and remuneration both at the CEO and division manager level. CEO and division managers receive both short-term and long-term incentives in their remuneration packages. The aim of providing long-term incentives is to align the incentives of the CEO and agents with those of the shareholders. Short-term incentives are provided for achieving short-term targets of the firm.

However none of the existing studies have tried to explain diversification discount or premium through compensation incentives to division managers and CEOs. Wulf (2002) shows that if compensation incentives are based on firm performance then, compensation incentives and investment incentives can be used as substitute mechanisms to mitigate influence activities by large influential division manager. However, she fails to touch upon the issue of the effect of using well structured compensation incentives and the substitute mechanism on the value of the firm.

Aggarwal and Samwick (2003) establish the relationship between diversification and agency problems by incorporating risk reduction and private benefits, which are two agency explanations for diversification, into a single model. They use pay for performance sensitivity as a compensation incentive to CEOs and top five executives in a firm. Even though they study the relationship between firm performance, diversification and compensation incentives, their analysis do not focus on explaining diversification discount/premium through compensation incentives to CEOs and division managers.

In a simple principle-agent framework CEO of the firm is the principle and division managers of different divisions are the agents. If the division managers receive more long-term benefits, then they would prefer not to undertake wasteful rent-seeking activities and that would mean a higher firm value and hence lower or no discount. In Australia short-term benefits depend on firm performance as well as achieving individual goals. However if they receive more short-term

benefits such that less weight is placed on firm performance then their interests are not aligned with those of the shareholders and they prefer to undertake rent-seeking activities if they derive private benefits from doing so. Similarly if the CEO receives more long-term incentives then he will try to monitor the activities of the division managers more closely and will not allow influence activity by division managers. This will lead to higher firm value and even premium. In a related context Choe *et al.* (2009) show that powerful CEOs manage to extract higher compensation but they find a mixed relation between CEO power and firm performance. CEO power may lead to either higher or lower firm performance. Their study is based on U.S. firm level data. So there is scope for further development in this area by examining the Australian firm level data on the value effect of diversification and remuneration for both CEOs and division managers.

## 2.5. Conclusion

In this thesis different theories that are brought forward to explain the various costs and benefits of diversification are discussed. First of all those theories which suggest that diversification is costly for the firm are explained. Agency theories predict that managerial agency problems, risk-reducing behavior by managers and managerial entrenchment leads to lower firm value. Inefficient internal capital market theories predict that rent-seeking activities by managers lead to misallocation of resources among different divisions of the firm which leads to inefficient investment and hence generates lower value for the firm. Others argue that discount exists because conglomerates undertake projects which are marginally profitable. Another argument is that conglomerates operate in non-innovative industries and hence they have fewer options and are more prone to suffer industry shocks. A different theory suggests that firms diversify in order to find businesses that suit the skills of a particular firm and discount arises due to this search match process.

Secondly those theories which support the argument that diversification is beneficial for the diversifying firms are discussed. The efficient internal capital market theory suggests that firms do a better job of allocating resources due to

greater monitoring ability, better asset redeployability and greater ability to choose positive net present value projects. Diversified firms have greater debt-coinsurance due to more stable cash-flows. Diversified firms are better equipped to reap the benefits of economies of scope and greater market power. This survey not only discusses these different theories on costs and benefits of diversification but also provides factual examples and real world instances to show the validity of those theories.

After discussing the various theories that prevail on the topic of value effect of diversification the empirical literature on this issue is surveyed. The studies which have been conducted on the U.S., Europe and emerging markets provide mixed evidence in this context. For example some studies find that U.S. firms traded at a discount whereas other studies find a premium. A comparative approach is necessary to survey the empirical literature on value effect of diversification. A detailed discussion of the methodology, database, country and period of study is provided and then the results that are obtained by different studies are discussed. The discussions on existing literature are also summarised in tabular forms for ease of comparison. Finally the survey is concluded by examining the empirical literature and discussing how various authors have tried to explain their findings. Their explanations find support for some of the theories discussed earlier, for example inefficient internal capital market theory and managerial agency problem.

Finally after surveying the theoretical and empirical literature on the value effect of diversification a detailed discussion of further scope for development in this literature is provided. This survey indicates that there is scope for development of a new theory which shows that value effect of diversification depends on remuneration. The empirical literature suggests that there is scope for development of new measures of diversification and scope for examining the effect of CEO and division manager remuneration on value effect of diversification. There is a need for testing the time period after the introduction of CLERP9 reforms to check whether diversifying firms still trade at a discount or premium. If the diversifying firms are found to be trading at a discount then there

is a need for the introduction of suitable corporate reforms to prevent the value loss from diversification.

# Chapter 3

# MOTIVATION, THEORETICAL BACKGROUND, DATA ANALYSIS AND EMPIRICAL METHODOLOGY

## 3.1. Motivation and Discussion of Issues

This section first provides a careful discussion regarding the motivation of this thesis. Second, a detailed discussion of the theoretical background is provided where relevant and finally the main issues of this thesis are discussed.

### *3.1.1. Influence Activity and Allocation of the Firm's Internal Capital*

Chapter 4 shows how influence activity or rent-seeking by division managers affects investment in the smallest division of the firm through analysis of publicly listed Australian firms.

#### *3.1.1.1. Motivation*

Li *et al*. (2010) examine the relationship between executive compensation and corporate investment decision using Australian data. They find that executives and directors focus on their equity based compensation while taking investment decisions for the firm. As equity based compensation increased relative to the market value of equity, higher investment is made. This may occur if managers believe that higher investment will lead to an increase in the volatility of the firm's shares and hence the value of their outstanding options will increase as well. This result supports the presence of agency problems in Australian corporate organizations. While the implications of agency theory have been empirically examined in the Australian context, those from inefficient internal

capital market theory have not been studied for diversified firms in Australia. Influence activity by CEOs and influential division managers can affect the capital budgeting process in a diversified firm. The following chapter analyses how influence activities in the form of signal jamming[15] affects the capital budgeting process of corporate organisations in Australia. Signal jamming is a process where the division manager of a large division tries to distort the private information about investment opportunity of some other division in order to appropriate more funds for his own division.

The theoretical and empirical literature on internal capital market shows how influence activity leads to misallocation of capital budget in a diversified firm. Scharfstein and Stein (2000) provide a formal model of influence activities to show how division managers spend their time in increasing outside options to strengthen their bargaining position with CEOs. They also show that the CEO, who derives private benefit from free cash flow of the company, misallocates company budget and pays division managers with capital budget instead of the free cash flow of the company. McNeil and Smythe (2009) and Glaser and Sautner (2007) find evidence that division managers with more lobbying power always manage to get more capital and free cash flows of the company even if they are in charge of a weaker division. This is consistent with the theory proposed by Scharfstein and Stein (2000). Wulf (1999, 2009) provides theory and evidence of influence activities in the form of signal jamming and shows that investment behavior in firms depends on influence activities in internal capital market.

The above literature show that influence activities in corporate organisations lead to distortions in the capital budgeting process. Wulf (2002) on the other hand shows how firms incorporate investment incentives in their capital budgeting process to mitigate influence problems that lead to misallocation of resources in internal capital market. Alternatively headquarters can offer compensation incentives which place a higher weight on firm performance as compared to divisional performance. One of the objectives of this thesis is to empirically

[15] See Fudenberg and Tirole (1986)

analyse the impact of influence activity on investment of the smallest segment in the firm. Following the theoretical literature on Wulf (2002) both investment incentives and compensation incentives are used in the empirical study.

The existing empirical literature on influence activities in internal capital market is confined primarily to the large U.S. and European economies. In this thesis an Australian perspective is presented. The Australian corporate governance system incorporates certain features of US, UK, Germany and Japanese corporate governance mechanisms to form its own tenets. Buchanan (2004) provides a comparison of different corporate governance systems and the differing roles of the CEO and the chairman for all these countries. Differences in corporate governance structures might produce a different result on the above mentioned issue in the case of Australia. Firstly, CEO and chairman are mostly different in Australia[16] unlike in some companies in the U.S. and the U.K. where the CEO plays a dual role. Thus CEOs may be less powerful in Australia since they do not hold a dual position and owing to this they may have less bargaining power. If CEOs are less powerful then they might be easily influenced by division managers of larger divisions leading to a larger distortion of capital budget.

Secondly, Suchard *et al.* (2001) find that poor performance has a lagged effect on CEO turnover in Australia as compared to the U.S. and the U.K., where CEO turnover results due to current performance. This may provide lower incentive for monitoring by CEOs in Australia. Finally CEOs in Australia receive lower stock based compensation as compared to the U.S. and the U.K (Kerin, 2003). Thus CEOs in Australia have less incentive to perform on behalf of the shareholders. Given these differences between corporate governance system in Australia and the U.S. and the U.K. it would be interesting to study how influence activities affect allocation of resources inside conglomerates in Australia. Under this scenario it is likely that less capital will be allocated to smaller divisions and more capital will be allocated to larger divisions with more influential division managers.

[16] Kiel and Nicholson (2003) found that CEO duality is less common in Australia as compared to the U.S.

#### *3.1.1.2. Theoretical Background and Discussion of Issues*

In Chapter 4 the theory on internal capital market and influence activity by Wulf (2002) is followed to provide a theoretical background for empirical analysis. In her model a firm consists of the headquarters (H) and two divisions, one large and the other small. The headquarters faces a fixed capital budget and chooses to make new investments across divisions in order to maximise the returns from investment. One of the divisions is an old and established division with known returns headed by an influential division manager hereafter referred to as L. The other division is a small relatively new division of the firm with unknown returns which is referred to as S. The headquarters and L are the two active agents in the model whereas S is a passive agent throughout. The objective of the headquarters and L are different. L's objective is to maximise the capital allocated to his division and hence has an incentive to undertake costly influence activity in order to divert capital allocation by headquarters in his favor. The headquarters receives two types of signal about S from an investment committee (which includes L as well) about investment opportunity in S: a subjective signal about S's type which can be influenced and distorted by L and an objective signal like past profitability which cannot be distorted by L but is noisy.

The profit maximising strategy for the headquarters is to use a combination of both types of signals where the respective weights on each signal depends on the noise in past profitability, ability of L to distort information about S and the private cost of influence by L. Conversely H may use only one type of signal for extreme cases. The main focus in Wulf (2002) is to see how the private cost of influence by L i.e. the weight placed on firm performance in L's compensation can be used to mitigate influencing by L. However this thesis not only examines this but also empirically analyses how the ability to distort information about S or the severity of influence problem determines H's decision to place different weights on the two types of signals about investment in S.

H can use two types of instruments: investment incentives and compensation incentives, to prevent L from influencing. Investment incentives are based on capital budget allocated to the large division, which is inversely related

to capital budget allocated to the small division since the amount of investment funds headquarters has in the internal capital market is fixed. For example, the type of investment contract which aims at preventing L from influencing would place a higher weight on the non-distortable public signal and a lower weight on the distortable private signal. This type of investment incentive makes the cost of influencing by L much higher than the gains from influencing. However H can also design compensation incentives to increase the cost of influencing by L. H does this by making L's compensation depend more on firm performance as compared to divisional performance. If L undertakes influence activities which lowers the overall value of the firm then such influence activity is costly for L. If H offers compensation contracts to L then H can rely more on private signal and less on noisy public signal about investment in S. So H can use either the investment incentives or the compensation incentives to prevent influence activity by L. Since these two incentives are substitutes the use of one lowers the marginal benefits of using the other contract.

Wulf (2002) formalises the tradeoff between the two types of incentives in the following equation:

$$I^S = \beta_0 + \beta_1(c, \phi, \psi, \theta)\prod \tag{3.1}$$

where $I^S$ is the investment in S, $\beta_0$ is the initial investment in S, $\beta_1$ is the function of exogenous parameters of the model, $c$ is the manager's private cost of influence and is the key parameter in Wulf (2002)'s model, $\phi$ is the manager's ability to distort signals, $\psi$ is the quality of the public signal and $\prod$ is the public signal about S's type. Investment in S generates high returns if S is good type and low returns if S is bad type. Headquarters is not aware of the type of S but knows about the distribution of the type of S. Hence H knows $\theta$ is the probability that S is of bad type. It is important to note here that $c$ is endogenously determined in the model whereas $\phi$ is an exogenous parameter of the model. $\beta_1$ is defined as the investment sensitivity to the public signal and is mathematically represented by $\beta_1 = \frac{\partial I^S}{\partial \prod}$. Investment incentive for L or $\beta_1$ is the weight placed on the public

signal for investment in S. So if H decides to provide investment incentive to L then $\beta_1$>0. This is because L would have less incentive to engage in costly influence activities when investment in S depends on non-distortable public signal. However her alternative hypothesis suggests that if H decides to provide compensation incentive to L then H would place less weight on the public signal and more weight on the private signal. When H links L's compensation to firm performance then *c* increases and as a result influence activity becomes unprofitable for L. Hence H can rely more on accurate private signal about investment prospect in S as compared to noisy public signal. Thus $\frac{\partial \beta_1}{\partial c} < 0$ or $\frac{\partial^2 I^S}{\partial \prod \partial c} < 0.$

One of the objectives of this thesis is to empirically investigate how H invests in S for various levels of influence activities by L. The focus is on the ability of L to distort private signal about investment in S i.e. $\phi$. As the ability of L to distort private signal increases H can place either more weight or less weight on public signal depending on the type of incentive offered and the informativeness of the private signal. Thus the following issues are tested here:

First, it is examined whether investment in the small division depends positively or negatively on its past performance (public signal). If past performance is a good indicator of future performance, then a positive relation between the two can be expected. This relation was defined as the investment sensitivity by Wulf (2002). Second, it is studied how the investment sensitivity varies as influence problems become more severe. If H proactively counters L's influence activities by offering compensation incentives, then L's private signal becomes more informative of S's investment opportunities. In this case, it is expected that the investment sensitivity will decrease in the severity of influence problems. On the other hand, if H does not rely much on compensation incentives for L, then L's influence activities would result in less informative private signal. In this case, one should expect the investment sensitivity to increase in the severity of influence problems. Finally, it is tested how compensation incentives

for L are related to investment sensitivity. As discussed above, a negative relation is expected between the investment sensitivity and the use of compensation incentives for L.

## 3.2. Diversification Discount or Premium: An Australian Perspective

Diversification discount or premium is defined as the difference between the aggregate market value of diversified firms operating in several business segments and the market value of a portfolio of single segment firms operating in corresponding businesses. When the aggregate value of diversified firms is greater than the market value of corresponding single segment firms the diversified firm is said to have a premium and a discount otherwise. This section provides the motivation behind empirical testing of diversification discount or premium in the Australian context. A brief theoretical justification for this study is provided and a detailed discussion of the empirical methodology used in Chapter 5 is given.

### *3.2.1. Motivation*

Studies conducted on U.S. firms in the context of the value effect of diversification clearly provide mixed evidence. Using COMPUSTAT database Lang and Stulz (1994), Berger and Ofek (1995), Bernardo *et al*. (2000), Anderson *et al.* (2000) and Graham *et al.* (2002) find that diversified firms in the U.S. were traded at a discount between 1978 and 1998. Servaes (1996) studies the period from 1961 and 1976 and finds a discount for the 1960s which vanished in the 1970s. Campa and Kedia (2002) and Mansi and Reeb (2002) also find a discount at the beginning of their period of study which either vanished eventually or turned into a premium. Schoar (2002) finds both discount and premium for two different measures using data from the Longitudinal Research Database (LRD) at the U.S. Bureau of Census. Villalonga (2004) finds a premium using Business Information Tracking System but a discount using data from COMPUSTAT for 1989-1996. However, the results regarding whether diversified firms traded at a discount or premium are not conclusive for U.S. firms. The discrepancies in the

results can stem either from methodological issues or from using different data sources.

International studies also show that discount exists in some countries whereas premium in others. Lins and Servaes (1999) find that discount existed in Japan, the United Kingdom, Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand whereas no discount is found in Germany. Lins and Servaes (2002) find that diversified firms traded at a discount in India but Khanna and Palepu (2000) find a premium for Indian firms using a different data source. Fleming *et al*. (2003) find that Australian firms traded at a discount between 1988 and 1998, but the discount vanishes when low performing firms are excluded from the sample. The international evidence suggests that the existence of discount or premium can result from institutional differences across countries, methodological issues, use of different data sources or due to sample selection bias.

The majority of the studies in this area use Tobin's *q* and the asset or sales multiplier to measure the excess value of the firm after its introduction by Lang and Stulz (1994) and Berger and Ofek (1995) respectively. Diversification dummy, number of segments and Herfindahl index are the most common measures of diversification. However some authors use different measures as well. Berger and Ofek (1995) also use related segments i.e. segments operating in similar line of business. Khanna and Palepu (2000) use number of different industries in group, total entropy measure of diversification, concentric measure of diversification other than Herfindahl index[17]. Graham *et al.* (2002) use completely different diversification measures like relatedness between acquiring firms and target firms, whether or not an acquisition leads to increase in number of segments. Villalonga (2004) uses entropy measures along with the conventional measures of diversification.

The existing literature on diversification discount or premium has used measures of diversification, such as, number of segments, Herfindahl index

[17] Construction of total entropy measure of diversification and concentric measure of diversification are described in detail in Chapter 2.

constructed from sales and assets and two different types of diversification dummies to examine whether diversified firms trade at a discount or premium. The conventional measures of diversification such as number of segments in a firm, Herfindahl indices and multi-segment dummies are a very crude way of measuring diversification. There is scope for further development in this area by constructing more concrete discrete and continuous measures of diversification. For example relatedness among different segments in a firm or number of segments might not be a very meaningful measure of diversification on their own. A firm may have multiple segments but they might operate in related businesses such that the firm cannot be called truly diversified. So if measures such as relatedness or number of segments are combined together in a meaningful way then that might provide more concrete discrete measures of diversification. Similarly continuous measures like Herfindahl indices should be combined with information such as number of segments in the firm and relatedness of the segments in the firm to arrive at a more meaningful continuous measure of diversification. Hence in this thesis effort is given to construct new and more concrete measures of diversification.

Another distinguishing feature of this thesis is providing a new explanation for the existence of diversification discount or premium. The existing literature on the value effect of diversification has tried to explain this diversification discount through various different ways. Lang and Stulz (1994) explain discount in diversified U.S. firms through industry effects, size, access to capital markets, intensity of research and development and inefficiencies arising in an internal capital market. Berger and Ofek (1995) show that overinvestment and cross-subsidisation lead to diversification discount. Servaes (1996) shows that lower insider ownership can lead to higher discount in diversified firms. Lins and Servaes (1999) explain that discount arises due to industrial group membership and ownership structure of the firm. Khanna and Palepu (2000) find premium for Indian firms. They explain their results through performance effects of group affiliation, e.g. (a) the degree of access to international investors and joint venture partners, (b) monitoring/entrenchment by inside owners and (c) financing through internal capital markets. Bernardo *et al.* (2000) explain that discount arises in

multi-segment firms because they have lower real options to diversify. Anderson *et al.* (2000) try to explain diversification through corporate governance structures. Fleming *et al.* (2003) argue that the discount in multi-segment firms reflect low performing firms in the industry.

However none of the existing studies have tried to explain diversification discount or premium through compensation incentives to division managers and CEOs. Wulf (2002) shows that if compensation incentives are based on firm performance, then compensation incentives and investment incentives can be used as substitute mechanisms to mitigate influence activities by large influential division managers. However, she fails to touch upon the issue of the effect of using well structured compensation incentives and the substitute mechanism on the value of the firm.

Aggarwal and Samwick (2003) establish the relationship between diversification and agency problems by incorporating risk reduction and private benefits, which are two agency explanations for diversification, into a single model. They use pay for performance sensitivity as a compensation incentive to CEOs and top five executives in a firm. Even though they study the relationship between firm performance, diversification and compensation incentives, their analysis do not focus on explaining diversification discount/premium through compensation incentives to CEOs and division managers. In this thesis four different measures of compensation are constructed to account for short-term and long-term incentive payments of both CEOs and division managers. These measures of compensation are used as an additional explanatory variable for diversification discount/premium.

### *3.2.2. Compensation and the Value Effect of Diversification: Theoretical Background*

One of the contributions of this thesis is adding compensation incentives as an additional explanatory variable for diversification discount/premium. Compensation incentives can have a positive impact on the value of the firm.

These assumptions are based on the theories of internal capital market[18] which state that division managers and CEOs undertake wasteful rent-seeking activities in order to appropriate valuable company resources or internal funds. Division managers often undertake unproductive rent-seeking activities to divert more capital budget for their respective divisions since they derive private benefits from it. These rent-seeking activities by division managers often lead to misallocation of resources across the divisions of a conglomerate, leading to a loss in firm value. Misallocation of resources takes place not only due to rent-seeking activities by division managers but also due to rent-seeking activities by CEOs. CEOs often prefer to pay division managers with capital budget instead of the free cash flow of the firm since the former derive private benefit from it (Scharfstein and Stein, 2000). Further they use the capital budget as a bridge-building tool to elicit cooperation from powerful division managers in previously unaffiliated divisions (Xuan, 2008).

Wulf (2002) provides both theory and evidence on how multi-segment firms provide compensation incentives to mitigate influence problems in their internal capital market. She shows that firms with influence problems often link compensation incentives to firm performance in order to mitigate influence problems. If compensation incentives are linked to firm performance then division managers will have less incentive to undertake unproductive activities which reduce the value of the firm. This is because a lower firm value would mean lower incentive compensation for them. The headquarters in a diversified firm relies on either objective information (accounting measures which cannot be distorted by division managers but contains some noise) or subjective information (managerial recommendations which can be influenced by division managers but is more accurate) about its divisions before investing in them. Thus if a diversified firm suffers from influence problem then the headquarters would prefer to invest in its divisions based on objective measures as compared to subjective measures of division performance. Excessive reliance on managerial recommendation in the presence of influence problem can lead to misallocation of resources resulting in lower firm value. However if the headquarters provides incentive compensation to

[18] See Scharfstein and Stein (2000) and Rajan *et al.* (2000).

mitigate influence problems in a firm then the division managers would prefer not to undertake wasteful influence activities and hence the headquarters can rely more on subjective measures of division performance. Her empirical results show that as the proportion of compensation incentive which is more linked to firm performance increases headquarters relies less on noisy objective measures of performance. However, she does not study the effect of such incentives on the value of the firm.

The above discussion suggests that rent-seeking activities lead to misallocation of resources, which may have a negative impact on the value of the firm. However offering appropriate compensation incentives can mitigate such unproductive rent-seeking activities. Following the above discussion, it can be argued that, value of the firm is affected by rent-seeking activities or influence activities which in turn depend on compensation of division managers and CEOs. Thus *ExcessValue* of the firm or diversification discount/premium can be a function of rent-seeking. This relationship is represented in the following functional form:

$$ExcessValue = f[rent - seeking]$$

where,

$$rent - seeking = g[CEOcompensation, DivisionManagercompensation]$$

Rankin (2009) shows that executive remuneration in Australia is more strongly linked to firm performance after the introduction of CLERP9[19] in 2004. One of the objectives of this thesis is to test whether the discount/premium in diversified Australian firms can be explained through compensation incentives. Compensation incentives of division managers and CEOs can be broadly divided into two categories: long-term incentive payments (LTIP) and short-term incentive payments (STIP). LTIP consist of at risk components which are related to firm performance such as options, equity etc., whereas STIP primarily consist

[19] CLERP9 is an audit reform and corporate disclosure act which required the adoption of accounting standards issued by the International Accounting Standards Board such as elaborate disclosure of director and executive remuneration, proportion of remuneration linked to firm performance etc.

of cash bonuses, which depends on achieving short-term targets. In Australia STIP depends on both firm performance as well as division performance.

Kerin (2003) reports that the Australian CEO's LTIP has increased significantly with 31% of their remuneration comprising of LTIP and 17% of their remuneration comprising of STIP around 2003. Since LTIP is directly linked to firm performance a higher LTIP is more likely to be positively related to firm value. On the other hand STIP are paid in order to deal with problems related to imperfect information and facilitation of signalling on the part of both board of directors and CEOs (Kerin, 2003). Provision of STIP by the board of directors can be interpreted as setting up short-term tasks for new CEOs to verify whether the board have selected the right candidate for the position. The CEO on the other hand signals to the board by successfully completing the short-term target.

The above functional relationship can be interpreted in the following way: a higher LTIP would lead to lower rent-seeking activities and hence higher firm value whereas a higher STIP would lead to either higher or lower rent-seeking depending on the weight placed on firm value.

The model established by Aggarwal and Samwick (2003) assume that managers diversify their firms to reduce idiosyncratic risk and to capture private benefits from diversification. Their empirical analysis shows that firm performance increases as compensation incentives (pay for performance) increases. This supports the above discussion. However they also find that firm performance decreases with diversification. Whether this decrease in performance leads to diversification discount or not will require more rigorous empirical estimations. In addition, Aggarwal and Samwick (2003) find that diversification is positively related to compensation incentives. The CEO or manager of a firm may find that their decision to diversify increases their private benefits even though it reduces value of the firm. Hence in equilibrium it will be optimal to pay them higher compensation incentives which are linked to firm performance in order to reduce their incentive to diversify. However, in reality this increase in compensation may not be able to offset the increase in private benefits from diversification and thus in equilibrium the manager may receive higher

compensation incentives and diversify more. Thus their empirical results show that when managers' private benefits from diversification increase, a contemporaneous increase in diversification and compensation incentives. Again, whether paying higher compensation incentives leads to diversification discount/premium needs careful empirical investigation.

## 3.3. Data

The sample in this thesis consists of firms which were listed on the Australian Stock Exchange (ASX) in August 2009. The firms in the sample belong to the following Global Industry Classification Standard (GICS) Industry groups (a) Automobile and Components, (b) Capital Goods, (c) Consumer Durables and Apparel, (d) Food, Beverage and Tobacco, (e) Healthcare Equipment and Services, (f) Materials, (g) Pharmaceuticals, Biotechnology and Life Sciences and (h) Technology, Hardware and Equipment. These industry groups have manufacturing operations as well.

The empirical analysis here requires the presence of both multi-segment and single-segment firms belonging to the same industrial groups. Hence some multi-segment firms which do not have any single-segment firm in the same industrial group and vice versa are omitted. Availability of compensation data and segment financial information for multi-segment firms was crucial to the analysis. Multi-segment firms which did not have compensation data were also omitted from the sample. Finally the sample consists of 111 firms of which 46 are multi-segment firms and 65 are single-segment firms. Hence the sample selection has been guided by three important factors: (a) Industry groups which had manufacturing operations as well, (b) presence of both multi-segment and single-segment firm in the same GICS industry group and (c) availability of compensation data and segment financial information for the multi-segment firms in the sample.

Financial information on these firms is collected from Aspect Huntley FinAnalysis, Connect 4, COMPUSTAT Global, Orbis and Osiris. However data for compensation of CEO and division manager is very difficult to collect.

Compensation data for division manager and CEO compensation are manually collected from annual reports of these companies which are available in Connect 4 Boardroom. Other than that, firm segments are matched to their respective division manager manually which is quite intricate since often the name of the segment is difficult to match with the designation of the division manager. The data consist of an unbalanced panel of 111 firms for the period 2004-2008. The sample consists of corporate giants like BHP, Amcor, Orica, Boral, OneSteel etc. BHP is commonly known as a mining giant but a closer look at the operating segments of BHP indicates operations in both Mining and Manufacturing. BHP belongs to the GICS industry group: Materials. In addition to having major operations in mining, BHP also produces aluminium products, metallurgical coal, stainless steel and petroleum products which fall under Manufacturing operations.

The financial information that is collected for these companies include segment sales, assets and profits, total sales and total assets of the firm, number of segments in a firm, both long-term and short-term debt, total equity, preference shares, operating revenue, cash paid for property plant and equipment and EBIT. Also an Australian and New Zealand Standard Industrial Classification (ANZSIC) code (as described in the Australian Bureau of Statistics database depending on the principal operation of that segment) is manually assigned to each of the segments in a firm. ANZSIC code is preferred to GICS codes, since ANZSIC codes would be more convenient due to their precise four digit nature in constructing some measures in this thesis. Data on total remuneration, salary, bonus, LTIP (Long-term Incentive Payments), shares and options held, for both CEO and division managers of the multi-segment firms in the sample are collected.

## 3.4. Empirical Methodology and Construction of Variables

### *3.4.1. Influence Activity and Allocation of the Firm's Internal Capital*

In this section focus is on the empirical formulation of the theory discussed in the previous section. The main issues are tested empirically by estimating an investment equation for the smallest division of the firm. Private information or

managerial recommendations from the large division manager regarding investment opportunity in small division are not observable, hence observable public signals like past segment profitability are used to estimate the empirical model. Relatedness between smallest and largest divisions of a firm, total number of divisions in a firm and degree of capital constraint is used as a proxy for the severity of influence problem. If influence problems are more severe other things equal, then firms should rely less on private signals and more on public signals, hence a positive relation is expected between the severity of influence activity and investment sensitivity (which basically measures how the investment in small division depends on its past performance). However, this relation can be reversed if compensation for the manager of large division is based more on firm performance as a whole. In this case, private signals become more informative since there will be less influence activities. Hence the proxies for the severity of influence problem can either be negatively related or positively related to investment sensitivity of the small segment depending on the type of incentive offered by H.

First of all, how investment incentives affect the investment in the smallest segment of the firm is estimated. Second, the relationship between severity of influence problem and investment sensitivity is assessed. The following regression equation is estimated,

$$I_{it}^{S} = \beta_0 + \beta_1(\Omega)\prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it} \qquad (3.2)$$

where, $\beta_1(\Omega) = \alpha + \sum_{j=0}^{4} \alpha_i rel_{itj} + \sum_{j=1}^{5} \gamma_j ndiv_{itj+1} + \sum_{j=1}^{4} \lambda_j cap_{ij}$.

In equation (3.2), investment in small segment ( $I_{it}^{S}$ ) is regressed on public signal ( $\prod_{it-1}^{S}$ ) of small segment. $I_{it}^{S}$ is measured by change in asset of firm *i* in the current period whereas, $\prod_{it-1}^{S}$ is proxied by the profit-asset ratio or profitability of the smallest segment in the previous period. Segment investment is generally calculated as capital expenditure less depreciation but the databases used here do

not contain such information. Hence change in asset[20] is used as a proxy for investment in the smallest segment of the firm. For example change in asset[21] of a particular segment in 2005 would be the logarithmic difference in its segment assets in 2005 as compared to 2004. The calculation of segment investment as logarithmic difference in its segment assets would mean there would be only four observations per firm in the regression analysis even if data is present for all five years. Thus firms which have only four years of observations have only three values and firms with three years of observations have only two values for segment investment. Lag value of profit per unit asset is used as a proxy for public signal[22] of the small division. Wulf (1999) uses two reasons in support of using lag value of profit per unit asset as a proxy for public signal: (a) it is not possible to calculate segment Tobin's *q* and industry Tobin's *q* does not reflect the segment investment opportunities and (b) since profits are more or less persistent, current profits are generally a good indicator of future profits.

The coefficient $\beta_1$ measures the division investment sensitivity to segment profitability in the previous period as a function of the proxies for severity of influence problem. $\beta_1$ in equation (3.2) is different from equation (3.1). Other parameters of the model are excluded from equation (3.2) for simplicity. The objective here is to test the first two issues discussed above using equation (3.2). $rel_{itj}$, $ndiv_{itj+1}$ and $cap_{ij}$ are dummy variables representing the firm attributes for influence problem. Firm characteristics like degree of diversification, organisational structure and financial strength makes the firm more prone to influence activities by large division managers. If the divisions of a firm are more related to each other then the large division manager will have more information about the small division's investment prospect. The headquarters in that case would rely more on the information provided by the large division's manager before investing in its small division. The large division's manager would also have greater ability to distort the actual investment opportunity in small divisions

[20] This measure of investment is used following Eisenberg *et al.* (1998) and Titman and Wessels (1988)

[21] Change in asset=log(Asset$_t$)-log(Asset$_{t-1}$)

[22] See Wulf (1999, 2002)

and hence will have a greater incentive for influencing the decision of the headquarters owing to his superior information. So the more related the divisions are the higher would be the ability of the large division's manager to influence headquarters decision and provide corrupt private signals about the small division's investment opportunity. So relatedness across segments is used as one of the proxies for the severity of influence problem.

If a firm has many divisions then it is difficult for the CEO and the investment committee to have all the information about all of its divisions. Hence it is difficult for them to evaluate the small segment's investment prospects accurately. Since the large division's manager is aware of this, he will have a greater ability as well as incentive to distort the investment opportunity of small division and to influence the headquarters in this respect. So number of divisions is used as another proxy for severity of influence problem

When capital is freely available in the firm then managers do not have to compete for it. But if capital is scarce then division managers will undertake influence activities so that they can get a larger share of the scarce capital from the headquarters. So the more capital-constrained is a firm, the more severe influence problems will be. Thus capital constraint is taken as a proxy for severity of influence problem.

$rel_{itj}$ is a vector of five dummies which denotes increasing level of relatedness between the smallest and largest segment of the firm from $rel_{it0}$ up to $rel_{it4}$. This variable is constructed by comparing the ANZSIC codes between the smallest and largest division of the firm. ANZSIC codes start with a letter representing the particular industry e.g. "C" stands for Manufacturing and is followed by four digits. In the case of manufacturing the ANZSIC codes start with "C2". If two divisions belong to different industries such that one belongs to Manufacturing and the other is in mining then none of the digits of the ANZIC code would match. Hence relatedness between such segments would be 0 i.e. those two divisions are completely unrelated. If two divisions have codes such that only the first digit matches then the related dummy takes a value of 1. This

means that the smallest and the largest divisions of the firm are only marginally related. If the first two digits of the code match then relatedness takes the value 2 implying that the firms are more related than when the relatedness dummy takes a value of 1. When the first three digits of the code match, the relatedness is denoted by 3, which also means that the divisions are more related than when relatedness was denoted by 2. If all four digits match then relatedness is denoted by 4 and the divisions are highly related. Table 3.1 below shows the distribution of the relatedness dummy as the relatedness increases from $rel_{it0}$ to $rel_{it4}$. 47% of the sample is only marginally related, whereas about 23 % of the sample is more related than when the relatedness dummy takes a value of 1, whereas only 6.86% of the sample is totally related to each other. Since most of the smallest and largest segments of the firm in the sample are unrelated to each other, influence problems may not be that severe.

There are altogether five dummies for the number of divisions ($ndiv_{it2}$, $ndiv_{it3}$, $ndiv_{it4}$, $ndiv_{it5}$, $ndiv_{it6}$). One prerequisite of this empirical analysis is that firms must have at least two divisions. Table 3.1 shows that almost 32% of the sample has only two divisions, about 25% of the sample has three divisions, 23% has four divisions, almost 6% has five divisions and 12% of the sample has six or more divisions. The distribution of number of divisions in the sample shows that very few firms in the sample have large numbers of divisions, which indicates that influence problems may not be that severe in the sample firms. The relatedness dummy and number of divisions dummy are the two most important variables here.

The various ways to measure financial constraints are leverage, dividend payout ratios, size of firm defined by sales and assets and access to public debt market. Wulf (1999, 2002) uses access to public debt market to see whether a firm is capital constrained or not and she describes this measure as the least controversial in the financial literature. She constructs a single dummy variable which takes the value of zero if a firm has a Standard and Poor's debt rating. This means that the firm is unconstrained and takes the value of one otherwise,

denoting that the firm is capital constrained. In order to construct this variable firms which have access to public debt markets i.e. those that have S&P credit ratings are examined, since that is a measure often used in the literature[23]. However, since all the firms in the sample have S&P credit ratings, a vector of dummies $cap_{ij}$ is constructed for various levels of capital constraint, e.g., $cap_{i1}$ denoting least constrained and $cap_{i4}$ denotes most constrained.

S&P credit ratings can be broadly divided into two main groups: (a) investment grade which consist of AAA (highest credit quality), AA (very high credit quality), A (high credit quality) and BBB (good credit quality) and (b) noninvestment grade which consist of BB (speculative), B (highly speculative), and CCC up to D (decreasing level of credit worthiness). The sample consists of firms which have four types of credit ratings: AAA, A, BBB, B. Hence four dummy variables $cap_{i1}, cap_{i2}, cap_{i3}, cap_{i4}$ are constructed depending on the S&P credit ratings. $cap_{i1}$ takes the value of one if a firm has AAA rating and is zero otherwise. $cap_{i2}$ takes the value of one if the firm is rated as A and zero otherwise. $cap_{i3}$ takes the value of one if a firm is rated as BBB and zero otherwise. $cap_{i4}$ takes the value of one if the rating is B and zero otherwise. As a firm's rating decreases from AAA to B it will find it more difficult to raise sufficient funds in the external market. Table 3.1 shows the distribution of *cap* dummy in the sample. Almost 67% of the sample has AAA credit rating whereas only about 4% of the sample has B credit rating. Once again the sample indicates that since the majority of the firms in the sample have the highest quality credit rating they will be less capital constrained and hence lower influence activities are expected.

[23] Wulf (1999, 2002) and Kashyap *et al.* (1994) use S&P credit ratings in a similar manner.

**Table 3.1:** *Descriptive Statistics of the rel, ndiv and cap Dummies*

| Dummy variable | Number of observations in total sample | % of observations in total sample |
|---|---|---|
| $rel_{it0}$ | 96 | 47.06 |
| $rel_{it1}$ | 48 | 23.53 |
| $rel_{it2}$ | 26 | 12.75 |
| $rel_{it3}$ | 20 | 9.80 |
| $rel_{it4}$ | 14 | 6.86 |
| Total | 204 | 100 |
| $ndiv_{it2}$ | 68 | 32.85 |
| $ndiv_{it3}$ | 53 | 25.60 |
| $ndiv_{it4}$ | 48 | 23.19 |
| $ndiv_{it5}$ | 13 | 6.28 |
| $ndiv_{it6}$ | 25 | 12.08 |
| Total | 207 | 100 |
| $cap_{i1}$ | 139 | 67.15 |
| $cap_{i2}$ | 25 | 12.08 |
| $cap_{i3}$ | 34 | 16.43 |
| $cap_{i4}$ | 9 | 4.35 |
| Total | 207 | 100 |

Other information about the firm is also included in the model in order to get a better idea about the division's investment prospects. Thus firm characteristics such as profitability and growth opportunity are used as control variables[24]. Growth opportunity ($go_{it}$) is measured by the ratio of total capital expenditure of the firm to total sales of the firm. Overall firm profitability[25] is controlled through the lag value of total profitability of the firm ($\prod_{it-1}^{F}$). $\delta_t$ is a year dummy variable for three years[26] from 2006-2008 and $\varepsilon_{it}$ is the disturbance term. Putting the value of $\beta_1(\Omega)$ in equation (3.2) and expanding it gives the following equation:

[24] Berger and Ofek (1995) have used these variables to control for firm characteristics.
[25] See Wulf (1999, 2002)
[26] Although the sample consists of five years of observation, after calculating small segment investment the data was limited to these three years only (2006-2008).

$$I_{it}^{S} = \beta_0 + \alpha \prod_{it-1}^{S} + \sum_{j=0}^{4} \alpha_j rel_{itj} * \prod_{it-1}^{S} + \sum_{j=1}^{5} \gamma_j ndiv_{itj+1} * \prod_{it-1}^{S} + \sum_{j=1}^{4} \lambda_j cap_{ij} * \prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it}. \quad (3.3)$$

In order to examine the first issue it is important to look at the sign of $\alpha$ . If the sign of the coefficient is positive then it means that the past profitability of S is a good indicator of future performance and hence investment in S should increase. For testing the second issue it is necessary to add the coefficient $\alpha$ to each of the coefficients on the interaction terms i.e. $\alpha_j, \gamma_j, \lambda_j$ . If the sum of these coefficients i.e. the investment sensitivity is positive then it means that the firm would prefer to invest more in its smallest segment if it has generated higher profit in the previous period. However if the additive of these coefficients are negative then it means that investment sensitivity decreases as influence activities become more severe. However in the case of a decreasing relationship it is necessary to investigate whether it is due to more compensation incentives used by H. Higher compensation incentives can align the division managers' incentives with those of the firm so that it would not be in the interest of L to undertake unproductive influence activities and hence private signals can become more reliable. The above specification is estimated using ordinary least squares (OLS).

According to Wulf (2002) firms that place a higher weight on firm performance in their compensation incentives can rely less on noisy public signal and more on accurate private signal from influential division managers. The severity of influence activity in an organisation is an exogenous variable but the headquarters can control influence activity by L through incentive compensation which is endogenously determined. One way to link L's incentive to firm's performance is to offer him higher equity ownership. So if L has higher equity ownership in a firm he will have lower incentive to carry out value reducing influence activities since that will lower the value of the firm. Thus, firms that have higher influence problem will provide L with higher equity ownership to reduce influence problem. This would mean that H can rely more on private information from L about investment in S as compared to noisy public signal. So

to summarise, higher influence problem in a firm would mean H can rely more on private information from L about investment in S given that L has a higher equity ownership. Thus firms that offer higher equity ownership to their division managers rely less on noisy public signal as influence problem increases and hence the investment sensitivity of S to segment profitability should be negatively related to the proxies for influence activity in firms where L's compensation incentives are larger.

$rel_{it0}$, $ndiv_{it2}$ and $cap_{i1}$ are base categories and hence are dropped from the regression[27]. In this case $\alpha$ which is the coefficient of $\prod_{it-1}^{S}$ would denote the sensitivity of $rel_{it0}$, $ndiv_{it2}$ and $cap_{i1}$. 2005 is taken as the base year and hence the dummy corresponding to it is dropped while estimating the regressions.

Finally in order to test the third issue it is necessary to introduce another interaction term to take into account private cost of influence *c* in equation (3.3) above. Wulf (2002) uses percentage weight placed on firm performance in calculating CEO's annual bonus. A higher weight placed on firm performance would mean higher private cost of influencing. If more weight is placed on division performance then private cost of influencing would be low. Here two types of compensation incentives to the division manager of the large division are included: long-term incentive payments (LTIP) and short-term incentive payments (STIP). Both LTIP and STIP comprise of at risk payments. LTIP consists of at risk components which are related to firm performance such as shares, options, equity etc., whereas STIP consists of salary and cash bonuses which depends on achieving annual financial, safety, business and personal goals. More explicitly managers earn a cash bonus if they achieve performance targets based on annual growth in sales revenue, segment EBIT, manufacturing profitability, profit attributable, new product development and agreed personal objectives. Since LTIP and STIP both depend on firm performance both of them can be effective in reducing L's incentive to influence. However since STIP depends both on firm performance as well as division performance it might reduce L's incentive to

[27] Including all the dummy variables in the regression leads to the "Dummy variable trap" when the regression equation cannot be solved due to perfect multicollinearity.

influence on the one hand and on the other hand it might increase L's incentive to influence. However which of these effects offsets the other is a matter of empirical investigation.

Hence both LTIP and STIP are used to test the implication of the third issue. A variable $CI_{itk}$ which denotes two types of compensation incentives is constructed. $lltd_{it}$ and $lstd_{it}$ denote long-term and short-term incentive payments to division manager of large division. They have been calculated as the proportion of LTIP and STIP in total remuneration of L. These compensation incentives are tested in two different models since these variables are highly correlated with each other. After incorporating $CI_{itk}$ Equation (3.3) can be written as,

$$I_{it}^{S} = \beta_0 + \alpha \prod_{it-1}^{S} + \eta_k CI_{itk} * \prod_{it-1}^{S} + \sum_{j=0}^{4} \alpha_j rel_{itj} * \prod_{it-1}^{S} + \sum_{j=1}^{5} \gamma_j ndiv_{itj+1} * \prod_{it-1}^{S} + \sum_{j=1}^{4} \lambda_j cap_{ij} * \prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it} \quad (3.4)$$

where $k$ denotes the type of incentive compensation being tested. The coefficient $\eta_k$ on the interaction term $CI_{itk} * \prod_{it-1}^{S}$ denotes the substitutability between investment and compensation incentives. The sign of the coefficient on $\eta_k$ should be negative which implies that as H gives higher compensation incentives to L, it relies less on inaccurate public signals and hence investment sensitivity decreases. Pooled regression analysis is used to test this issue.

### *3.4.2. Diversification Discount or Premium?*

This section discusses various methodologies that are used in Chapter 5 to test whether diversified firms in Australia trade at a discount or premium. New methodologies are used in this thesis but at the same time the data has been used to test existing methodologies. This helps to compare the changes owing to the new methodologies.

#### *3.4.2.1. Tobin's q and Conventional Measures of Diversification*

Tobin's *q* is widely used as a measure of firm performance in the literature on corporate diversification. Lang and Stulz (1994), Servaes (1996), Lins and

Servaes (2002), Villalonga (2004) use Tobin's $q$ to measure firm performance. Number of segments in a firm and Herfindahl Index are used as the most common measures of diversification[28]. Another common measure of diversification is the use of dummy variables constructed from number of segments. Two types of dummy variables are constructed so far in the literature. The first one is a series of dummies for different number of segments in the firm and the second one is a multi-segment dummy. These dummy variables are discussed in detail in the next section. Tobin's $q$ is simply denoted as $q_{it}$ from now on, $numseg_{it}$ is number of segments in a firm, $H_{itsales}$ is Herfindahl index from sales and $H_{itassets}$ is Herfindahl index from assets.

$q_{it}$ is generally measured as the ratio of market value of the firm to the replacement value of its assets. The market value of the firm is the sum of market value of common stock, book value of debt and preferred stock. The replacement value of its assets is measured as the sum of book value of assets other than plant, equipment and inventories and estimated replacement cost of plant equipment and inventories. However replacement cost data is not available in Australia and there is no active market for corporate debt as well (Craswell *et al.*, 1997)). Hence following Khan *et al.* (2008) a different measure of $q_{it}$ for Australia is used in this chapter. The numerator of $q_{it}$ is measured as the sum of market value of equity, book value of preference shares and debt (both long and short-term). The denominator of $q_{it}$ is measured as the book value of total assets.

Herfindahl index is the sum of squared values of sales or assets per segment as a fraction of total firm sales. To be clearer, Comment and Jarrell (1995) defines a revenue based Herfindahl index as,

$$F_{jt} = \sum_{i=1}^{Njt} \left( \frac{X_{ijt}}{\sum_{i=1}^{Njt} X_{ijt}} \right)^2$$

[28] See Lang and Stulz (1994), Berger and Ofek (1995), Schoar (2002),Villalonga (2004),Comment and Jarrell (1995).

where *j* denotes firm, *i* denotes segment and t denotes year, $X_{ijt}$ is the revenue attributable to a segment. The Herfindahl indices for single segment firm would be one but a firm that has ten segments with each segment contributing ten percent towards its sales would have $H_{itsales}$ and $H_{itassets}$ equal to 0.1. Hence Herfindahl index would decrease as the firm becomes more diversified in the sense that its revenue is more dispersed across various segments. The objective here is to test whether firm performance which is represented by $q_{it}$ and degree of diversification measured by $numseg_{it}$, $H_{itsales}$ and $H_{itassets}$ are positively related or negatively related.

*3.4.2.2. Lang and Stultz (1994) vs. Berger and Ofek (1995)*

Two different methodologies are proposed by Lang and Stulz (1994) and Berger and Ofek (1995) to measure the value effect of diversification and to find the statistical significance of diversification discount and premium. Both these papers show that diversified firms traded at a discount in the U.S. In this thesis both methodologies are applied to firm level data of Australian firms to see whether diversified firms in Australia trade at a discount or premium. These two methodologies have been accepted and widely used in the empirical literature on corporate diversification[29] and hence emphasis is placed on them.

Lang and Stulz (1994) provide two different estimates of diversification discount. First of all they estimate the following regression,

$$q_{it} = a + b_2 D(2) + b_3 D(3) + b_4 D(4) + b_5 D(5) + \varepsilon_{it} \quad (3.5)$$

where *q* represents Tobin's *q* as measured in the previous section, *D(j)* is a dummy variable which takes the value of one if a firm has *j* or more segments. It is important to note here that the coefficient on *D(j)* reports the marginal contribution to $q_{it}$ of the $j^{th}$ segment in the firm. Discount is measured as the difference between the mean $q_{it}$ of single segment firms and the mean $q_{it}$ of multi-segment firms. For example the coefficient on *D(2)* provides the difference

[29] See Servaes (1996), Lins and Servaes (1999), Bernardo *et al.* (2000), Anderson *et al.* (2000), Villalonga (2004) etc.

between $q_{it}$ for firms with two segments and $q_{it}$ for firms with one segment. The sum of the coefficients on *D(2), D(3)* and *D(4)* provides the difference between $q_{it}$ of firms with four segments and $q_{it}$ of firms with one segment.

However there is a problem in using $q_{it}$ to compare the values of diversified firms with specialised firms. Some diversified firms or large divisions of those diversified firms might belong to low $q_{it}$ industries. Comparing diversified firms belonging to the low $q_{it}$ industries to equally weighted portfolios of specialised firms may show that diversified firms have lower $q_{it}$'s as compared to specialised firms even though diversification is not responsible for low $q_{it}$'s of those diversified firms. Lang and Stulz (1994) suggest a methodology for calculating $q_{it}$'s to eliminate this problem. They compare the $q_{it}$'s of diversified firms to the $q_{it}$ these firms would have if the stand-alone $q_{it}$ of each division were the average $q_{it}$ of the single segment firms in its industry. This newly constructed $q_{it}$ was called the pure-play $q_{it}$ or the industry-adjusted $q_{it}$ or imputed $q_{it}$. So a firm's diversification discount is now defined as the difference between its pure-play $q_{it}$ and its $q_{it}$. This industry adjusted $q_{it}$ is called, $LSRSZ_{it}$[30], where,
$LSRSZ_{it}$ = Firm's Tobin's $q$ – Industry adjusted $q$

Firm's Tobin's $q$ or $q$ has been defined earlier in this chapter whereas industry adjusted $q$ can be constructed as,

$$\text{Imputed } q = \sum_{j=1}^{n} q_j * \frac{Asset_j}{\sum_{i=1}^{k} Asset_i}$$

where $j$ represents division in a firm and $i$ represents industry to which the division belongs. The calculation of $LSRSZ_{it}$ is very complex and hence the following illustration involving a hypothetical firm will help to explain the methodology in calculating $LSRSZ_{it}$ in a better manner. Let the hypothetical diversified firm consist of two segments one in Material (I think that you use lower case for industry groups previously) and the other in Capital goods. Material and Capital goods are two industry groups classified by Global Industry Classification Standard (GICS). Thus imputed $q$ can be calculated as,

[30] *LSRSZ* has been named here after Lang and Stulz (1994) and Rajan *et al.* (2000)

*Imputed q= [($q_1$* Asset of single segment firms in Material) + ($q_2$*Asset of single segment firms in Capital goods)]/Sum of assets of single segment firms in Material and Capital goods.*

where $q_1$ is the average Tobin's *q* of single segment firms in Material and $q_2$ is the average Tobin's *q* of single segment firms in Capital goods. Equation (3.5) is re-estimated using $LSRSZ_{it}$ to estimate the diversification discount. Lang and Stulz (1994) methodology is tested in the Australian context using cross-sectional regressions for each year in the sample.

Berger and Ofek (1995) propose a different methodology for estimating the statistical significance of diversification on value of the firm. They do not use $q_{it}$ or $LSRSZ_{it}$ as their dependent variable but construct new measures of excess value of the firm like asset and sales multiplier. In this chapter $EXBOA_{it}$ and $EXBOS_{it}$ are the asset and sales multiplier respectively. Berger and Ofek (1995) claim that their methodology can overcome the shortcomings of using Tobin's *q* and industry adjusted *q*. They explain that assumptions need to be made about rates of depreciation and inflation to estimate the firm's replacement value. Firm's replacement value is essential for calculating *q*. Additionally, calculating industry adjusted *q* is also quiet challenging. This is because neither the segment market values nor the segment replacement values can be computed from the available data. Further these measures provide few opportunities for finding the sources of gains and losses due to diversification. The multiplier approach proposed by Berger and Ofek (1995) provides a direct estimate of the excess value associated with diversification on the one hand and helps to locate the sources of the overall value effect through segment level investigations on the other hand.

The construction of excess value measures is also quite complex and hence the methodology for constructing $EXBOA_{it}$ is illustrated below with the help of an example. $EXBOA_{it}$ is defined as:

$EXBOA_{it}$=*log [Tobin's q/Imputed q calculated from assets]*
where,

$$Imputed\ q = \sum_{i=1}^{n} AI_i * [Ind_i (V / AI)_{mf}];$$

$AI_i$ = segment *i*'s value of accounting item (here assets) used in the valuation multiple;

$Ind_i (V / AI)_{mf}$ = multiple of total capital to an accounting item (here assets) for the median single-segment firm in segment *i*'s industry;
*V*= firm's total capital (market value of equity + book value of debt);
*n*= number of segments

For example, the imputed value of the hypothetical firm with two segments as mentioned earlier can be calculated in the following manner: Let Segment 1 operate in Material and Segment 2 operates in Capital goods. Imputed value of Segment 1 is calculated as the product of the asset of Segment 1 and ($m_1$), where ($m_1$) is the median value of capital divided by the sales for single segment firms in Material. Imputed value of Segment 2 is calculated likewise. Imputed value of the firm is calculated as the sum of imputed value of Segment 1 and Segment 2.

Berger and Ofek (1995) use a multi-segment dummy variable *div*, as a measure of diversification which takes the value of one for firms with more than one segment. *div* captures the percentage difference in average excess value between focused and diversified firms. They use firm-size ($firmsize_{it}$,), profitability ($profitability_{it}$) and growth-opportunity ($go_{it}$) as control variables since these variables on the one hand might not be entirely dependent on degree of diversification but on the other hand might be responsible for firms trading at values different from their imputed values. Firm size is measured by the natural log of total assets of the firm, profitability is measured by the ratio of earnings before tax (EBT) of the firm to total sales of the firm and growth opportunity is measured by the ratio of total capital expenditure of the firm to total sales of the firm.

The following equation is estimated in Chapter 5 using both the excess value measures ($EXBOA_{it}$ and $EXBOS_{it}$) and pooled regression analysis for all years in the sample as per Berger and Ofek (1995):

$$ExVal_{it} = \alpha_0 + \beta_1(div) + \beta_2(firmsize_{it}) + \beta_3(profitability_{it}) + \beta_4(go_{it}) + \varepsilon_{it} \quad (3.6)$$

where, $ExVal_{it}$=$EXBOA_{it}$ or $EXBOS_{it}$

*3.4.2.3. Methodology for Constructing New Measures of Diversification*

In this section different indices for measuring diversification are constructed using number of segments, relatedness between segments, segment sales and assets, total sales and assets of the firm, Herfindahl indices constructed from sales and assets. Relatedness has been calculated using Australian and New Zealand Standard Industrial Classification (ANZSIC) codes as released by the Australian Bureau of Statistics in 1993. According to ANZSIC all the major industries have been divided into seventeen major divisions, e.g. Division C – Manufacturing. Each division is then divided into two digit subdivision titles and codes, e.g. C21 is Food, Beverage and Tobacco Manufacturing within manufacturing industry. Each subdivision is then divided into group titles and codes, e.g. C211 means Meat and Meat Product manufacturing within subdivision C21 under manufacturing. Group titles are further divided into classification titles and codes which provide us with four digit ANZSIC codes, e.g. C2111 means Meat Processing within C211.

The operations of each of the segments in a firm are considered and are manually matched with ANZSIC codes in the ABS database such that all the segments in the data have a four digit ANZSIC code. When a firm has only two segments it is comparatively easy to find out the relatedness between those two segments. For example, if all the four digits of the ANZSIC codes are completely different between the two segments then the two segments are unrelated. If the first digit matches then relatedness between the segments is one. If the first two digits match then relatedness between the segments is two and so on. However,

construction of relatedness between segments is somewhat complicated here since firms which might have more than two segments are also considered. So now relatedness is defined as the maximum similarity a segment has with other segments in the firm. Relatedness can take on five different values from 0 to 4. If relatedness is zero then it means that the segments in a firm are totally unrelated. If relatedness is one then segments are slightly related. If relatedness is two or three then that would mean that the segments are moderately related and if relatedness is four then the segments are completely related. The methodology for constructing relatedness is illustrated below with the help of the following two hypothetical firms.

**Table 3.2:** *Calculation of Relatedness for Hypothetical Firms A and B*

| **Firm A** | | | **Firm B** | | |
|---|---|---|---|---|---|
| **Segment** | **ANZSIC codes** | **Relatedness** | **Segment** | **ANZSIC codes** | **Relatedness** |
| **Segment 1** | 2711 | 2 | **Segment 1** | 2711 | 3 |
| **Segment 2** | 2729 | 2 | **Segment 2** | 2712 | 3 |
| **Segment 3** | 2549 | 1 | **Segment 3** | 2713 | 4 |
| | | | **Segment 4** | 2713 | 4 |

Table 3.2 shows the number of segments and their respective ANZSIC codes in Firm A and Firm B. Firm A has three segments and Firm B has four segments. Let us consider Firm A. The ANZSIC code for Segment 1 in Firm A is 2711. Segment 1 is more related to Segment 2 (the first two digits of the ANZSIC codes match) as compared to Segment 3 (only the first digit matches). So the maximum likeliness Segment 1 has with Segment 2 and Segment 3 is 2. Likewise the maximum likeliness Segment 3 has with other segments is 1. Hence relatedness of Segment 1 is 2, Segment 2 is 2 and Segment 3 is 1. Similarly in case of Firm B, the maximum relatedness Segment 1 and Segment 2 have with other segments is 3 and maximum relatedness that Segment 3 and Segment 4 have is 4.

All new measures of diversification are listed in Table 3.3. The first measure of diversification $DI_i$ is a diversification index calculated for each firm in the sample from relatedness (*rel)* and number of segments (*numseg)* in a firm with *i*

denoting firm and *j* denoting segment in a firm. $DI_{it}$ ranges from 0 to 1. If $DI_{it}$ for a certain firm is zero then that firm is highly diversified but if $DI_{it}$ equals one then that firm is not diversified. $DI_{it}$ is a better measure of diversification as compared to *rel* or *numseg*. In order to illustrate the validity of this claim, $DI_A$ and $DI_B$ are calculated from Table 3.2 above. Firm A has only three segments whereas Firm B has four segments which means according to the existing literature Firm B is more diversified. However in this example $DI_A$=1/3 and $DI_B$=7/8. Since 1/3<7/8, it implies that Firm A is more diversified than Firm B contrary to the existing literature on corporate diversification.

**Table 3.3:** *New Measures of Diversification*

| |
|---|
| $DI_{it} = \dfrac{\sum_{j=1}^{n} \text{Re}latedness_j}{4 * numseg_i}$ |
| $HDI_{itassets} = DI_{it} * H_{itassets}$ |
| $HDI_{itsales} = DI_{it} * H_{itsales}$ |
| $IH_{itassets} = \sum_{j=1}^{N} \left[ \dfrac{rel_j}{n*4} * \left( \dfrac{Assets_j}{\sum_{j=1}^{N} Assets_j} \right)^2 \right]$ |
| $IH_{itsales} = \sum_{j=1}^{N} \left[ \dfrac{rel_j}{n*4} * \left( \dfrac{Sales_j}{\sum_{j=1}^{N} Sales_j} \right)^2 \right]$ |

The second and third measure of diversification is an interaction of diversification with Herfindahl indices. $HDI_{itassets}$ and $HDI_{itsales}$ might be able to provide better statistical estimates in place of *div* or other numbers of segment dummies since they capture the effect of relatedness and number of segments on one hand and Herfindahl indices on the other. The fourth and fifth measures of diversification are a reconstructed Herfindahl index calculated using the ratio of

relatedness of $j^{th}$ segment of the firm and four (maximum relatedness) multiplied by number of segments in the firm as weights. $IH_{itassets}$ and $IH_{itsales}$ are an improved measure of diversification since they provide information about segment size (captured by sales and assets) compared to firm size but at the same time incorporate the effects of relatedness between the segments and number of segments in a firm. In the following sub-section the effectiveness of all these new measures of diversification is listed in Table 3 with the help of the actual sample.

*3.4.2.4. Sample Study*

In this section a comparative study on some multi-segment firms in the sample is provided for the year 2008. Table 4 provides firm level as well as segment level information on five firms in the sample. Firm level information consists of company name, industry group as mentioned in Global Industry Classification Standard (GICS), number of segment in each firm, $H_{itassets}$, $H_{itsales}$, $DI_{it}$, $HDI_{itassets}$, $HDI_{itsales}$, $IH_{itassets}$ and $IH_{itsales}$. Segment level information consists of the names of segments, ANZIC codes relevant to those segments and relatedness calculated from the ANZSIC codes. Five different companies belonging to five different industry groups are chosen. Fleetwood Corporation Limited (FCL) belongs to the industry group Automobiles and Components, Hills Industries Limited (HIL) belongs to the industry group Capital goods, Boral Limited belongs to the industry group Construction Materials, Orica belongs to the industry group Chemicals and BHP Billiton Limited (BHP) belongs to the industry group Metals and Mining.

Fleetwood Corporation Limited has two segments whose level of relatedness is very low but their Herfindahl indices show that they are moderately diversified. However diversification index, $DI_{it}$ which is calculated by combining relatedness and number of segments shows that Fleetwood Corporation Limited is much more diversified than predicted by the Herfindahl indices. Further $HDI_{itassets}$ and $HDI_{itsales}$ which increases the Herfindahl indices by the diversification index shows that Herfindahl indices have been scaled down from 0.50 and 0.51 to 0.13.

$IH_{itassets}$ and $IH_{itsales}$ which has been constructed from Herfindahl indices by using diversification index as weight shows that Fleetwood Corporation Limited is highly diversified even though it operates in the manufacturing industry (ANZSIC codes starting with '2').

Table 3.4 shows that as the number of segments increases $H_{itassets}$ decreases consistently showing that firms are becoming more diversified. This is highly consistent with the existing empirical literature. Hills Industries Limited has three segments whereas Boral Limited has four segments, hence Boral Limited is more diversified. However if the information that the segments in Boral Limited are more related to each other as compared to Hills Industries Limited is considered then the newly constructed measures of diversification show that Hills Industries Limited is more diversified as compared to Boral Limited. Companies which have more than five segments such as Orica and BHP Billiton Limited further show that incorporating relatedness and number of segments in a company in the existing measures of diversification such as number of segments and Herfindahl indices deflates the value of the diversification indices.

However, the aptness of five different measures of diversification in delivering accurate results would depend on the data under examination and the statistical significance of these measures through empirical estimations. If the values of these measures are considered for Orica and BHP Billiton it is not possible to determine the exact level of diversification. Orica has five segments compared to BHP Billiton which has nine and their Herfindahl indices constructed from sales and assets also show that BHP Billiton is more diversified than Orica. However diversification index, $DI_{it}$ shows that Orica is more diversified. $HDI_{itassets}$ and $HDI_{itsales}$ again shows that BHP Billiton is more diversified than Orica even though the actual figures have been scaled down by the diversification index. On the other hand, $IH_{itassets}$ and $IH_{itsales}$ shows that Orica and BHP Billiton have more or less similar levels of diversification. So now it becomes important to conduct statistical estimates to assess the appropriateness of the constructed measures of diversification.

**Table 3.4:** *Comparison between Different Measures of Diversification for Five Diversified Firms in Australia*

| **Company** | **Segment** | **ANZSIC** | **rel** | **N** | $H_{isale}$ | $H_{iasset}$ | $DI_i$ | $HDI_{isa}$ | $HDI_{ias.}$ | $IH_{isal}$ | $IH_{iasse}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FCL | Manufactured Accommodation | 2919 | 1 | 2 | 0.51 | 0.50 | 0.25 | 0.13 | 0.13 | 0.06 | 0.06 |
| FCL | Recreational Vehicles | 2829 | 1 | 2 | 0.51 | 0.50 | 0.25 | 0.13 | 0.13 | 0.06 | 0.06 |
| HIL | Electronics | 2849 | 1 | 3 | 0.40 | 0.43 | 0.42 | 0.17 | 0.18 | 0.06 | 0.07 |
| HIL | Building & Industrial | 2731 | 2 | 3 | 0.40 | 0.43 | 0.42 | 0.17 | 0.18 | 0.06 | 0.07 |
| HIL | Home & Hardware | 2761 | 2 | 3 | 0.40 | 0.43 | 0.42 | 0.17 | 0.18 | 0.06 | 0.07 |
| Boral | Asia | 2632 | 3 | 4 | 0.41 | 0.36 | 0.69 | 0.28 | 0.25 | 0.07 | 0.06 |
| Boral | Construction Materials - Australia | 2631 | 3 | 4 | 0.41 | 0.36 | 0.69 | 0.28 | 0.25 | 0.07 | 0.06 |
| Boral | United States Of America | 2633 | 3 | 4 | 0.41 | 0.36 | 0.69 | 0.28 | 0.25 | 0.07 | 0.06 |
| Boral | Building Products - Australia | 2621 | 2 | 4 | 0.41 | 0.30 | 0.69 | 0.28 | 0.25 | 0.07 | 0.06 |
| Orica | Minova | 2949 | 4 | 5 | 0.32 | 0.32 | 0.55 | 0.18 | 0.17 | 0.01 | 0.02 |
| Orica | Chemical Services | 2549 | 1 | 5 | 0.32 | 0.32 | 0.55 | 0.18 | 0.17 | 0.01 | 0.02 |
| Orica | Consumer Products | 2949 | 4 | 5 | 0.32 | 0.32 | 0.55 | 0.18 | 0.17 | 0.01 | 0.02 |
| Orica | Mining Services | 1520 | 0 | 5 | 0.32 | 0.32 | 0.55 | 0.18 | 0.17 | 0.01 | 0.02 |
| Orica | Chemnet | 2535 | 2 | 5 | 0.32 | 0.32 | 0.55 | 0.18 | 0.17 | 0.01 | 0.02 |
| BHP | Petroleum Products | 2520 | 4 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Aluminium Production | 2721 | 1 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Base Metals | 1319 | 4 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Stainless Steel Materials | 2949 | 1 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Energy Coal | 1101 | 1 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Diamond Mining | 1420 | 1 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Iron Ore | 1311 | 3 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Manganese | 1319 | 4 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |
| BHP | Metallurgical Coal | 2520 | 4 | 9 | 0.15 | 0.15 | 0.61 | 0.09 | 0.09 | 0.01 | 0.01 |

#### *3.4.2.5. Empirical Specification for Estimating New Measures of Diversification*

One of the objectives in Chapter 5 is to identify those measures of diversification which are statistically meaningful in the Australian context.

Further, using those significant measures of diversification and various control variables it is investigated whether diversified firms in Australia trade at a discount or premium. Hence the following regression model is estimated to find out the significance of various measures of diversification,

$$EV_{it} = \alpha_0 + \alpha_1(DM_{it}) + \varepsilon_{it} \tag{3.7}$$

where $EV_{it}$ denotes various excess value measures such as $LSRSZ_{it}$, $EXBOS_{it}$ and $EXBOA_{it}$ and $DM_{it}$ denote different measures of diversification $DI_{it}$, $HDI_{itassets}$, $HDI_{itsales}$, $IH_{itsales}$ and $IH_{itassets}$. The sign of the coefficient $\alpha_1$ denotes whether diversified firms in Australia trade at a discount or premium. A positive sign on $\alpha_1$ denotes a premium whereas a negative sign indicates a discount. In Chapter 5 cross-section analysis for empirical tests following Lang and Stulz (1994) and pooled regression analysis following Berger and Ofek (1995) is employed. The empirical study conducted in this thesis is an improvement over the existing literature not only in measurement issues but also in methodology. Firm-fixed effects regressions are used to find out the results which are obviously an improvement over cross-section and pooled regression analysis.

Firm characteristics such as firm-size ($firmsize_{it}$,), profitability ($profitability_{it}$) and growth-opportunity ($go_{it}$) and time dummies are used as control variables to check the robustness of the results obtained in equation (3.7). The following equation is tested.

$$\begin{aligned} EXBOA_{it} &= \alpha_0 + \alpha_1(DM_{it}) + \alpha_2(firmsize_{it}) + \alpha_3(profitability_{it}) \\ &+ \alpha_4(go_{it}) + \delta_t + \varepsilon_{it} \end{aligned} \tag{3.8}$$

where $DM_{it}$ denotes diversification measures such as, $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$. $\delta_t$ denotes time dummy variables for five years in the sample. One of the time dummies is dropped while estimating equation (3.8) in order to avoid problems related to multi-collinearity.

#### *3.4.2.6. Compensation and the Value Effect of Diversification: Methodology*

In this section long-term and short-term incentive payments are constructed for both the CEO and division managers. $ltc_{it}$ and $ltd_{it}$ denote long-term incentive payments to CEOs and division managers respectively. $ltc_{it}$ and $ltd_{it}$ is the proportion of options and equity and other long-term payments in total remuneration. $stc_{it}$ and $std_{it}$ denote short-term incentive payments to CEOs and division managers respectively. $stc_{it}$ and $std_{it}$ is the proportion of salary and bonus in total remuneration. The following empirical model is tested to see whether the value effect of diversification is robust after controlling for different types of compensation incentives ($CI_{itk}$) such as $ltc_{it}$, $ltd_{it}$, $stc_{it}$ and $std_{it}$. It is obvious that $ltc_{it}$ and $stc_{it}$ are correlated since $ltc_{it}$= 1- $stc_{it}$. Similarly $ltd_{it}$ and $std_{it}$ are also correlated with each other. Thus these compensation incentives are tested separately. However $ltc_{it}$ and $ltd_{it}$ are not correlated. Also, no correlation was found between $stc_{it}$ and $std_{it}$. The following empirical model is estimated:

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{itk}) + \varepsilon_{it} \tag{3.9}$$

According to the theory discussed earlier the coefficient on $\eta_1$ should be positive in the case of $ltc_{it}$ and $ltd_{it}$ which implies that long-term incentive payments have a positive relationship with the value of the firm. The coefficient on $\eta_1$ can be either positive or negative in case of $stc_{it}$ and $std_{it}$ which indicates that short-term incentive payments might have a positive or negative relationship with the value of the firm. This is because short-term incentive payments depend on firm performance indicators as well as division performance. However empirical estimation of equation (3.9) cannot show whether compensation incentives can explain the value effect of diversification. Also, all levels of compensation incentives might not have an impact on the value of the firm. A significant effect of compensation incentives on firm performance may be captured for only some values of such incentives.

Hence, dummy variables are constructed to represent those different levels of compensation incentives. $hltc_{it}$ is a dummy variable for long-term incentive payments to CEOs. This dummy variable is constructed for different values of $ltc_{it}$, for example, at 10% and above, 20% and above, 30% and above and so on. In this sample the maximum value $ltc_{it}$ takes is 80%. Hence seven different dummy variables are constructed. It should be noted here that $hltc_{it}$ is a single dummy variable and not a vector of dummies. Thus, dummy variables for short-term incentive payments to CEOs are $hstc_{it}$. Similarly, dummy variables for long-term and short-term incentive payments to division managers are $hltd_{it}$ and $hstd_{it}$ respectively. Next these various dummies are interacted with three measures of diversification, $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$. Given that the compensation incentives are constructed in an exogenous and reasonable way, one of the objectives of this thesis is to examine whether diversification discount/premium are related to such incentives or not. Further, which of these dummy variables can explain diversification/discount premium will also be examined. The following two regression equations are estimated,

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{itk}) + \eta_2(CI_{itk})*(DM_{it}) + \varepsilon_{it} \tag{3.10}$$

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{itk}) + \eta_2(CI_{itk})*(DM_{it}) + \alpha_2(firmsize_{it}) + \alpha_3(profitability_{it}) + \alpha_4(go_{it}) + \delta_t + \varepsilon_{it} \tag{3.11}$$

The coefficient $\eta_2$ i.e. the coefficient on the interaction term gives the excess value of the firm, given that the CEOs and division managers receive high levels of compensation incentives. If the sum of the coefficient on diversification measures i.e. $\alpha_1$ and the interaction term i.e. $\eta_2$ is positive that means diversified firms in Australia are trading at a premium and if it is negative then that would mean diversified firms are trading at a discount. The robustness of the results obtained in equation (3.10) is checked by controlling for firm-size, profitability, growth opportunity and the time dummies. Given the functional form above the coefficient on $hltc_{it}*DM_{it}$ and $hltd_{it}*DM_{it}$ are expected to be positive. A positive

sign on $\eta_2$ would indicate that higher long-term incentive payments would lead to lower rent-seeking activities by division managers and CEOs since such wasteful rent-seeking activities would lower the value of the firm and their total remuneration as well. If division managers and CEOs engage less in unproductive rent-seeking activities then the value of the firm increases which might result in premium since diversification discount will decrease. However the coefficient on $hstc_{it}*DM_{it}$ and $hstd_{it}*DM_{it}$ can be either positive or negative. A negative sign on $\eta_2$ in this case would suggest that if CEOs and division managers receive higher short-term incentive payments which depend more on division performance then they would engage more in unproductive rent-seeking activities since short-term payments depend less on the value of the firm and this in turn would generate lower firm value. However a positive sign on $\eta_2$ would suggest that if CEOs and division managers receive higher short-term incentive payments which depend more on firm performance then they would engage less in unproductive rent-seeking activities since short-term payments depend more on the value of the firm and this in turn would generate higher firm value. Hence a higher short-term incentive payment would mean either higher or lower excess value of the firm and can lead to either premium or discount.

# Chapter 4

# INFLUENCE ACTIVITY AND ALLOCATION OF FIRMS' INTERNAL CAPITAL: AUSTRALIAN EVIDENCE

## 4.1. Introduction

The objective of this chapter is to present the empirical results related to influence activity and capital allocation decisions of diversified firms in Australia. The theoretical framework for the empirical estimation was described in detail in Chapter 3 of this thesis. The theoretical model is based on a hypothetical firm comprising headquarters and two divisions, one small and the other large. Headquarters decides how much capital to allocate to the small division based on either recommendation from the manager of large division (private signal) or some observable information about the small division (public signal). The manager of large division is influential and may want to distort information about the investment prospect of small division in order to divert internal capital to his own division. Headquarters uses two types of incentives for the manager of large division to mitigate this influence problem: investment incentives and compensation incentives. Investment incentives are based on capital budget allocated to the large division, which is inversely related to capital budget allocated to the small division since headquarters has a fixed amount of funds in the internal capital market. Compensation incentives for the manager of large division are from direct compensation to him, which may depend on various performance indicators.

This chapter examines three related issues. First, whether investment in the small division depends positively or negatively on its past performance. If past

performance is a good indicator of future performance, then a positive relation between the two can be expected. Following Wulf (2002), the relation between investment in the small division and its past performance is defined as the investment sensitivity. Second, how the investment sensitivity varies as influence problems become more severe is studied. If headquarters proactively counters the large division manager's influence activities by offering compensation incentives that depend on the performance of the firm as a whole, then the large division manager has less incentive to engage in influence activities. In this case, his private signal becomes more informative of the small division's investment opportunities. Thus it may be expected that the investment sensitivity will decrease in the severity of influence problems. On the other hand, if headquarters does not rely much on compensation incentives, then the large division manager's influence activities would result in less informative private signals. In this case, it can be expected that the investment sensitivity will increase in the severity of influence problems. Finally, it is tested how compensation incentives for the large division manager are related to the investment sensitivity. As discussed above, a negative relation is expected between the investment sensitivity and the use of compensation incentives that depend on the performance of the firm as a whole. As discussed in the previous chapter, the lagged value of segment profitability is used as a proxy for public signal while the severity of influence problems is proxied by relatedness between segments, the number of segments in the firm, and capital constraints.

## 4.2. Results

### *4.2.1. Influence Problems and Investment Incentives*

The main results on the first two issues are presented in this section. The following equation is estimated:

$$I_{it}^{S} = \beta_0 + \alpha \prod_{it-1}^{S} + \sum_{j=0}^{4} \alpha_j rel_{itj} * \prod_{it-1}^{S} + \sum_{j=1}^{5} \gamma_j ndiv_{itj+1} * \prod_{it-1}^{S} + \sum_{j=1}^{4} \lambda_j cap_{ij} * \prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it}. \quad (4.1)$$

In equation (4.1), investment in the small segment ( $I_{it}^{S}$ ) is regressed on public signal ( $\prod_{it-1}^{S}$ ) about the small segment's investment opportunities. $I_{it}^{S}$ is measured by a change in the small segment's assets for firm *i* in period *t* and $\prod_{it-1}^{S}$ is the profit-asset ratio or profitability of the small segment in period *t-1*. $rel_{itj}$, $ndiv_{itj+1}$ and $cap_{ij}$ are dummy variables which are used as proxies for the severity of influence problems. $rel_{itj}$ are dummy variables which measure the relatedness between smallest and largest segment in the firm. $ndiv_{itj+1}$ are dummy variables corresponding to the number of divisions in a firm. $cap_{ij}$ are dummy variables which measure the degree of capital constraint. Overall firm profitability[31] ( $\prod_{it-1}^{F}$ ) and growth opportunity ($go_{it}$ ) are used as control variables. $\prod_{it-1}^{F}$ is the lag value of total profitability of the firm. $\delta_t$ is a year dummy variable for three years[32] from 2006-2008 and $\varepsilon_{it}$ is the error term.

Table 4.1 shows the estimation results for various specifications of equation (4.1).

[31] See Wulf (1999, 2002)

[32] Initially the sample comprises five years of observation but after calculating small segment investment the data was limited to these three years only (2006-2008).

**Table 4.1:** *Estimations of Small Segments Investment Sensitivity to Profits as a Function of Firm Characteristics*

| **Variables** | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
|---|---|---|---|---|
| $\prod_{it-1}^{S}$ | 0.267** | 0.255** | 0.261** | 0.249** |
| | (2.089) | (2.055) | (2.028) | (1.985) |
| $rel_{it1} * \prod_{it-1}^{S}$ | -1.311* | -1.215* | -1.298* | -1.203* |
| | (-1.797) | (-1.774) | (-1.720) | (-1.696) |
| $rel_{it2} * \prod_{it-1}^{S}$ | -1.304** | -1.201** | -1.208* | -0.930 |
| | (-2.350) | (-2.283) | (-1.676) | (-1.260) |
| $rel_{it3} * \prod_{it-1}^{S}$ | -1.132 | -0.774 | -1.193 | -0.858 |
| | (-1.314) | (-0.964) | (-1.328) | (-1.014) |
| $rel_{it4} * \prod_{it-1}^{S}$ | -1.137 | -0.203 | -1.135 | -0.183 |
| | (-0.708) | (-0.128) | (-0.692) | (-0.112) |
| $ndiv_{it3} * \prod_{it-1}^{S}$ | 1.290** | 1.134** | 1.229* | 1.128* |
| | (2.152) | (2.042) | (1.874) | (1.793) |
| $ndiv_{it4} * \prod_{it-1}^{S}$ | 2.116*** | 1.898*** | 2.127*** | 1.927*** |
| | (3.066) | (2.946) | (3.051) | (2.960) |
| $ndiv_{it5} * \prod_{it-1}^{S}$ | -1.769 | -2.186 | -1.913 | -2.332 |
| | (-1.069) | (-1.335) | (-1.131) | (-1.375) |
| $ndiv_{it6} * \prod_{it-1}^{S}$ | 1.272** | 1.249** | 1.001 | 0.888 |
| | (2.066) | (2.025) | (1.431) | (1.172) |
| $go_{it}$ | | 0.003 | | 0.003 |
| | | (0.812) | | (0.684) |
| $\prod_{it-1}^{F}$ | | 0.002 | | 0.002 |
| | | (0.906) | | (0.964) |
| $\delta_{2006}$ | | -0.335* | | -0.334* |
| | | (-1.876) | | (-1.810) |
| $\delta_{2007}$ | | -0.208 | | -0.208 |
| | | (-1.214) | | (-1.210) |
| $\delta_{2008}$ | | -0.492** | | -0.490** |
| | | (-2.074) | | (-2.028) |
| $cap_{i2} * \prod_{it-1}^{S}$ | | | -0.024 | -0.260 |
| | | | (-0.0541) | (-0.469) |
| $cap_{i3} * \prod_{it-1}^{S}$ | | | 0.399 | 0.445 |
| | | | (0.708) | (0.786) |
| $cap_{i4} * \prod_{it-1}^{S}$ | | | -1.572 | -0.993 |
| | | | (-0.625) | (-0.308) |
| *const* | 0.055 | 0.327** | 0.056 | 0.322* |
| | (0.705) | (2.040) | (0.674) | (1.959) |
| *N* | 145 | 145 | 145 | 145 |
| *R-squared* | 0.162 | 0.205 | 0.165 | 0.207 |

**Note:** *denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent *t*-stat. Models 1-4 include (i) five relatedness categories (*rel*) of which $rel_{it0}$ is the base category, (ii) five segment categories (*ndiv*) of which $ndiv_{it2}$ is the base category and (iii) four capital constrained categories (cap) of which $cap_{i1}$ is the base category. The coefficient of $\prod_{it-1}^{S}$ represents sensitivity for base categories: $rel_{it0}$, $ndiv_{it2}$ and $cap_{i1}$

Model 1 includes only two proxies for influence activities: four relatedness dummies ($rel_{it1}$, $rel_{it2}$, $rel_{it3}$, $rel_{it4}$) and four division dummies ($ndiv_{it3}$, $ndiv_{it4}$, $ndiv_{it5}$, $ndiv_{it6}$). $rel_{it0}$ and $ndiv_{it2}$ are taken as the base case and hence dropped in Model 1. The coefficient of $\prod_{it-1}^{S}$ represents the investment sensitivity for the base case. Model 2 is a re-estimation of Model 1 by controlling for firm characteristics such as lagged value of firm profitability and growth opportunity. Time-specific effects are controlled in Model 2 by introducing time dummies. Time dummy for 2005 is dropped while estimating Model 2 to avoid problems of multi-collinearity. Model 3 is a re-estimation of Model 1 by introducing another proxy for influence activity, which takes into account the degree of capital constraint. Three capital constraint dummies ($cap_{i2}$, $cap_{i3}$, $cap_{i4}$) are included in Model 3. $cap_{i1}$ is dropped from Model 3 since it is taken as the base case. Model 3 is re-estimated by introducing control variables for firm characteristics and time dummies in Model 4.

All four models estimated in Table 4.1 show that the coefficient of $\prod_{it-1}^{S}$ is positive and significant at the 5% critical level. Hence as past performance of S increases by 1%, investment in S increases by .25% to .27% if other variables remain constant. In other words, if a small division exhibits higher profitability in the previous period, then it will have larger investment in the current period. Hence Table 4.1 shows that investment sensitivity is positive.

Model 2 shows that the results obtained in Model 1 do not change even after introducing the control variables. In order to examine how the investment sensitivity varies as influence problems become more severe, it is necessary to look at the coefficients of the interaction terms. The coefficient of the interaction terms $rel_{it1} * \prod_{it-1}^{S}$ and $rel_{it2} * \prod_{it-1}^{S}$ consisting of segment profitability and relatedness are negative and significant. The coefficient of $rel_{it1} * \prod_{it-1}^{S}$ is relevant when $rel_1$ takes the value of one. Hence when the smallest and the largest segment of the firm are marginally related to each other then, a 1% increase in $\prod_{it-1}^{S}$ would lead to 0.255 – 1.215 = -0.96% decrease in the investment sensitivity. Similarly, the coefficient of the interaction term $ndiv_{it6} * \prod_{it-1}^{S}$ is relevant when the number of

divisions is greater than or equal to six. Thus when the number of divisions in a firm is greater than or equal to six, then a 1% increase in past profitability of S would lead to a 0.255 + 1.249 = 1.50% increase in the investment sensitivity.

The control variables in Model 2 used to account for firm performance do not have any significant impact in this model. However the coefficients of the time dummies are positive and significant implying that the time specific factors have an impact on the investment in the small segment. The coefficients of the interaction term involving segment profitability and the capital constraint dummies in Model 3 and Model 4 are not statistically significant.

In Table 4.2, the coefficient of $\prod_{it-1}^{S}$ is added to the coefficients of each of the interaction terms of Model 2 in Table 4.1. Table 4.2 shows how the investment sensitivity varies as relatedness between the smallest and the largest divisions of the firm increases and the number of divisions in the firm increases.

**Table 4.2:** *Calculation of Investment Sensitivity for Various Levels of Influence Activities*

| **Firm Characteristics** | **Investment Sensitivity**<br>**Model 2** |
|---|---|
| $rel_{it0}$ | 0.255**<br>(0.04) |
| $rel_{it1}$ | -0.960<br>(0.20) |
| $rel_{it2}$ | -0.946*<br>(0.10) |
| $rel_{it3}$ | -0.519<br>(0.54) |
| $rel_{it4}$ | 0.052<br>(0.97) |
| $ndiv_{it2}$ | 0.255**<br>(0.04) |
| $ndiv_{it3}$ | 1.389***<br>(0.01) |
| $ndiv_{it4}$ | 2.153***<br>(0.00) |
| $ndiv_{it5}$ | -1.931<br>(0.24) |
| $ndiv_{it6}$ | 1.504***<br>(0.01) |

**Note:***denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent p-values.

Table 4.2 shows that the investment sensitivity decreases for $rel_{it1}$, $rel_{it2}$ and $rel_{it3}$ respectively. However, this relation is positive for $rel_{it0}$ and $rel_{it4}$, although the coefficient for the latter is not significant. Further Table 4.2 shows that the investment sensitivity increases for $ndiv_{it2}$, $ndiv_{it3}$, $ndiv_{it4}$ and $ndiv_{it6}$. The coefficient for $ndiv_{it5}$ is negative but insignificant. Taken together, Table 4.2 suggests that the investment sensitivity is negatively related to the relatedness between the large and small segments but positively related to the number of divisions in the firm. Thus, while relatedness and number of divisions are both used as proxies for the severity of influence problems, the mechanism by which they affect the investment sensitivity appears to be different. These differences are discussed below.

The relatedness between segments has positive and negative sides, both of which stem from the fact that the manager of large division is more informed about the investment opportunity of the small division as they are more related. On the positive side, this implies that the large division manager's recommendation becomes more informative as the two divisions are more related. On the negative side, the large division manager is also more likely to engage in influence activities as the two divisions become more related. Insofar as headquarters controls the large division manager's influence activities through additional compensation incentives, the negative side can be mitigated, in which case headquarters can rely more on the large division manager's recommendation in determining investment in the small division. As a result the investment sensitivity can decrease. Thus Table 4.2 seems to suggest that more compensation incentives are provided to the large division manager when the severity of influence problems increases in that the two divisions become more related. This issue is examined in detail in the next section.

On the other hand, as the number of divisions in the firm increases, there is a higher chance of influence activities by the manager of large division. This negative side is not compensated for by more information; more divisions in the firm would mean that the manager of large division is less likely to be informed

about the investment prospect of small division. In this case, headquarters does not benefit from providing compensation incentives to the manager of large division. Instead headquarters will rely more on the noisy public signal in determining investment in the small division. Thus a positive relation between the investment sensitivity and the number of divisions in the firm might be expected.

As discussed above, Tables 4.1 and 4.2 report mixed evidence on how investment sensitivity varies with the severity of influence problems. Thus it is necessary to examine whether headquarters relies on compensation incentives to counter influence activities by the manager of large division. This issue is examined in the next section.

### *4.2.2. Influence Problems and Compensation Incentives*

This section studies how the provision of compensation incentives to the manager of large division affects the investment sensitivity. Various specifications of the following equation are estimated.

$$I_{it}^{S} = \beta_0 + \alpha \prod_{it-1}^{S} + \eta_k CI_{itk} * \prod_{it-1}^{S} + \sum_{j=0}^{4} \alpha_j rel_{itj} * \prod_{it-1}^{S} + \sum_{j=1}^{5} \gamma_j ndiv_{itj+1} * \prod_{it-1}^{S}$$
$$+ \sum_{j=1}^{4} \lambda_j cap_{ij} * \prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it} \qquad (4.2)$$

where $CI_{itk}$ denotes two types of compensation incentives to the manager of large division. $lltd_{it}$ and $lstd_{it}$ respectively denote the long-term and short-term incentive payments to the manager of large division. $k$ is the type of incentive compensation being tested. The coefficient $\eta_k$ shows the relation between compensation incentives to L and investment sensitivity. The sign of the coefficient $\eta_k$ can be either positive or negative. If H offers larger long-term incentive payments, which depend on firm performance, to L then L will have lower incentive to distort private signal. Thus H can rely more on informative private signal and hence investment sensitivity decreases and sign of the coefficient $\eta_k$ is expected to be negative. Two cases are possible when H offers short-term incentive payments to

L, since short-term incentive payments depend on firm as well as division performance. If H offers a high short-term incentive which places a higher weight on firm performance then $\eta_k$ should be negative following the above logic. However, if short-term incentive is offered such that, more weight is placed on division performance then H would rely less on private signal. It is difficult to predict how much weight is actually placed on division performance vis-à-vis firm performance since Australian firms do not disclose such information. Short-term incentives where more weight is placed on division performance may fail to align the incentives of L with those of the firm. In this case a higher short-term incentive will lead to an increase in investment sensitivity as H would rely more on public signal. Thus the coefficient of $\eta_k$ is expected to be positive.

Small segment's investment is regressed on either long-term or short-term incentive payments interacted with $\prod_{it-1}^{S}$ in Table 4.3. In specification (1) of Table 4.3, $I_{it}^{S}$ is regressed on short-term incentive payment to the large division manager ($lstd_{it}$) interacted with $\prod_{it-1}^{S}$. In (2), $I_{it}^{S}$ is regressed on long-term incentive payment to the large division manager ($lltd_{it}$) interacted with $\prod_{it-1}^{S}$. In both specifications (1) and (2), the severity of influence problems is controlled by relatedness dummies and division dummies. Firm-specific effects are controlled by lagged firm profitability ($\prod_{it-1}^{F}$), and growth opportunity ($go_{it}$). Time dummies are used to control for time-specific effects.

**Table 4.3:** *Estimations of the Effect of Compensation Incentives on Investment Sensitivity of the Small Segment*

| **Variables** | **(1)** | **(2)** |
|---|---|---|
| $\prod_{it-1}^{S}$ | 0.629*** | 0.341*** |
| | (5.951) | (3.748) |
| $rel_{it1} * \prod_{it-1}^{S}$ | -1.444** | -1.010** |
| | (-2.161) | (-2.464) |
| $rel_{it2} * \prod_{it-1}^{S}$ | -1.720*** | -1.223** |
| | (-3.041) | (-2.505) |
| $rel_{it3} * \prod_{it-1}^{S}$ | -1.232 | -1.600 |
| | (-1.066) | (-1.017) |
| $rel_{it4} * \prod_{it-1}^{S}$ | -0.728 | -0.876 |
| | (-0.461) | (-0.541) |
| $ndiv_{it3} * \prod_{it-1}^{S}$ | 1.487*** | 1.073** |
| | (2.666) | (2.242) |
| $ndiv_{it4} * \prod_{it-1}^{S}$ | 2.048*** | 2.059*** |
| | (3.125) | (4.617) |
| $ndiv_{it5} * \prod_{it-1}^{S}$ | -2.975 | -3.748 |
| | (-1.485) | (-1.534) |
| $ndiv_{it6} * \prod_{it-1}^{S}$ | 1.607** | 1.113* |
| | (2.164) | (1.761) |
| $\delta_{2006}$ | -0.434** | -0.308* |
| | (-2.114) | (-1.676) |
| $\delta_{2007}$ | -0.374* | -0.245 |
| | (-1.851) | (-1.363) |
| $\delta_{2008}$ | -0.507* | -0.277 |
| | (-1.968) | (-1.392) |
| $\prod_{it-1}^{F}$ | 0.003 | 0.002 |
| | (0.681) | (0.488) |
| $go_{it}$ | 0.005 | 0.003 |
| | (0.500) | (0.253) |
| $\prod_{it-1}^{S} * lstd_{it}$ | -0.508*** | |
| | (-3.880) | |
| $\prod_{it-1}^{S} * lltd_{it}$ | | -0.010 |
| | | (-0.0386) |
| *Const* | 0.439** | 0.280* |
| | (2.248) | (1.682) |
| *N* | 118 | 101 |
| *R-squared* | 0.289 | 0.362 |

**Note:** *denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent *t*-stat.

Specification (1) in Table 4.3 shows that the coefficient of the interaction term $\prod_{it-1}^{S} * lstd_{it}$, is negative and statistically significant. But the coefficient of the interaction term $\prod_{it-1}^{S} * lltd_{it}$, in specification (2) is not significant. The above results show that short-term incentive payments have a significant role in allocation of capital to the smallest segment of the firm. The coefficient of $\prod_{it-1}^{S} * lstd_{it}$ further suggests that firms that provide well-designed short-term incentives to the

manager of large division place a higher weight on informative private signals as compared to noisy public signals and thus investment sensitivity decreases.

To understand better the negative relationship between investment sensitivity and short-term incentives, Table 4.4 presents descriptive statistics for $lstd_{it}$ and $lltd_{it}$. As shown in Table 4.4, the average short-term incentive payment for large division managers is 87% of their total remuneration. In contrast, the average long-term incentive payment to large division managers is only 23% of their total remuneration[33]. Total remuneration of L is the sum of $lstd_{it}$ and $lltd_{it}$. Hence the mean value of $lstd_{it}$ and $lltd_{it}$ should add up to 100%. But Table 4.4 shows the average total remuneration of L to be 110%. Since the number of observations for $lstd_{it}$ and $lltd_{it}$ are different in the sample this might affect the mean values of $lstd_{it}$ and $lltd_{it}$. This 10% error can be attributed to sample bias. Thus in Australia, short-term incentive payments may be the main driving force in aligning large division managers' incentives with shareholder interests. Typical short-term incentive payments are based on both firm and division performance, in achieving various targets. While the detailed breakdown of various short-term incentives is not available, one can infer from the above result that it may be the case that a higher weight is placed on firm performance. In this case, managers have less incentive to do wasteful rent-seeking activities and have more incentives to meet annual targets, which in turn allow headquarters to place more weight on private signals for investing in the small segment.

**Table 4.4:** *Descriptive Statistics of Long-Term and Short-Term Incentive Payments of the Division Manager of the Large Division*

| Variable | Mean | N |
|---|---|---|
| $lstd_{it}$ | .87 | 62 |
| $lltd_{it}$ | .23 | 37 |

The above results show that firms decrease the investment sensitivity when they use more compensation incentives to motivate large division managers. The

[33] Kerin (2003) also reports that long-term incentive payments are comparatively small in Australia relative to the US.

logic behind this is that more compensation incentives lead to less influence activities, hence private signals from large division managers become more informative. If this is the case, then it may be expected that compensation incentives for large division managers will be positively related to the severity of influence problems. To check this, short-term incentive payments to large division managers are regressed on various proxies for the severity of influence problems such as relatedness and the number of divisions. The results are presented in Table 4.5.

**Table 4.5:** *Effect of Short-Term Incentive Payments of Large Division Manager on Severity of Influence Problems*

| **Variables** | **(1)** | **(2)** |
|---|---|---|
| $rel_{it1}$ | 1.27***<br>(3.09) | |
| $rel_{it2}$ | 0.64***<br>(13.18) | |
| $rel_{it3}$ | 0.70***<br>(6.44) | |
| $rel_{it4}$ | 0.80***<br>( (23.61) | |
| $ndiv_{it3}$ | | 0.73***<br>(23.27) |
| $ndiv_{it4}$ | | 0.75***<br>(23.50) |
| $ndiv_{it5}$ | | 1.02***<br>(5.11) |
| $ndiv_{it6}$ | | 1.51*<br>(1.89) |
| *N* | 162 | 162 |
| *R-squared* | 0.2192 | 0.2607 |

**Note:** *denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent *t*-stat.

Table 4.5 shows that the coefficients of the dummy variables in both specification (1) and specification (2) are positive and significant at 1% respectively, confirming that headquarters rely on more compensation incentives for large division managers as influence problems become potentially more severe.

### *4.2.3. Influence Activity and Firm Diversification*

Relatedness between segments and the number of divisions in a firm are used to proxy the severity of influence problems in this thesis. In the literature on firm diversification, these proxies have been used to measure the degree of diversification. For example, Berger and Ofek (1995) interpret increases in the number of segments in a firm as an increase in firm diversification. They show that, as a firm becomes more diversified, it leads to a larger discount in firm value. They also show that, as the relatedness between segments of a diversified firm increases, such a diversification discount is ameliorated.

Wulf (1999) provides some arguments as to why she chooses the relatedness between segments and the number of segments to proxy the severity of influence problems. She argues that the ability of large division manager to influence the private signal received by headquarters should depend on the degree of diversification within the firm. If a firm is less diversified in that its segments are more related, then the large division manager will have more information about the investment prospect of small division. Such an informational advantage increases the large division manager's ability to distort the private signal. Thus the relatedness between segments can be considered as a reasonable proxy for influence problems. In this regard, less diversified firms are potentially more prone to influence activities when diversification is measured by the relatedness between segments.

On the other hand, the number of segments as a proxy for influence problems has different implications for firm diversification. If a firm is more diversified in that it has more segments, then headquarters' span of control increases, which can reduce its ability to evaluate the small segment's investment prospect accurately. This opens up room for the large division manager's influence. Thus when the number of segments within the firm is used as a proxy for influence problems, more diversified firms are potentially more prone to influence problems when diversification is measured by the number of segments.

The above discussion clarifies apparent difficulties and inherent contradictions in Wulf (1999)'s argument. That is, while her argument that the large division manager's ability to distort the private signal depends on the degree of diversification is reasonable, the implications are different depending on how diversification is measured. When it is measured by the relatedness between segments, then less diversified firms are subject to more influence problems. When it is measured by the number of segments, then more diversified firms are subject to more influence problems. Thus one should be careful in measuring firm diversification as well as finding suitable proxies for influence problems within the firm. This point was shown clearly in Table 4.2.which indicated that there was a negative relation between the investment sensitivity and the relatedness between segments in most cases, but a positive relation between the investment sensitivity and the number of segments within the firm.

Based on the above, it seems necessary to use some other measures of firm diversification that are not prone to the problems discussed above. For this purpose, the following equation is estimated.

$$I_{it}^{S} = \beta_0 + \alpha \prod_{it-1}^{S} + \varphi_1 DM_{it} * \prod_{it-1}^{S} + \eta_k CI_{itk} * \prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it} \quad (4.3)$$

Equation (4.3) is similar to equation (4.2) of this chapter except that it has various measures of diversification introduced in Chapter 3 instead of the proxies for influence problems such as the relatedness between segments and the number of segments. In (4.3), $DM_{it}$ represents the five different measures of diversification which are formulated in Chapter 3. The value of each of these $DM_{it}$s lies between 0 and 1. As the value of these diversification measures increases from 0 to 1 the firm is considered to be less diversified. Based on the discussions so far, if a firm is less diversified, then there will be less influence activities. In this case, headquarters can rely more on informative private signals, hence smaller investment sensitivity. Thus it may be expected that the coefficient of the interaction term $DM_{it} * \prod_{it-1}^{S}$ will be negative.

Table 4.6 shows estimation results where investment in the small segment ( $I_{it}^{S}$ ) is regressed on the lagged value of its past profitability ( $\prod_{it-1}^{S}$ ) and the interaction terms $DM_{it} * \prod_{it-1}^{S}$. Five different specifications are estimated in Table 4.6 with five different measures of diversification.

**Table 4.6:** *Effect of Influence Activity or Degree of Diversification on Investment Sensitivity of Small Segment using New Measures*

| **Variables** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
|---|---|---|---|---|---|
| $\Pi_{it-1}^{S}$ | 0.305** | 0.466*** | 0.462** | 0.538** | 0.533** |
| | (2.048) | (2.798) | (2.344) | (2.507) | (2.311) |
| $\Pi_{it-1}^{S} * DI_{it}$ | -0.011 | | | | |
| | (-0.037) | | | | |
| $\Pi_{it-1}^{S} * HDI_{itsales}$ | | -1.093 | | | |
| | | (-1.602) | | | |
| $\Pi_{it-1}^{S} * HDI_{itassets}$ | | | -0.925 | | |
| | | | (-1.527) | | |
| $\Pi_{it-1}^{S} * IH_{itsales}$ | | | | -2.897* | |
| | | | | (-1.819) | |
| $\Pi_{it-1}^{S} * IH_{itassets}$ | | | | | -2.142* |
| | | | | | (-1.841) |
| *Const* | 0.123 | 0.129 | 0.128 | 0.118 | 0.118 |
| | (1.539) | (1.617) | (1.629) | (1.481) | (1.461) |
| *N* | 145 | 145 | 145 | 145 | 145 |
| *R-squared* | 0.029 | 0.035 | 0.035 | 0.046 | 0.046 |

**Note:** *denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent *t*-stat

Table 4.6 shows that investment in the small segment is positively and significantly related to public signal in all five specifications. Moreover the coefficients to the interaction term are negative and significant in specifications (4) and (5). Thus less diversification indeed leads to lower investment sensitivity. To check the robustness of this, equation (4.3) is estimated further by adding other variables that were used in previous estimations. Compensation incentives and other control variables are added specifically. The results are reported in Table 4.7.

**Table 4.7:** *The Effect of Short-Term Incentive Payments to L on Investment Sensitivity of Small Segment in Presence of Influence Problems*

| **Variables** | **(1)** | **(2)** | **(3)** | **(4)** |
|---|---|---|---|---|
| $\prod_{it-1}^{S}$ | 0.538** | 1.068*** | 0.533** | 1.003*** |
| | (2.507) | (4.392) | (2.311) | (5.791) |
| $\prod_{it-1}^{S} * IH_{itsales}$ | -2.897* | -4.444*** | | |
| | (-1.819) | (-2.798) | | |
| $\prod_{it-1}^{F}$ | | 0.002 | | 0.002 |
| | | (0.490) | | (0.535) |
| $go_{it}$ | | 0.003 | | 0.003 |
| | | (0.314) | | (0.361) |
| $\delta_{2006}$ | | -0.391 | | -0.395 |
| | | (-1.534) | | (-1.522) |
| $\delta_{2007}$ | | -0.367 | | -0.357 |
| | | (-1.501) | | (-1.455) |
| $\delta_{2008}$ | | -0.548** | | -0.554** |
| | | (-2.003) | | (-2.006) |
| $\prod_{it-1}^{S} * lstd_{it}$ | | -0.764** | | -0.702*** |
| | | (-2.400) | | (-2.771) |
| $\prod_{it-1}^{S} * IH_{itassets}$ | | | 2.142* | -3.136*** |
| | | | (-1.841) | (-3.808) |
| *Const* | 0.118 | 0.522** | 0.118 | 0.523** |
| | (1.481) | (2.147) | (1.461) | (2.116) |
| *N* | 145 | 118 | 145 | 118 |
| *R-squared* | 0.046 | 0.136 | 0.046 | 0.136 |

**Note:** *denotes 10% level of significance. ** denotes 5% level of significance. *** denotes 1% level of significance. Coefficients are adjusted up to three decimal places. The figures in parentheses represent *t*-stat

Specifications (1) and (3) in Table 4.7 are respectively the same as specifications (4) and (5) in Table 4.6. In specification (2) and (4), controls for firm characteristics and time dummies are included. Further, the interaction term for short-term incentive payment to the manager of large division is included as well. Specifications (2) and (4) show that the coefficients of the interaction terms $\prod_{it-1}^{S} * IH_{itsales}$ and $\prod_{it-1}^{S} * IH_{itassets}$ are negative and significant. This is consistent with the results in Table 6. For example, specification (2) implies that a 1% increase in $\prod_{it-1}^{S}$ would lead to a .908 - 3.009 = -2.1% decrease in investment sensitivity. Thus, as the firm becomes less diversified in that diversification measures such as $IH_{itsales}$ increase, the firm is prone to less influence problems, which allows its headquarters to rely more on informative private signals as compared to noisy public signals. Finally, specifications (2) and (4) also provide strong support for the earlier results on the relation between the investment sensitivity and compensation incentives to the large division manager, even after

controlling for influence problems or the degree of diversification (represented by $\prod_{it-1}^{S} * IH_{itsales}$ and $\prod_{it-1}^{S} * IH_{itassets}$). That is, the coefficients of the interaction terms related to short-term incentives are negative and significant.

## 4.3. Conclusion

This chapter examines how influence activities by large division managers in multidivisional organisations affect the investment in their small divisions. First, the relation between the investment in the small division and its past performance which is known as investment sensitivity is examined. This investment sensitivity is found to be positive, indicating that H invests more in S as past performance increases. Second, mixed evidence is found between the investment sensitivity and increase in the severity of influence problems when proxies such as, relatedness and division dummies are used. These results show that as the influence problem becomes more severe due to increase in relatedness between segments, headquarters relies more on private information from L. This may be because H successfully offsets the negative effects of increasing relatedness by offering appropriate compensation incentives to L. The division dummy however shows an increase in investment sensitivity as influence problems become more severe. As the number of divisions increase in a firm, the informativeness of the private signal decreases. Thus H would not rely on compensation incentives to L and hence investment sensitivity decreases.

Next, the relationship between compensation incentives and investment sensitivity is examined. A negative relationship is found between short-term incentives and investment sensitivity. This negative relationship indicates that Australian firms that provide high short-term incentive payments rely more on managerial recommendations for investing in S as compared to noisy accounting measures. Hence, the above results indicate that short-term incentives may be the main driving force in aligning L's incentives with shareholder's interests.

Finally, the contradiction in using relatedness and number of divisions in a firm to measure influence activity and degree of diversification are discussed. An alternative method of capturing both influence problem and degree of

diversification is provided. The empirical results using the new measures of diversification suggest that as value of these new measures of diversification increases the firm is considered to be less diversified. Based on earlier discussions, if a firm is less diversified then there will be less influence activities. Thus, headquarters can rely more on private information from L as compared to noisy public signal and hence investment sensitivity decreases.

These new measures of diversification also support the results obtained earlier. Short-term incentives payments are found to be effective in offsetting influencing by L. First, if short-term remuneration is contingent on achieving annual targets based on firm performance then L will engage less in influence activities that leads to loss of firm value. Secondly, division managers of large and matured divisions possess valuable information about investment prospect in firm's divisions which entitles them to certain information rent[34]. If their remuneration includes this information rent then they might forgo wasteful rent-seeking activity. Hence as the division managers receive higher short term remuneration headquarters can rely more on private information about investment in S.

It is beyond the scope of this chapter to examine whether the increased reliance on large division managers leads to loss of firm value or not. The effect of remuneration on firm performance is not examined in this chapter either. Chapter 5 examines these two issues. First, it is examined whether diversification leads to loss of firm value by using new measures of diversification and examining whether diversified Australian firms trade at a discount or premium relative to the single segment firms in the same industry. Second, it is also examined how CEO and division manager remuneration affects this discount or premium.

[34] See Choe and Yin (2009) and Schoar (2002)

# Chapter 5

# DIVERSIFICATION DISCOUNT OR PREMIUM: AN AUSTRALIAN PERSPECTIVE

## 5.1. Introduction

The literature survey in Chapter 2 on the effect of diversification shows that the existence of diversification discount could be a methodological issue. In this chapter, Australian firm-level data is used to re-examine the existing methodologies and investigate whether diversified firms in Australia trade at a discount or premium. The methodologies proposed by Lang and Stulz (1994) and Berger and Ofek (1995) are used respectively to examine whether the difference between existing methodologies yields different results. Second, the new measures of diversification constructed in Chapter 3 (by including information such as relatedness between segments in the firm, the number of segments in the firm and Herfindahl indices) are incorporated in the test. Finally, executive remuneration is used as an additional variable in an attempt to explain the results obtained by using these new measures of diversification.

## 5.2. Tobin's *q* and Conventional Measures of Diversification

In this section, the relationship between Tobin's *q* and the three commonly used measures of diversification is examined. Tobin's *q* is denoted by $q_{it}$ and was defined in Chapter 3. The three measures of diversification are $numseg_{it}$, $H_{itsales}$ and $H_{itassets}$, which are number of segments in a firm and Herfindahl indices constructed from sales and assets respectively.

**Table 5.1:** *Descriptive Statistics of Tobin's q, Number of Segment and Herfindahl Indices Constructed from Sales and Assets*

| **Year** | **2004** | **2005** | **2006** | **2007** | **2008** |
|---|---|---|---|---|---|
| $q_{it}$ | 0.74<br>(0.02) | 0.76<br>(0.02) | 0.74<br>(0.01) | 0.76<br>(0.01) | 0.74<br>(0.01) |
| $numseg_{it}$ | 3.02<br>(0.14) | 3.13<br>(0.14) | 3.20<br>(0.14) | 3.14<br>(0.13) | 3.20<br>(0.14) |
| $H_{itsales}$ | 0.50<br>(0.03) | 0.54<br>(0.02) | 0.55<br>(0.02) | 0.56<br>(0.02) | 0.58<br>(0.02) |
| $H_{itassets}$ | 0.51<br>(0.02) | 0.57<br>(0.02) | 0.57<br>(0.02) | 0.56<br>(0.02) | 0.60<br>(0.02) |
| *N* | 105 | 105 | 107 | 110 | 111 |

Note: The figures in parentheses denote standard deviation

Table 5.1 shows the mean value of $q_{it}$, $numseg_{it}$, $H_{itsales}$ and $H_{itassets}$ respectively. The mean $q$ varies between 0.74 and 0.76 over the sample period. The average number of segments in a firm ranges between 3.02 and 3.20. $H_{itsales}$ lies between 0.50 and 0.58 and $H_{itassets}$ lies between 0.51 and 0.60. The mean values of $H_{itsales}$ and $H_{itassets}$ indicate that the average firm in the sample is fairly diversified.

Table 5.2 shows the correlation between $q_{it}$ and the three measures of diversification. First, it is shown that $q_{it}$ is negatively related to $numseg_{it}$ for all years in the sample. An increase in the number of segments in a firm is interpreted as an increase in diversification for that firm. Thus this negative correlation indicates the negative correlation between diversification and firm performance. On the other hand, $H_{itsales}$ and $H_{itassets}$ are shown to be positively correlated with firm performance. Since Herfindahl indices lie between zero and one and a decrease in the indices implies that the firm is more diversified, a positive correlation implies that more diversified firms have lower value. In sum, Table 5.2 indicates a negative correlation between diversification and firm performance in all three measures of diversification. All these results for Australian firms are highly significant and are similar to those obtained by Lang and Stulz (1994).

**Table 5.2:** *Correlation Between Tobin's q and Three Measures of Diversification*

| **Year** | **2004** | **2005** | **2006** | **2007** | **2008** |
|---|---|---|---|---|---|
| | $q_{it}$ | $q_{it}$ | $q_{it}$ | $q_{it}$ | $q_{it}$ |
| $numseg_{it}$ | -0.53 | -0.46 | -0.41 | -0.33 | -0.29 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| $H_{itsales}$ | 0.54 | 0.42 | 0.44 | 0.35 | 0.28 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| $H_{itassets}$ | 0.53 | 0.46 | 0.45 | 0.32 | 0.26 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |

Note: The figures in parentheses denote p-values.

In order to see more clearly the negative relationship between diversification and firm performance, the sample firms are further divided below based on the three measures of diversification. In Table 5.3, the sample is divided into five groups depending on the value of $H_{itsales}$ and mean Tobin's q is calculated for each group. As shown in Table 5.3, mean $q_{it}$ is consistently higher for firms which are less diversified, i.e. firms with higher values of Herfindahl index. For example, mean $q_{it}$ is 0.87 in 2007 when $H_{itsales}$ = 1 as compared to mean $q_{it}$ of 0.71 when $H_{itsales}$ lies between 0 and 0.4. The same exercise is repeated with $H_{itassets}$ in Table 5.4 and with $numseg_{it}$ in Table 5.5. Once again, firm performance is shown to be higher as the value of $H_{itassets}$ is larger or the number of segments is smaller, i.e. the firm is less diversified. For example, Table 5.5 shows that, in 2008, mean $q_{it}$ is 0.80 for single segment firms whereas it is only 0.69 for firms which have five or more segments.

**Table 5.3:** *Mean of Tobin's q for Different Values of Herfindahl Indices Constructed from Sales*

| | Year | $H_{itsales}$ =1 | .8<$H_{itsales}$<1 | .6< $H_{itsales}$ <.8 | .4< $H_{itsales}$ <.6 | 0< $H_{itsales}$ <.4 |
|---|---|---|---|---|---|---|
| $q_{it}$ | 2004 | 0.88 {42} | 0.77 {9} | 0.76 {14} | 0.73 {48} | 0.72 {65} |
| $q_{it}$ | 2005 | 0.90 {53} | 0.88 {8} | 0.75 {18} | 0.73 {41} | 0.69 {68} |
| $q_{it}$ | 2006 | 0.84 {56} | 0.80 {10} | 0.65 {18} | 0.73 {47} | 0.66 {74} |
| $q_{it}$ | 2007 | 0.87 {60} | 0.83 {13} | 0.66 {17} | 0.75 {48} | 0.71 {80} |
| $q_{it}$ | 2008 | 0.80 {62} | 0.74 {11} | 0.69 {17} | 0.74 {57} | 0.71 {68} |

Note: Figures in the braces are the number of firms each year for each category of Herfindahl index.

**Table 5.4:** *Mean of Tobin's q for Different Values of Herfindahl Indices Constructed from Assets*

| | Year | $H_{itassets}$ =1 | .8<$H_{itassets}$<1 | .6< $H_{itassets}$ <.8 | .4< $H_{itassets}$ <.6 |
|---|---|---|---|---|---|
| $q_{it}$ | 2004 | 0.88 {42} | 0.83 {15} | 0.72 {13} | 0.71 {34} | 0.72 {74} |
| $q_{it}$ | 2005 | 0.90 {54} | 0.77 {9} | 0.73 {17} | 0.76 {36} | 0.70 {72} |
| $q_{it}$ | 2006 | 0.84 {59} | 0.76 {7} | 0.67 {16} | 0.73 {48} | 0.67 {75} |
| $q_{it}$ | 2007 | 0.86 {62} | 0.81 {4} | 0.69 {18} | 0.77 {49} | 0.70 {85} |
| $q_{it}$ | 2008 | 0.80 {63} | 0.77 {8} | 0.66 {16} | 0.76 {40} | 0.70 {88} |

Note: Figures in the braces are the number of firms each year for each category of Herfindahl index.

**Table 5.5:** *Mean of Tobin's q for Different Number of Segments*

| | | $numseg_{it}$ | | | | |
|---|---|---|---|---|---|---|
| | Year | 1 | 2 | 3 | 4 | >=5 |
| $q_{it}$ | 2004 | 0.88 {42} | 0.76 {24} | 0.78 {36} | 0.71 {44} | 0.69 {32} |
| $q_{it}$ | 2005 | 0.90 {54} | 0.77 {22} | 0.75 {33} | 0.75 {32} | 0.67 {47} |
| $q_{it}$ | 2006 | 0.84 {59} | 0.70 {26} | 0.74 {27} | 0.70 {44} | 0.66 {49} |
| $q_{it}$ | 2007 | 0.86 {62} | 0.71 {30} | 0.76 {33} | 0.76 {44} | 0.68 {49} |
| $q_{it}$ | 2008 | 0.80 {63} | 0.72 {36} | 0.76 {30} | 0.74 {32} | 0.69 {54} |

Note: Figures in the braces are the number of firms each year for the respective number of segments

The results in Tables 5.3, 5.4 and 5.5 suggest that diversification might lead to loss of value for the firm. Lang and Stulz (1994) argue that conglomerates might have lower value as compared to single segment firms if inefficiencies generated due to influence cost and agency costs outweigh the benefits from diversification. For example, inefficient capital allocation across different divisions of a conglomerate through its internal capital market may lead to loss in firm value. However, it is not possible to infer from Tables 5.3, 5.4 and 5.5 whether diversified firms trade at a discount or not, since these observations do not provide estimates of statistical significance of the incremental contribution to $q_{it}$ of diversification.

## 5.3. Lang and Stultz (1994) vs. Berger and Ofek (1995)

To measure the value effect of diversification and find the statistical significance of diversification discount or premium, different methodologies are proposed by Lang and Stulz (1994) and Berger and Ofek (1995). Lang and Stulz (1994) provide two different estimates of diversification discount. First, they estimate the following regression,

$$q_{it} = a + b_2 D(2) + b_3 D(3) + b_4 D(4) + b_5 D(5) + \varepsilon_{it} \quad (5.1)$$

where $q_{it}$ is Tobin's $q$ and $D(j)$ is a dummy variable which takes the value of one if a firm has $j$ or more segments. Therefore the coefficient of $D(j)$ captures the marginal contribution to $q_{it}$ of diversifying from $j$-1 to $j$ segments.

**Table 5.6:** *Marginal Contributions to q of Diversification*

| $q_{it}$ year | a | b2 | b3 | b4 | b5 | N | R-sq |
|---|---|---|---|---|---|---|---|
| | 0.85*** | -0.08*** | 0.01 | -0.07* | -0.02 | 160 | |
| **2004** | (45.95) | (-3.26) | (0.61) | (-3.70) | (-0.91) | | 0.31 |
| | 0.88*** | -0.11** | -0.01 | -0.01 | -0.08*** | 175 | |
| **2005** | (21.90) | (-2.64) | (-0.67) | (-0.28) | (-4.00) | | 0.23 |
| | 0.82*** | -0.12*** | 0.04 | -0.04 | -0.04* | 192 | |
| **2006** | (30.39) | (-3.44) | (1.55) | (-1.39) | (-1.74) | | 0.17 |
| | 0.85*** | -0.14*** | 0.06 | 0.00 | -0.08*** | 206 | |
| **2007** | (21.92) | (-2.82) | (1.51) | (-0.10) | (-6.00) | | 0.13 |
| | 0.78*** | -0.06** | 0.04 | -0.02 | -0.05*** | 206 | |
| **2008** | (36.77) | (-2.02) | (1.19) | (-0.72) | (-3.90) | | 0.09 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

The results from the estimation of equation (5.1) are reported in Table 5.6. The coefficient of *D(2)* is negative and statistically significant for all the years in the sample. This indicates that diversified firms with two or more segments have lower mean $q_{it}$ for each year in the sample compared to single segment firms. Also it can be seen from Table 5.6 that the average value of $q_{it}$ decreases as the number of segments increases for each year in the sample. This drop in average $q_{it}$ is again significant for firms with five or more segments.

Next, diversification discount is calculated in Table 5.7 from the coefficients of *D(j)* in Table 5.6. Discount is measured as the difference between the mean $q_{it}$ of single segment firms and the mean $q_{it}$ of multi-segment firms. The coefficient of *D(2)* gives the difference between $q_{it}$ of firms with two segments and $q_{it}$ of firms with one segment. The sum of the coefficients of *D(2)* and *D(3)* measures the difference between $q_{it}$ of firms with three segments and $q_{it}$ of firms with one segment. Likewise, the sum of the coefficients of *D(2), D(3)* and *D(4)* measures the difference between $q_{it}$ of firms with four segments and $q_{it}$ of firms with one segment. Consequently the negative value of the difference between $q_{it}$ of multi-segment firms and $q_{it}$ of firms with one segment indicates the diversification discount. Hence, the sign of the diversification discount calculated in Table 5.7 is positive.

**Table 5.7:** *Unadjusted Diversification Discount*

| | | ***numseg*** | | | |
|---|---|---|---|---|---|
| | **Year** | **2** | **3** | **4** | **5** |
| | | 0.08*** | 0.07*** | 0.14*** | 0.16*** |
| **DD** | **2004** | (0.00) | (0.00) | (0.00) | (0.00) |
| | | 0.11*** | 0.13*** | 0.13*** | 0.21*** |
| **DD** | **2005** | (0.01) | (0.00) | (0.00) | (0.00) |
| | | 0.12*** | 0.08*** | 0.12*** | 0.16*** |
| **DD** | **2006** | (0.00) | (0.01) | (0.00) | (0.00) |
| | | 0.14*** | 0.09*** | 0.09*** | 0.17*** |
| **DD** | **2007** | (0.01) | (0.04) | (0.03) | (0.00) |
| | | 0.06** | 0.03 | 0.04* | 0.10*** |
| **DD** | **2008** | (0.05) | (0.35) | (0.07) | (0.00) |

Note: The figures in parentheses denote p-values. *** denotes 1% level of significance. ** denotes 5% level of significance. *denotes 10% level of significance.

Table 5.7 shows that diversified firms in Australia trade at a discount compared to single segment firms for all years in the sample. In 2004, for example, firms with two segments traded at a discount of 8% and firms with five or more segments had a discount of 16%. In 2008, the discount lies between 6% and 10%. Table 5.7 also indicates that, for each year in the sample, the size of discount tends to increase as the number of segments increases.

Lang and Stulz (1994) note problems in using $q_{it}$ to compare the value of diversified firms with that of single-segment firms, and use instead industry-adjusted $q_{it}$. The construction of industry-adjusted $q_{it}$ was described in detail in Chapter 3. The industry-adjusted $q_{it}$, denoted by $LSRSZ_{it}$, is the difference between the $q_{it}$ of diversified firms and the pure-play $q_{it}$ and the industry-adjusted diversification discount is the difference between industry-adjusted $q_{it}$ and $q_{it}$ of a diversified firm. Using $LSRSZ_{it}$, equation (5.1) is re-estimated in Table 5.8, where the negative sign of a coefficient indicates a diversification discount and the positive sign a premium.

**Table 5.8:** *Marginal Industry-Adjusted Diversification Discount*

| $LSRSZ_{it}$ | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | **a** | **b2** | **b3** | **b4** | **b5** | **N** | **R-sq** |
| | 0.71*** | 0.05 | 0.01 | -0.07*** | -0.02 | 160 | |
| **2004** | (24.23) | (1.51) | (0.61) | (-3.70) | (-0.91) | | 0.11 |
| | 0.70*** | 0.07 | -0.01 | -0.01 | -0.08*** | 175 | |
| **2005** | (17.19) | (1.54) | (-0.67) | (-0.28) | (-4.00) | | 0.07 |
| | 0.67*** | 0.03 | 0.04 | -0.04 | -0.04* | 192 | |
| **2006** | (19.30) | (0.60) | (1.55) | (-1.39) | (-1.74) | | 0.03 |
| | 0.67*** | 0.04 | 0.06 | 0.00 | -0.08*** | 206 | |
| **2007** | (16.61) | (0.70) | (1.51) | (-0.10) | (-6.00) | | 0.06 |
| | 0.62*** | 0.10*** | 0.04 | -0.02 | -0.05*** | 206 | |
| **2008** | (24.61) | (2.88) | (1.19) | (-0.72) | (-3.90) | | 0.14 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance.***denotes 1% level of significance.

Table 5.8 shows that after adjusting for industry effects the discount is reduced and has turned into premium in some cases. For example, it shows that in 2004 only firms with four or more segments report a discount of 7% after adjusting for industry effects, as compared to 14% in Table 5.7. In 2005 and 2006, firms with five or more segments trade at a discount of 8% and 4% respectively as compared to 21% and 16% in Table 5.7. An interesting difference between Tables

5.7 and 5.8 is that firms with two or more segments traded at a premium of 10% in 2008 in Table 5.8 while they were traded at a discount of 6% in Table 5.7.

Comparison of the results in Tables 5.7 and 5.8 shows that after adjusting for the industry effects the discount has decreased dramatically and has even turned into a premium in some cases. These results suggest that the existence of diversification discount could be a measurement issue.

Berger and Ofek (1995) propose a different methodology for estimating the statistical significance of diversification on firm performance. They do not use $q_{it}$ or $LSRSZ_{it}$ as the dependent variable but construct new measures of excess value of the firm called asset multiplier ($EXBOA_{it}$) and sales multiplier ($EXBOS_{it}$).

The following equation is estimated using both the excess value measures ($EXBOA_{it}$ and $EXBOS_{it}$). The methodology adopted for empirical estimations is pooled regression analysis following Berger and Ofek (1995):

$$ExVal_{it} = \alpha_0 + \beta_1(div) + \beta_2(firmsize_{it}) + \beta_3(profitability_{it}) + \beta_4(go_{it}) + \varepsilon_{it} \quad (5.2)$$

where $ExVal_{it}$ is the excess value of the firm. Excess value of the firm is measured by $EXBOA_{it}$ and $EXBOS_{it}$. *Div* is a multi-segment dummy whereas $firmsize_{it}$, $profitability_{it}$ and growth opportunity ($go_{it}$) are control variables.

**Table 5.9:** *Estimations of Excess Value of the Firm on a Multi-Segment Dummy and Control Variables*

| | $EXBOA_{it}$ | $EXBOS_{it}$ |
|---|---|---|
| ***div*** | 0.27*** | -0.26 |
| | (3.42) | (-1.15) |
| ***firmsize$_{it}$*** | -0.06*** | -0.13*** |
| | (-3.53) | (-3.07) |
| ***profitability$_{it}$*** | 0.00 | 0.00 |
| | (0.59) | (-0.59) |
| ***go$_{it}$*** | 0.00*** | 0.00 |
| | (4.68) | (0.78) |
| ***const*** | 0.92*** | 1.64** |
| | (3.39) | (2.40) |
| ***N*** | 870 | 899 |

Note: The figures in parentheses denote *t*-stat. *** denotes 1% level of significance. ** denotes 5% level of significance. *denotes 10% level of significance.

Table 5.9 reports the results for the estimation of equation (5.2) using $EXBOA_{it}$ and $EXBOS_{it}$ as dependent variables. Estimation results with $EXBOA_{it}$ show that the coefficient to *div* is positive and significant at the 1% critical level, suggesting that multi-segment firms in Australia trade at a premium of 27% as compared to single-segment firms. However, the coefficient to *div* is negative though not significant when $EXBOS_{it}$ is used as a dependent variable. Further, it shows that $firmsize_{it}$ affects the excess value of a firm negatively and significantly although $profitability_{it}$ and $go_{it}$ have no impact on the excess value of the firm.

It is worth discussing the results obtained by Berger and Ofek (1995) and Fleming et al. (2003). Berger and Ofek (1995) use three accounting measures: earnings before interest and taxes (EBIT), assets and sales to calculate the excess value measures. They find a discount of 15%, 13% and 14% using EBIT, assets and sales multipliers respectively for the U.S. firms from 1986 to 1991. They also use relatedness and the number of segments along with the multi-segment dummy to explain their results. They find a negative coefficient to the number of segments. This implies that the loss of value from diversification increases as firms become more diversified when diversification is measured by the number of segments. On the other hand, a positive coefficient to the estimates of relatedness implies that the value loss from diversification can be reduced as segments in a firm become more related. Fleming et al. (2003) conduct a similar study with Australian firms from 1988 to 1998. They use two accounting measures: earnings before taxes (EBT) and sales to calculate excess value measures. They find a 29% discount using the EBT multiplier. Further, by investigating whether profitability or firm performance affects the valuation discount of multi-segment firms in Australia, they find that high-performing multi-segment firms have higher valuation premium of 27% as compared to low-performing multi-segment firms. These results are somewhat supportive of the findings by Fleming et al. (2003). In other words, diversification premium is more likely to prevail in Australia.

## 5.4. New Measures of Diversification

### *5.4.1. Discount or Premium*

In Sections 5.2 and 5.3, diversification measures such as the number of segments, Herfindahl indices constructed from sales and assets, and the two different types of diversification dummies are used to examine whether diversified firms in Australia trade at a discount or premium. Section 5.3 reports somewhat mixed results on the issue of diversification discount in the case of Australian firms. The results obtained in Section 3 show that Australian firms trade at a discount using Tobin's *q* but, after adjusting for industry effects, the discount is reduced considerably and in some cases even changed to premium. A statistically significant premium is found using an asset multiplier.

The conventional measures of diversification such as the number of segments in a firm, Herfindahl indices and multi-segment dummies are a very crude proxy for corporate diversification. There is scope for further development in this area by constructing more refined measures of diversification that utilise as much available information as possible. For example, relatedness among different segments in a firm or the number of segments might not be very meaningful measures of diversification on their own. A firm may have multiple segments but, if they operate in related businesses, then one may not consider the firm to be more diversified than a firm with a smaller number of segments but in different lines of business. Thus if measures such as relatedness or the number of segments are combined in a meaningful way, then it might provide a more informative measure of diversification. Similarly improvements can also be made on continuous measures like Herfindahl indices by incorporating information such as relatedness and the number of segments in the firm and relatedness between the segments in the firm. Thus, in Chapter 3, five new measures of diversification are constructed: $DI_{it}$, $HDI_{itassets}$, $HDI_{itsales}$, $IH_{itassets}$ and $IH_{itsales}$.

The objective of this section is to identify those measures of diversification which are statistically significant for the sample used here. Further, those significant measures of diversification and various control variables are employed

to revisit whether diversified firms in Australia trade at a discount or premium. The following regression model is tested to assess the significance of various measures of diversification,

$$EV_{it} = \alpha_0 + \alpha_1(DM_{it}) + \varepsilon_{it} \quad (5.3)$$

where $EV_{it}$ denotes various excess value measures such as $LSRSZ_{it}$, $EXBOS_{it}$ and $EXBOA_{it}$ and $DM_{it}$ denotes various new measures of diversification constructed in Chapter 3. The sign of the coefficient $\alpha_1$ indicates whether diversified firms in Australia trade at a discount or premium. A positive sign on $\alpha_1$ denotes a premium whereas a negative sign indicates a discount. In Section 5.3, cross-sectional analysis is used for empirical tests following Lang and Stulz (1994) and pooled regression analysis is used following Berger and Ofek (1995). In this section, firm fixed-effect regressions are used.

**Table 5.10:** *Estimation of Industry-Adjusted Diversification Discount on New Measures of Diversification*

| | $LSRSZ_{it}$ | $LSRSZ_{it}$ | $LSRSZ_{it}$ | $LSRSZ_{it}$ | $LSRSZ_{it}$ |
|---|---|---|---|---|---|
| $DI_{it}$ | -0.05<br>(-1.18) | | | | |
| $HDI_{itassets}$ | | 0.03<br>(0.45) | | | |
| $HDI_{itsales}$ | | | -0.01<br>(-0.19) | | |
| $IH_{itsales}$ | | | | 0.12<br>(0.62) | |
| $IH_{itassets}$ | | | | | 0.10<br>(0.75) |
| ***const*** | 0.74***<br>(45.91) | 0.72***<br>(61.83) | 0.72***<br>(65.83) | 0.72***<br>(65.18) | 0.72***<br>(97.60) |
| ***N*** | 176 | 176 | 176 | 176 | 176 |

Note: The figures in parentheses denote *t*-stat. *** denotes 1% level of significance. ** denotes 5% level of significance. *denotes 10% level of significance.

**Table 5.11:** *Estimation of Excess Value of Firm Constructed from Sales on New Measures of Diversification*

| | $EXBOS_{it}$ | $EXBOS_{it}$ | $EXBOS_{it}$ | $EXBOS_{it}$ | $EXBOS_{it}$ |
|---|---|---|---|---|---|
| $DI_{it}$ | -1.50<br>(-1.25) | | | | |
| $HDI_{itassets}$ | | -0.10<br>(-0.04) | | | |
| $HDI_{itsales}$ | | | -0.35<br>(-0.12) | | |
| $IH_{itsales}$ | | | | 3.97<br>(1.26) | |
| $IH_{itassets}$ | | | | | 3.04<br>(1.22) |
| ***const*** | 0.66<br>(-1.44) | -1.21***<br>(-2.93) | -1.17**<br>(-2.49) | -1.44***<br>(-8.60) | -1.38***<br>(-11.14) |
| ***N*** | 163 | 163 | 163 | 163 | 163 |

Note: The figures in parentheses denote *t*-stat. *** denotes 1% level of significance. ** denotes 5% level of significance. *denotes 10% level of significance.

**Table 5.12:** *Estimation of Excess Value of Firm Constructed from Assets on New Measures of Diversification*

| | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ |
|---|---|---|---|---|---|
| $DI_{it}$ | -1.78<br>(-0.79) | | | | |
| $HDI_{itassets}$ | | 1.20*<br>(1.95) | | | |
| $HDI_{itsales}$ | | | 0.67<br>(0.87) | | |
| $IH_{itsales}$ | | | | 2.85***<br>(3.03) | |
| $IH_{itassets}$ | | | | | 1.99**<br>(2.66) |
| ***const*** | 0.08<br>(0.98) | -0.17<br>(-1.79) | -0.09<br>(-0.74) | -0.13<br>(-2.71) | -0.09<br>(-2.26) |
| ***N*** | 156 | 156 | 156 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. *** denotes 1% level of significance. **denotes 5% level of significance. *denotes 10% level of significance.

Tables 5.10, 5.11 and 5.12 show the regression results from estimating equation (5.3). In Table 5.10, $LSRSZ_{it}$ is regressed on $DI_{it}$, $HDI_{itassets}$, $HDI_{itsales}$, $IH_{itsales}$ and $IH_{itassets}$ respectively. The coefficients to the various measures of diversification show discount in some cases and premium in others but they are all insignificant. In Table 5.11, the same regression is repeated with $EXBOS_{it}$ as a dependent variable. Once again, none of the coefficients are significant although

there is a discount with $DI_{it}$, $HDI_{itassets}$ and $HDI_{itsales}$ and premium with $IH_{itsales}$ and $IH_{itassets}$. In Table 5.12, $EXBOA_{it}$ is regressed on the five different measures of diversification. It reports a discount with $DI_{it}$ although insignificant and premium for all the other diversification measures. It is worth noting that the coefficients to $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$ are significant at the 10%, 1% and 5% levels, respectively. Thus it appears, once again, that diversification premium is more likely in Australia when using new measures of corporate diversification.

In Table 5.12 below the robustness of the results are checked further by including firm-level control variables, $firmsize_{it}$, $profitability_{it}$, $go_{it}$ and time dummies. In particular, it will be interesting to see whether the diversification premium found with $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$ continues to be the case. The following equation is estimated:

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \alpha_2(firmsize_{it}) + \alpha_3(profitability_{it}) + \alpha_4(go_{it}) + \delta_t + \varepsilon_{it} \quad (5.4)$$

where $DM_{it}$ denotes diversification measures such as $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$ and $\delta_t$ denotes the time dummies for five years in the sample. One of the time dummies is dropped while estimating equation (5.4) in order to avoid problems related to multi-collinearity.

**Table 5.13:** *Estimations of Excess Value from Assets on New Measures of Diversification and Control Variables*

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) |
|---|---|---|---|
| $HDI_{itassets}$ | 1.00* | | |
| | (1.82) | | |
| $IH_{itsales}$ | | 2.51** | |
| | | (2.63) | |
| $IH_{itassets}$ | | | 1.70** |
| | | | (2.42) |
| $firmsize_{it}$ | 0.17 | 0.15 | 0.16* |
| | (1.52) | (1.47) | (1.80) |
| $profitability_{it}$ | 0.00 | | 0.00 |
| | (0.00) | 0.00 | (0.17) |
| | | (0.12) | |
| $go_{it}$ | -0.00 | -0.00 | -0.00 |
| | (-0.55) | (-0.55) | (-0.49) |
| $t_2$ | -0.20*** | -0.21*** | -0.21*** |
| | (-3.00) | (-3.52) | (-3.42) |
| $t_3$ | -0.16*** | -0.14** | -0.15*** |
| | (-3.03) | (-2.70) | (-2.96) |
| $t_4$ | -0.17** | -0.15* | -0.17** |
| | (-2.30) | (-2.01) | (-2.41) |
| $t_5$ | -0.06 | -0.05 | -0.07 |
| | (-0.79) | (-0.69) | (-0.95) |
| *const* | -3.59 | -3.15 | -3.56* |
| | (-1.54) | (-1.50) | (-1.80) |
| ***N*** | 156 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

Table 5.13 shows that premium exists and is significant for all three measures of diversification even after controlling for $firmsize_{it}$, $profitability_{it}$, $go_{it}$ and $\delta_t$. The above results also show that $firmsize_{it}$ is positively and significantly related to the excess value measure constructed from assets. It may be possible that larger firms have more resources to invest in their divisions, which may have a positive impact on the asset-based measure of excess value. Besides, time is an important contributor to the value of the firm. Overall, the results so far suggest that the diversification discount observed from using Lang and Stulz's method may be due to measurement issues and that diversification premium is more likely to be the case in Australia when more appropriate measures of corporate diversification are used.

### *5.4.2. Can Compensation explain Diversification Premium?*

The objective of this section is to empirically investigate whether diversification discount or premium can be explained by long-term and short-term incentive payments to CEOs and division managers. As discussed previously, long-term incentives should be more conducive to firm value and, therefore, they should partially offset diversification discount or premium. $ltc_{it}$ and $ltd_{it}$ denote long-term incentive payments to CEOs and division managers respectively. $ltc_{it}$ and $ltd_{it}$ are the proportion of shares, options and other long-term payments in total remuneration. $stc_{it}$ and $std_{it}$ denote short-term incentive payments to CEOs and division managers respectively. $stc_{it}$ and $std_{it}$ are the proportion of salary and bonus in total remuneration. The diversification premium obtained in Table 5.13 is re-examined after controlling for different types of compensation incentives ($CI_{it}$) such as $ltc_{it}$, $ltd_{it}$, $stc_{it}$ and $std_{it}$ respectively. It is obvious that $ltc_{it}$ and $stc_{it}$ are correlated since $ltc_{it}$= 1- $stc_{it}$. Similarly $ltd_{it}$ and $std_{it}$ are also correlated with each other. Thus these compensation incentives are tested separately. However $ltc_{it}$ and $ltd_{it}$ are not correlated. Also, no correlation was found between $stc_{it}$ and $std_{it}$. The following model is estimated:

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{it}) + \varepsilon_{it} \quad (5.5)$$

Table 5.14 shows the regression results with $EXBOA_{it}$ as the excess value measure and $HDI_{itassets}$ as the measure of diversification. The results show a significant premium even after controlling for compensation incentives. Also, the results are consistent with the contention that long-term incentive payments to division managers have a positive and significant relationship with the excess value of the firm. The same positive and significant diversification premium is reported in Tables 5.15 and 5.16 where $IH_{itsales}$ and $IH_{itassets}$ are used as measures of diversification respectively. They also show that long-term incentive payments to division managers have a significant and positive effect on the excess value of a firm.

**Table 5.14:** *Estimations of Excess Value from Assets on $HDI_{itassets}$ and Long-Term and Short-Term Compensation Incentives to CEOs and Division Managers*

| | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ |
|---|---|---|---|---|
| $HDI_{itassets}$ | 1.21* | 1.22* | 1.16* | 1.20* |
| | (1.72) | (1.71) | (1.92) | (1.93) |
| $ltc_{it}$ | 0.10 | | | |
| | (0.32) | | | |
| $stc_{it}$ | | -0.08 | | |
| | | (-0.39) | | |
| $ltd_{it}$ | | | 0.20** | |
| | | | (2.38) | |
| $std_{it}$ | | | | -0.00 |
| | | | | (-0.03) |
| *const* | -0.20 | -0.14 | -0.19* | -0.17 |
| | (-1.46) | (-0.93) | (-1.96) | (-1.07) |
| *N* | 141 | 150 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

**Table 5.15:** *Estimations of Excess Value from Assets on $IH_{itsales}$ and Long-Term and Short-Term Compensation Incentives to CEOs and Division Managers*

| | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ |
|---|---|---|---|---|
| $IH_{itsales}$ | 2.70** | 2.73** | 2.79*** | 2.90*** |
| | (2.67) | (2.75) | (3.09) | (2.86) |
| $ltc_{it}$ | 0.04 | | | |
| | (0.13) | | | |
| $stc_{it}$ | | -0.05 | | |
| | | (-0.25) | | |
| $ltd_{it}$ | | | 0.20** | |
| | | | (2.59) | |
| $std_{it}$ | | | | 0.07 |
| | | | | (0.39) |
| *const* | -0.14* | -0.10 | -0.15*** | -0.19 |
| | (-1.72) | (-0.74) | (-3.16) | (-1.12) |
| *N* | 141 | 150 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

**Table 5.16:** *Estimations of Excess Value from Assets on $IH_{itassets}$ and Long-Term and Short-Term Compensation Incentives to CEOs and Division Managers*

| | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ | $EXBOA_{it}$ |
|---|---|---|---|---|
| $IH_{itassets}$ | 1.96** | 1.98** | 1.20*** | 2.02** |
| | (2.66) | (2.65) | (2.77) | (2.57) |
| $ltc_{it}$ | 0.07 | | | |
| | (0.22) | | | |
| $stc_{it}$ | | -0.06 | | |
| | | (-0.29) | | |
| $ltd_{it}$ | | | 0.22** | |
| | | | (2.67) | |
| $std_{it}$ | | | | 0.06 |
| | | | | (0.37) |
| ***const*** | -0.11 | -0.06 | -0.11*** | -0.13 |
| | (-1.48) | (-0.44) | (-2.78) | (-0.95) |
| ***N*** | 141 | 150 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

In what follows, the contribution of compensation incentives towards the value of the firm is investigated further. This is because, while compensation incentives other than $ltd_{it}$ seem to have no significant impact as reported in Tables 5.14 to 5.16, it may be possible that only a certain level of such incentives may have a significant effect on the diversification premium. Alternatively, significant effects of compensation incentives on firm performance may be captured for only some values of such compensation incentives.

Thus dummy variables are constructed to represent different levels of compensation incentives. $hltc_{it}$ is a dummy variable for long-term incentive payments to CEOs. This dummy variable is constructed for different values of $ltc_{it}$, for example, at 10% and above, 20% and above, 30% and so on. In this sample the maximum value $ltc_{it}$ takes is 80%. Hence seven different dummy variables are constructed. For example, $hltc_{it}$ takes the value of one if $ltc_{it}$>=0.3, i.e. if the CEO receives 30% or more of total remuneration in long-term incentive payments, and is zero otherwise. A dummy variable for short-term incentive payments to CEOs is similarly constructed and denoted by $hstc_{it}$. Similarly, dummy variables for long-term and short-term incentive payments to division managers are denoted by $hltd_{it}$ and $hstd_{it}$ respectively. Next these various dummies are interacted with three measures of diversification, $HDI_{itassets}$, $IH_{itsales}$ and $IH_{itassets}$.

The following two equations are estimated where DM denotes the diversification measure and CI denotes the relevant compensation dummy:

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{it}) + \eta_2(CI_{it})*(DM_{it}) + \varepsilon_{it} \quad (5.6)$$

$$EXBOA_{it} = \alpha_0 + \alpha_1(DM_{it}) + \eta_1(CI_{it}) + \eta_2(CI_{it})*(DM_{it}) + \alpha_2(firmsize_{it}) + \alpha_3(profitability_{it}) + \alpha_4(go_{it}) + \delta_t + \varepsilon_{it}. \quad (5.7)$$

After estimating equations (5.6) and (5.7) with all the dummy variables and the interaction terms, incentive payments which contribute significantly to the value of the firm are identified. In the final results reported in this chapter, the results with only significant incentive dummies are reported. In the sample of Australian firms being studied here, only long-term incentive payments for CEOs and division managers greater than or equal to 30% of the total remuneration turn out to produce a significant diversification premium. The dummy variables which represent 40% or 50% of long-term incentive payments are not reported, since a dummy for 30% or more long-term incentive payments automatically includes the higher values. Firms which pay less than 30% in long-term incentive payments do not enjoy the benefits of a significant diversification premium. On the other hand, a significant diversification premium is observed when short-term incentive payments for CEOs are greater than or equal to 50% of the total remuneration, while a significant diversification discount is observed when short-term incentive payments for division managers are greater than or equal to 90% of the total remuneration. This means that if firms pay less than 50% of total remuneration of CEOs as short-term incentive payments the firm does not enjoy the diversification premium. Similarly, firms that pay less than 90% of total remuneration in short-term remuneration to division managers also fail to enjoy a premium. Thus only these results are reported in Tables 5.17 and 5.18.

**Table 5.17:** *Estimations of the Effect of Various Levels of Compensation Incentives and Control Variables on the Excess Value from Assets while using* $HDI_{itassets}$

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| $HDI_{itassets}$ | 0.80* | 0.75* | 1.60** | 1.22* | 0.99* | 0.84* | 1.24** | 1.03* |
| | (1.80) | (1.94) | (2.51) | (1.87) | (1.95) | (1.79) | (2.00) | (1.84) |
| $firmsize_{it}$ | | 0.16 | | 0.16 | | 0.13 | | 0.17 |
| | | (1.43) | | (1.30) | | (1.11) | | (1.50) |
| $profitability_{it}$ | | 0.00 | | 0.00 | | 0.00 | | -0.00 |
| | | (0.12) | | (0.02) | | (0.05) | | (-0.02) |
| $go_{it}$ | | -0.00 | | -0.00 | | -0.00 | | -0.00 |
| | | (-0.71) | | (-0.46) | | (-0.50) | | (-0.55) |
| ***t2*** | | -0.20*** | | -0.21*** | | -0.20*** | | -0.20*** |
| | | (-2.77) | | (-3.02) | | (-2.98) | | (-2.82) |
| ***t3*** | | -0.15*** | | -0.16*** | | -0.14** | | -0.16*** |
| | | (-2.79) | | (-3.09) | | (-2.73) | | (-3.02) |
| ***t4*** | | -0.17** | | -0.16** | | -0.15* | | -0.16** |
| | | (-2.28) | | (-2.19) | | (-1.97) | | (-2.24) |
| ***t5*** | | -0.06 | | -0.05 | | -0.40 | | -0.06 |
| | | (-0.82) | | (-0.68) | | (-0.49) | | (-0.74) |
| $hltc_{it}$ | -0.20 | -0.13 | | | | | | |
| | (-1.58) | (-0.90) | | | | | | |
| $HDI_{itassets}$ | 1.37 | 0.87 | | | | | | |
| $*hltc_{it}$ | (1.53) | (0.87) | | | | | | |
| $hstc_{it}$ | | | 0.08 | -0.01 | | | | |
| | | | (0.53) | (-0.10) | | | | |
| $HDI_{itassets}$ | | | -0.48 | -0.26 | | | | |
| $*hstc_{it}$ | | | (-1.50) | (-0.76) | | | | |
| $hltd_{it}$ | | | | | 0.05 | -0.03 | | |
| | | | | | (0.48) | (-0.33) | | |
| $HDI_{itassets}$ | | | | | 0.60** | 0.63** | | |
| $*hltd_{it}$ | | | | | (2.56) | (2.14) | | |
| $hstd_{it}$ | | | | | | | 0.13 | 0.10 |
| | | | | | | | (1.66) | (1.31) |
| $HDI_{itassets}$ | | | | | | | -1.57 | -1.16 |
| $*hstd_{it}$ | | | | | | | (-1.23) | (-1.22) |
| ***const*** | -0.12 | -3.29 | -0.24 | -3.32 | -0.15* | -2.70 | -0.18* | -3.58 |
| | (-1.59) | (-1.45) | (-1.71) | (-1.33) | (-1.90) | (-1.14) | (-1.82) | (-1.53) |
| ***N*** | 156 | 156 | 156 | 156 | 156 | 156 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

In Table 5.17, equations (5.7) and (5.8) are estimated using $HDI_{itassets}$ as a measure of diversification. Models 1 to 8 in Table 5.17 show that the coefficient of $HDI_{itassets}$ is positive and significant throughout. The coefficient of the interaction term $HDI_{itassets} * hltd_{it}$ is positive and significant in Models 5 and 6. This implies that effective long-term incentive payments to division managers contribute positively to the value of the firm. Model 6 shows that a 1% increase in $HDI_{itassets}$ leads to a 0.84+0.63 = 1.47% increase in the value of the firm when

firms offer long-term incentives which are greater than or equal to 30% of total remuneration to division managers.

**Table 5.18:** *Estimations of the effect of various levels of compensation incentives and control variables on the excess value from assets while using* $IH_{itsales}$

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| $IH_{itsales}$ | 1.28 | 1.22 | 3.40*** | 2.85*** | 2.21* | 1.89* | 3.00*** | 2.65*** |
| | (1.43) | (1.60) | (9.83) | (5.53) | (1.95) | (1.81) | (3.34) | (2.81) |
| $firmsize_{it}$ | | 0.13 | | 0.14 | | 0.13 | | 0.15 |
| | | (1.28) | | (1.32) | | (1.27) | | (1.47) |
| $profitability_{it}$ | | 0.00 | | 0.00 | | 0.00 | | 0.00 |
| | | (0.41) | | (0.15) | | (0.16) | | (0.00) |
| $go_{it}$ | | -0.00 | | -0.00 | | -0.00 | | -0.00 |
| | | (-0.56) | | (0.15) | | (-0.46) | | (-0.53) |
| ***t2*** | | -0.20*** | | -0.22*** | | -0.21*** | | -0.19*** |
| | | (-3.49) | | (-3.50) | | (-3.53) | | (-2.98) |
| ***t3*** | | -0.14** | | -0.15*** | | -0.14** | | -0.12** |
| | | (-2.68) | | (-2.84) | | (-2.73) | | (-2.19) |
| ***t4*** | | -0.15** | | -0.15* | | -0.15* | | -0.13* |
| | | (-2.01) | | (-1.97) | | (-1.97) | | (-1.69) |
| ***t5*** | | -0.05 | | -0.05 | | -0.05 | | -0.04 |
| | | (-0.71) | | (-0.67) | | (-0.60) | | (-0.51) |
| $hltc_{it}$ | -0.13* | -0.10 | | | | | | |
| | (-1.89) | (-1.53) | | | | | | |
| $IH_{itsales}$ | 3.28*** | 2.75*** | | | | | | |
| $*hltc_{it}$ | (5.58) | (3.89) | | | | | | |
| $hstc_{it}$ | | | 0.08 | -0.00 | | | | |
| | | | (0.80) | (-0.01) | | | | |
| $IH_{itsales}$ | | | -1.29 | -0.87 | | | | |
| | | | (-1.16) | (-0.90) | | | | |
| $*hstc_{it}$ | | | | | | | | |
| $hltd_{it}$ | | | | | 0.08 | -0.01 | | |
| | | | | | (1.16) | (-0.12) | | |
| $IH_{itsales}$ | | | | | 0.55 | 0.82 | | |
| | | | | | (0.83) | (1.32) | | |
| $*hltd_{it}$ | | | | | | | | |
| $hstd_{it}$ | | | | | | | 0.21** | 0.13 |
| | | | | | | | (2.03) | (1.39) |
| $IH_{itsales}$ | | | | | | | -5.26*** | -3.09** |
| | | | | | | | (-3.05) | (-2.32) |
| $*hstd_{it}$ | | | | | | | | |
| ***const*** | -0.07 | -2.65 | -0.17** | -2.85 | -0.11* | -2.76 | -0.14*** | -3.17 |
| | (-1.46) | (-1.29) | (-2.38) | (-1.33) | (-1.88) | (-1.28) | (-2.94) | (-1.52) |
| ***N*** | 156 | 156 | 156 | 156 | 156 | 156 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

Table 5.18 reports the estimation results for equation (5.7) and (5.8) when $IH_{itsales}$ is used as a measure of diversification. In Models 1 and 2, the coefficient of $IH_{itsales}$ is positive but not significant when $IH_{itsales}$*$hltc_{it}$ and $hltc_{it}$ are added to the model. However, the coefficient of $IH_{itsales}$*$hltc_{it}$ is positive and significant. This implies that long-term payments to CEOs greater than or equal to 30% of their total remuneration increase the diversification premium. The coefficient of

$IH_{itsales}$ is positive and significant in Models 3 to 8. In Models 7 and 8, the coefficients of $IH_{itsales}$*$hstd_{it}$ are negative and significant. Summing the coefficients of $IH_{itsales}$ and $IH_{itsales}$*$hstd_{it}$ in Model 8 shows that firms where division managers receive 90% of their remuneration in short-term incentives trade at a discount of 3.09 - 2.65 = 0.44%.

**Table 5.19:** *Estimations of the effect of various levels of compensation incentives and control variables on the excess value from assets while using* $IH_{itassets}$

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| $IH_{itassets}$ | 1.21** | 1.10*** | 3.23*** | 2.57*** | 1.57*** | 1.38*** | 2.13*** | 1.82** |
| | (2.60) | (3.42) | (13.69) | (5.94) | (3.08) | (2.97) | (2.85) | (2.50) |
| $firmsize_{it}$ | | 0.12 | | 0.14 | | 0.13 | | 0.16* |
| | | (1.27) | | (1.41) | | (1.36) | | (1.77) |
| $profitability_{it}$ | | 0.00 | | 0.00 | | 0.00 | | 0.00 |
| | | (0.48) | | (0.18) | | (0.19) | | (0.08) |
| $go_{it}$ | | -0.00 | | -0.00 | | -0.00 | | -0.00 |
| | | (-0.67) | | (-0.42) | | (-0.46) | | (-0.54) |
| ***t2*** | | 0.20*** | | -0.21*** | | -0.21*** | | -0.18*** |
| | | (-3.24) | | (-3.39) | | (-3.38) | | (-2.82) |
| ***t3*** | | -0.13** | | -0.15*** | | -0.14*** | | -0.14** |
| | | (-2.54) | | (-3.00) | | (-2.80) | | (-2.51) |
| ***t4*** | | -0.16** | | -0.20** | | -0.16** | | -0.15*** |
| | | (-2.15) | | (-2.17) | | (-2.15) | | (-2.07) |
| ***t5*** | | -0.06 | | -0.05 | | -0.05 | | -0.50 |
| | | (-0.77) | | (-0.73) | | (-0.66) | | (-0.72) |
| $hltc_{it}$ | -0.15** | -0.12* | | | | | | |
| | (-2.19) | (-1.82) | | | | | | |
| $IH_{itassets}$ *$hltc_{it}$ | 3.95*** | 3.32*** | | | | | | |
| | (9.86) | (6.24) | | | | | | |
| $hstc_{it}$ | | | 0.09 | 0.00 | | | | |
| | | | (0.86) | (0.02) | | | | |
| $IH_{itassets}$ *$hstc_{it}$ | | | -1.63*** | -1.10** | | | | |
| | | | (-2.85) | (-2.36) | | | | |
| $hltd_{it}$ | | | | | 0.07 | -0.01 | | |
| | | | | | (0.85) | (-0.08) | | |
| $IH_{itassets}$ *$hltd_{it}$ | | | | | 0.98*** | 1.03** | | |
| | | | | | (2.78) | (2.51) | | |
| $hstd_{it}$ | | | | | | | 0.25* | 0.14 |
| | | | | | | | (1.85) | (1.33) |
| $IH_{itassets}$ *$hstd_{it}$ | | | | | | | -7.16*** | -4.07** |
| | | | | | | | (-2.98) | (-2.02) |
| ***const*** | -0.06*** | -2.50 | -0.20** | -2.79 | -0.07*** | -2.69 | -0.09** | -3.24* |
| | (-1.89) | (-1.27) | (-2.02) | (-1.41) | (-2.89) | (-1.37) | (-2.40) | (-1.78) |
| ***N*** | 156 | 156 | 156 | 156 | 156 | 156 | 156 | 156 |

Note: The figures in parentheses denote *t*-stat. * denotes 10% level of significance. ** denotes 5% level of significance. ***denotes 1% level of significance.

In Table 5.19, $IH_{itassets}$ is used as a measure of diversification. It is shown that the coefficient of $IH_{itassets}$ is positive and significant in all models. Model 2 shows that the coefficient of $IH_{itassets}$*$hltc_{it}$ is positive and significant. Adding the

coefficients to $IH_{itassets}$*$hltc_{it}$ and $IH_{itassets}$ also shows that diversified firms which offer 30% or more of the remuneration as long-term incentives to CEOs trade at a premium of 4.42%. The coefficient on $IH_{itassets}$*$hstc_{it}$ is negative and significant indicating that paying short-term incentives to CEOs can have a negative impact on the excess value of the firm. Despite this, firms which pay effective short-term incentive payments to CEOs still trade at a premium of 1.47%. But diversification premium when CEOs receive 30% or more in long-term incentives are higher than when CEOs receive 50% or more in short-term incentives.

The coefficient to $IH_{itassets}$*$hltd_{it}$ is also positive and significant and the sum of the coefficients to $IH_{itassets}$*$hltd_{it}$ and $IH_{itassets}$ in Model 6 shows that diversified firms paying 30% or more in long-term incentives to their division managers trade at a premium of 2.41%. However the coefficient of $IH_{itassets}$*$hstd_{it}$ is negative and significant in Model 8 and the sum of the coefficients to $IH_{itassets}$*$hstd_{it}$ and $IH_{itassets}$ is negative as well. This implies that firms where division managers' short-term incentive payments are 90% or more of their total remuneration trade at a discount of 2.25%.

Tables 5.17 to 5.19 consistently show that diversified firms which offer 30% or more long-term incentives to CEOs and division managers trade at a premium. This may imply that such levels of long-term incentive payments are successful in aligning the incentives of CEOs and division managers with those of the diversified firms. When compensation incentives of CEOs and division managers are well aligned with the objectives of the firm, the CEOs and division managers are less prone to undertake unproductive rent-seeking activities that can misallocate valuable company resources. Hence diversified firms offering such incentives trade at a premium. On the other hand, one might expect short-term incentive payments to CEOs and division managers to have at best a neutral, if not negative, effect. It is because short-term incentives such as salary and bonus are often provided to meet the market participation constraint, rather than for the purpose of long-term goal congruence. This is confirmed in the above results. Firms paying 90% or more as short-term incentives to division managers trade at

a discount. Also firms offering 50% or more as short-term incentives to CEOs experience a negative effect of short-term incentives although they still trade at a premium; in the absence of such short-term incentives, the size of diversification premium would be larger.

## 5.5. Conclusion

Two issues are examined in this chapter. First, whether the diversification discount is (or is not) a measurement issue; and second, compensation incentives are incorporated in the study in order to see whether they can explain diversification discount or premium.

As to the first issue, the results from this chapter show that the existence of diversification discount could be a measurement issue. First, following Lang and Stulz' (1994) methodology of using Tobin's *q* and multiple dummy variables for different segments in a firm, it is found that Australian firms in the sample trade at a discount in all years. However, after adjusting for industry effects, the discount reduced significantly and even turned into a premium in some cases. Second, the Berger and Ofek (1995) methodology leads to a significant premium when, asset-based excess value is used as a dependent variable. Finally, the use of newly constructed measures of diversification and firm-fixed effects leads to a mixed result when using $LSRSZ_{it}$ and $EXBOS_{it}$ whereas, with $EXBOA_{it}$, a significant premium is observed throughout. This premium obtained using $EXBOA_{it}$ is robust to standard control variables. Put together, these results may imply that diversified firms in Australia trade at a premium and the existence of diversification discount may be a measurement issue.

Regarding the second issue, incorporating compensation incentives for CEOs and division managers, long-term incentives versus short-term incentives in particular, shows that diversification premium is robust after controlling for long-term incentive payments. Long-term incentives do contribute to diversification premium; indeed, without explicitly incorporating long-term incentives, the reported diversification premium can be exaggerated. In the sample of Australian firms in this study, such effective long-term incentives are shown to be 30% or

more of total remuneration. Short-term incentives, on the other hand, are shown to be at best neutral and in some cases reduce the diversification premium. In particular, the diversification premium turns to a discount in firms paying 90% or more as short-term incentives to division managers. Overall, the results suggest that at least part of diversification discount/premium can be explained by compensation incentives; without explicitly incorporating compensation incentives, the reported diversification discount/premium can be either over- or under-estimated.

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***Errata***

P3 para 1, line 13: "state that" for "state that that"

P39 para 3, line 2: "Lins and Servaes (1999, 2002)" for "Lins and Servaes, 1999; Lins and Servaes, 2002)"

P56 para 3, line 2: "She" for "He"

P56 para 3, line 3: "She" for "He"

P67 para 3, line 4: "Her" for "His"

P106 para 1, line 7: "Table 3.3" for "Table 3"

P106 para 2, line 2: "Table 3.4" for "Table 4"

P128 para 1, line 7: "Table 4.7" for "Table 6"

***Addendum***

P1 para 2: Add after sentence 4:

"Often members of an organization spend large amount of time, effort and ingenuity in order to influence decision makers to partake decision that are in their favour. This type of rent seeking activity is referred to as influence activity by Milgrom (1988)."

P2 para 1: Add after sentence 1:

"Signal jamming is a process where division manager of a large division tries to distort the private information about investment opportunity of some other division in order to appropriate more funds for his own division (Wulf, 2002)."

P71 para 2, line 1: delete "thesis" and read "In this chapter….."

P105 para 1, line 8: insert "into unrelated operations" after "….Firm A is more diversified"

P85 footnote 19: Add after line 1:

"The Australian government announced a Royal Commission into HIH in 2001. In 2002, Australian government released Corporate Law Economic Reform Program (CLERP9), a discussion paper to promote firmer corporate governance standards. The Corporate Governance Council was formed by the Australian Stock Exchange (ASX) in 2002 and the guidelines for this council were updated in 2003. ASX set out the principles of good corporate governance practices[35] in Australia. In 2003, the report on HIH Royal Commission was released. On July 1, 2004, CLERP 9 was implemented for all Australian companies. The objective of

[35] See Fleming (2003)

all these reforms were to bring in better transparency in corporate governance practices, bring in more robust penalty systems and offer greater protection to shareholders. For example, the ASX Corporate Governance Council's principles focussed on 1) laying solid foundation for management and oversight, 2) the structure of the board should be such that it adds value to the company, 3) promoting ethical and responsible decision-making, 4) safeguarding integrity in financial reporting, 5) making timely and balanced disclosures, 6) respecting the rights of shareholders, 7) recognising and managing risk, 8) encouraging enhanced performance, 9) remunerating fairly and responsibly and 10) recognising the legitimate interests of stakeholders."

P144, last sentence:

comment: "Why these measures are more appropriate?"-See P5 for explanation

P105 para1, line 7 and line 8: delete $DI_A$=1/3 and insert $DI_A$=5/12 and delete 1/3 and insert 5/12

P89: Comment: "Why public signal can be measured by profit-asset ratio?"- See P90 para1, last five lines.

Descriptive statistics for Chapter 5

| | ***Mean*** | ***S.D.*** | ***N*** |
|---|---|---|---|
| $q_{it}$ | .7447477 | .1429219 | 939 |
| $LSRSZ_{it}$ | .706613 | .1446698 | 939 |
| $EXBOA_{it}$ | -.0369553 | .4057361 | 870 |
| $EXBOS_{it}$ | -1.141034 | 1.992608 | 899 |
| $DI_{it}$ | .3203192 | .2836981 | 939 |
| $HDI_{itassets}$ | .1182024 | .1281749 | 939 |
| $HDI_{itsales}$ | .1244248 | .1306848 | 939 |
| $IH_{itsales}$ | .0384882 | .0586968 | 939 |
| $IH_{itassets}$ | .0358208 | .0622985 | 939 |
| $ltd_{it}$ | .2079239 | 1.107229 | 510 |
| $std_{it}$ | .9038153 | 1.107229 | 510 |
| $ltc_{it}$ | .1771987 | .1401299 | 643 |
| $stc_{it}$ | .6260451 | .23562 | 683 |
| $hltc_{it}$ | .2556818 | .4374884 | 176 |
| $hstc_{it}$ | .7897727 | .4086325 | 176 |
| $hltd_{it}$ | .0511364 | .2209043 | 176 |
| $hstd_{it}$ | .0681818 | .2527768 | 176 |
| $firmsize_{it}$ | 19.9612 | 2.765038 | 939 |
| $profitability_{it}$ | 16.96419 | 96.34156 | 939 |
| $go_{it}$ | -9.291168 | 30.90606 | 939 |

Distribution of compensation dummies when dummies take the value of 1, for Chapter 5

| **Dummy variable** | **Number of observations in total sample** | **% of observations in total sample** |
|---|---|---|
| $hltc_{it}$ | 45 | 25.57 |
| $hstc_{it}$ | 139 | 78.98 |
| $hltd_{it}$ | 9 | 5.11 |
| $hstd_{it}$ | 12 | 6.82 |

Table 5.9: Add row below

| | $\boldsymbol{EXBOA_{it}}$ | $\boldsymbol{EXBOS_{it}}$ |
|---|---|---|
| *R-squared* | 0.1584 | 0.0682 |

Table 5.10: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $\boldsymbol{LSRSZ_{it}}$ |
|---|---|
| $DI_{it}$ | 0.0061 |
| $HDI_{itassets}$ | 0.0321 |
| $HDI_{itsales}$ | 0.0551 |
| $IH_{itsales}$ | 0.0581 |
| $IH_{itassets}$ | 0.0225 |

Table 5.11: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $\boldsymbol{EXBOS_{it}}$ |
|---|---|
| $DI_{it}$ | 0.0081 |
| $HDI_{itassets}$ | 0.0065 |
| $HDI_{itsales}$ | 0.0095 |
| $IH_{itsales}$ | 0.0241 |
| $IH_{itassets}$ | 0.0001 |

Table 5.12: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $EXBOA_{it}$ |
|---|---|
| $DI_{it}$ | 0.0051 |
| $HDI_{itassets}$ | 0.0044 |
| $HDI_{itsales}$ | 0.0054 |
| $IH_{itsales}$ | 0.0430 |
| $IH_{itassets}$ | 0.0139 |

Table 5.13: Add R-squared to the row below.

| | $EXBOA_{it}$ **(1)** | $EXBOA_{it}$ **(2)** | $EXBOA_{it}$ **(3)** |
|---|---|---|---|
| **R-squared** | 0.1808 | 0.1282 | 0.1748 |

Table 5.14: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $EXBOA_{it}$ |
|---|---|
| $ltc_{it}$ | 0.0003 |
| $stc_{it}$ | 0.0029 |
| $ltd_{it}$ | 0.0006 |
| $std_{it}$ | 0.0043 |

Table 5.15: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $EXBOA_{it}$ |
|---|---|
| $ltc_{it}$ | 0.0377 |
| $stc_{it}$ | 0.0418 |
| $ltd_{it}$ | 0.0286 |
| $std_{it}$ | 0.0497 |

Table 5.16: Add R-squared to the row below. Values in the following column are **R-squared** for the respective regressions

| | $EXBOA_{it}$ |
|---|---|
| $ltc_{it}$ | 0.0084 |
| $stc_{it}$ | 0.0118 |
| $ltd_{it}$ | 0.0045 |
| $std_{it}$ | 0.0182 |

Table 5.17: Add R-squared to the row below.

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| **R-squared** | 0.0132 | 0.1496 | 0.0103 | 0.1677 | 0.0026 | 0.1484 | 0.0032 | 0.1798 |

Table 5.18: Add R-squared to the row below.

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| **R-squared** | 0.0436 | 0.0892 | 0.0612 | 0.1228 | 0.0339 | 0.1276 | 0.0414 | 0.1246 |

Table 5.19: Add R-squared to the row below.

| | $EXBOA_{it}$ (1) | $EXBOA_{it}$ (2) | $EXBOA_{it}$ (3) | $EXBOA_{it}$ (4) | $EXBOA_{it}$ (5) | $EXBOA_{it}$ (6) | $EXBOA_{it}$ (7) | $EXBOA_{it}$ (8) |
|---|---|---|---|---|---|---|---|---|
| **R-squared** | 0.0207 | 0.1014 | 0.0333 | 0.1441 | 0.0104 | 0.1512 | 0.0074 | 0.1707 |