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

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## Abstract

This paper analyzes how influence activities in the form of signal jamming affect the capital budgeting process of corporate organizations in Australia. First, the relationship between investment in the smallest division and its past performances is tested. The relationship is defined as investment sensitivity. Second, how the investment sensitivity varies as influence problems become more severe is examined. Finally, the relationship between compensation incentives for the large division manager and the investment sensitivity is reviewed. The findings suggest that investment sensitivity is positive for Australian firms. Mixed evidence is obtained between investment sensitivity and increase in the severity of influence problems when measures such as, relatedness and number of divisions are used. With increase in number of divisions, influence activity becomes more severe and headquarters relies more on public signal. However, with the increase in relatedness across divisions, influence problem increases and headquarters relies more on private information from manager of the large division. Evidence suggest that Australian firms provide high short term incentive payments to managers of large divisions to mitigate the influence activity problems and thus rely more on managerial recommendations for investing in smallest division as compared to noisy accounting measures.

**Keywords:** Influence activity, capital budgeting, compensation incentives
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## 1. Introduction

Efficient allocation of internal funds across divisions depends largely on the decisions of the CEOs in large conglomerates. The theoretical and empirical literature on internal capital market suggests that influence activity leads to misallocation of capital budget in a diversified firm and thus create value loss for the 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 the CEOs. Moreover, 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. Consistent with the theory proposed by Scharfstein and Stein (2000), McNeil and Smythe (2009) find evidence in the US that division managers with more lobbying power always manage to get more capital and free cash flows of the company albeit they are in charge of a weaker division.[1]

In contrast, Rajan *et al.* (2000) describes the rent-seeking activity as a form of power struggle[2] within a company and 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. Alternatively, Wulf (1998; 2002; 2009) provide theory and evidence of influence activities in the form of signal jamming[3] and shows that for the US investment behavior in firms depends on influence activities in internal capital market. To mitigate influence problems, firms can either incorporate investment incentives in their capital budgeting process or headquarters can offer compensation incentives which place a higher weight on firm performance as compared to divisional performance.

The main drawback of the existing empirical literature on influence activities in internal capital market is that they are primarily confined to the US and the large European economies. Despite their importance, very little work, if any, has been undertaken to examine the extent of influence activities within firms in the Australian economy. The Australian corporate governance system incorporates features from the US, the UK, the Germany and the Japanese corporate governance mechanisms to form its own tenets (Buchanan, 2004). Australia has developed a number of unique characteristics as compared to other OECD member economies. First, unlike in some companies in the US and the UK

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[1] Similar empirical findings are shown by Scharfstein (1998), Schoar (2002), Xuan (2008), and Glaser *et al.* (2011).

[2] The following example will describe power struggle. 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."

[3] 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. See Fudenberg and Tirole (1986)

where the CEO plays a dual role, in Australia position of a CEO and a chairman are held by two different persons.[4] Because CEOs in Australia do not hold a dual position, most likely they are less powerful and have less bargaining power compared to the CEOs in other countries with dual roles. Furthermore, if CEOs are less powerful, they might be easily influenced by the division managers of larger divisions leading to a larger distortion of capital budget.

Second, poor performance has a lagged effect on CEO turnover in Australia as compared to the US and the UK, where CEO turnover results because of current performance (Suchard *et al.*, 2001). This may provide lower incentive for monitoring by CEOs in Australia. Finally, in Australia CEOs receive lower stock based compensation as compared to their corresponding positions in the US and the UK (Kerin, 2003). Consequently, CEOs in Australia have less incentive to perform on behalf of the shareholders and more likely less capital will be allocated to smaller divisions and more capital will be allocated to larger divisions with better influential division managers. Given these differences between corporate governance system in Australia and the US and the UK, it would be interesting to empirically examine how influence activities affect allocation of resources inside conglomerates in Australia.

Moreover, in a recent study, Li *et al*. (2011) examine the relationship between executive compensation and corporate investment decision using Australian data and 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 evidence indicates the presence of agency problems in Australian corporate organizations. However, 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.

The main objective of this paper is to capture the effects of influence activity or rent-seeking by division managers on investment in the smallest division of the firm in Australia. In particular, this study analyzes how influence activities in the form of signal jamming affects the capital budgeting process of corporate organizations in Australia. In doing so, three related issues are examined. First, whether investment in the small division depends positively or negatively on its past performance is tested. If past performance is a good indicator of future performance, then a positive relation between the two is expected.

Second, how the investment sensitivity varies as influence problems become more severe is studied. The relation between investment in the small division and its past performance is defined as the investment sensitivity (Wulf, 2002). If headquarters proactively counters the large division

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

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. Consequently, investment sensitivity will decrease in the severity of influence problems. On the contrary, 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 is expected that the investment sensitivity will increase in the severity of influence problems. Finally, the relationship between compensation incentives for the large division manager and the investment sensitivity is examined. Theoretical literature suggests a negative relation between the investment sensitivity and the use of compensation incentives that depend on the performance of the firm as a whole (Wulf, 2009). Empirically, lagged value of segment profitability is used as a proxy for public signal and the severity of influence problems is measured by relatedness between segments, the number of segments in the firm, and capital constraints.

The paper proceeds as follows. Section 2 demonstrates the theoretical background behind the empirical analysis and lays down the issues to be empirically examined in this paper. Section 3 briefly discusses the data, their sources and the sample selection process. In addition, this section meticulously discusses the construction of each variable required for empirical estimations. Section 4 provides a detailed discussion of the empirical methodology. Section 5 reports the findings and discusses their implications for Australian conglomerates. Section 6 concludes our discussion.

## 2. Theoretical Background

This paper follows the theory on internal capital market and influence activity by Wulf (1998, 2002). In this model, a hypothetical firm is assumed, which 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 maximize 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 maximize 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 such as past profitability, which cannot be distorted by L, however, is noisy.

The profit maximizing 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. Wulf (2002) primarily focused on 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 paper not only examines the above conjecture for Australia 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 that the 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. Consequently, 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) formalizes the tradeoff between the two types of incentives in the following equation:

$$I^S = A_0 + A_1(c, \phi, \psi, \theta)\prod \qquad (1)$$

where $I^S$ is the investment in S, $A_0$ is the initial investment in S, $A_1$ is the function of exogenous parameters of the model, $c$ is the manager's private cost of influence, $\phi$ is the L'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 among the factors that affect $I^S$, while $c$ is endogenously determined, $\phi$ is an exogenous parameter of the model. $A_1$ is defined as the investment sensitivity to the public signal and is mathematically represented by $A_1 = \frac{\partial I^S}{\partial \prod}$. Investment incentive for L or $A_1$ is the weight placed on the public signal for investment in S. Hence, if H decides to provide investment incentive to L, implies $A_1$>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 the 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. This implies $\frac{\partial A_1}{\partial c} < 0$ or $\frac{\partial^2 I^S}{\partial \prod \partial c} < 0$.

Alternatively, it would be interesting to examine how H invests in smallest segment for various levels of influence activities by L. The focus is on the ability of L to distort private signal about investment in smallest segment 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. If influence problems, i.e. L's ability to distort signals ($\phi$) are more severe keeping other things constant, 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 ($\frac{\partial A_1}{\partial \phi} > 0$). However, this relation can be reversed ($\frac{\partial A_1}{\partial \phi} < 0$) if compensation for L is based more on firm performance as a whole. In this case, private signals become more informative since there will be less influence activities. Consequently, the proxies for the severity of influence problem can be either negatively or positively related to investment sensitivity of the small segment depending on the type of incentive offered by H.

## 3. Data and Construction of Variables

### *3.1. Data*

The sample in this paper consists of firms which were listed on the Australian Stock Exchange (ASX) in August 2009 and covers a period of 2004-2008. The firms in the sample belong to the following Global Industry Classification Standard (GICS) Industry groups. These include: (i) Automobile and components, (ii) Capital goods, (iii) Consumer durables and apparel, (iv) Food, beverage and tobacco, (v) Healthcare equipment and services, (vi) Materials, (vii) Pharmaceuticals, biotechnology and life Sciences and (viii) Technology, hardware and equipment. Although some of the industry groups mentioned above do not seem to be associated with manufacturing operations, the actual firms in these industries, which are included in this analysis, have manufacturing operations as part of their organizational structure.

**[Insert Table 1]**

Table 1 reports the summary statistics. Among the industry groups, Materials has the maximum share (32.9%), followed by Capital goods (29.4%) and Food, Beverage and Tobacco (19.8%). Since this analysis requires information on compensation data and segment financial information for multi-segment firms, firms which do not have more than one segment and do not have compensation data on multi segments were omitted from the sample. Thus, the sample selection is guided by two key factors: (a) Industry groups which had manufacturing operations and (b) availability of compensation data and segment financial information for the multi-segment firms in the sample. Based on available data, 46 multi-segment firms are included 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 not readily available. Compensation data for division manager and CEO compensation are manually collected from annual reports of these companies, which are available in Connect 4 Boardroom. Furthermore, firm segments are matched to their respective division manager manually which is quite intricate since the name of the segment is often difficult to match with the designation of the division manager. The data consist of an unbalanced panel of 46 firms for the period 2004-2008.[5]

The financial information collected for these companies include segment sales, assets, profits, total sales and total assets of the firm, number of segments in a firm and cash paid for property plant and equipment. Moreover, 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 the measures used in this analysis. 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.

[5] The sample consists of corporate giants such as BHP, Amcor, Orica, Boral, OneSteel etc. Although BHP is commonly known as mining giant, 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.

*3.2. Construction of Variables*

(i) Investment in the smallest segment: Investment in the smallest segment ( $I_{it}^{S}$ ) is measured by change in asset of that segment for firm '*i*' in the current period *t*. Thus the following expression holds.

$$I_{it}^{S} = \Delta \ln(Asset)_{t} - \Delta \ln(Asset)_{t-1} \qquad (2)$$

Even though segment investment is generally calculated as capital expenditure less depreciation, the databases used here do not contain such information. Hence following Eisenberg *et al.* (1998) and Titman and Wessels (1988), change in asset is used to measure investment in the smallest segment of the firm. For example change in asset of a particular segment in 2005 would be the logarithmic difference in its assets in 2005 as compared to 2004. The calculation of segment investment as logarithmic difference in its assets would mean there would be four observations per firm in the empirical estimations even though there is data for all five years. Thus firms which have four years of observations have three values and firms with three years of observations have two values for segment investment. The mean and standard deviation of change in assets for the smallest segments of firms in the sample are 0.17 and 0.84, respectively (see Table 1).

(ii) Public signal: Public signal ( $\prod_{it-1}^{S}$ ) for investment in the smallest segment of the firm '*i*' in period t, is measured by the profit-asset ratio or profitability of that segment in the previous period, *t-1*. Wulf (1998) provides two reasons in support of using lag value of profit per unit asset as a proxy for public signal against other measures: (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. Table 1 reports that the mean and standard deviation of profitability of smallest segment of firms in the sample are 0.14 and 0.68, respectively.

(iii) Firm attributes to measure influence problem: Firm characteristics such as degree of diversification, organizational structure and financial strength makes the firm more prone to influence activities by L. Relatedness between segments, the number of segments in the firm and capital constraints are used as measures of firm attributes for influence problem. Each individual measure is described in greater details below.

(iv) Relatedness between segments: If the divisions of a firm are more related to each other, then L will have more information about the investment prospect in the smallest division. H in that case would rely more on the information provided by L before investing in the smallest segment. L would also have greater ability to distort the actual investment opportunity in the smallest segment and hence will have a greater incentive for influencing the decision of H owing to his superior information. Consequently, more related are the divisions, the higher would be the ability of L to influence H's decision and provide corrupt private signals.

$rel_{itj}$ is a vector of five dummies which runs from $rel_{it0}$ to $rel_{it4}$ and denotes increasing level of relatedness between the smallest and largest segment of the firm '*i*' at time '*t*' with number of segments '*j*'. 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. Likewise, when the first three digits of the code match, the relatedness is denoted by 3 and indicates that the divisions are more related than when relatedness was denoted by 2. Finally, if all four digits match then relatedness is denoted by 4 and the divisions are highly related.

Table 1 reports the distribution of the relatedness dummy in the sample for Australian firms. The relatedness increases from $rel_{it0}$ to $rel_{it4}$, where 47% of the sample is only marginally related, about 24% of the sample is more related when the relatedness dummy takes a value of 1, whereas only 7% of the sample is totally related to each other.

***Observation 1:*** *Table 1 indicates that 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 for Australian firms.*

(v) Number of segments: If a firm has many divisions then it is difficult for the CEO and the investment committee to have all 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 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. Hence number of divisions is used as another proxy for severity of influence problem.

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 1 reports that almost 33% of the sample has only two divisions, about 26% of the sample has three divisions, about 23% has four divisions, almost 6% has five divisions and 12% of the sample has six or more divisions.

***Observation 2:*** *The distribution of number of divisions in the sample in Table 1 shows that very few firms in the sample have large numbers of divisions, which indicates that influence problems may not be that severe in Australia.*

(vi) Capital constraints: When capital is freely available in the firm then managers do not have to compete for it. However, if capital is scarce, division managers will undertake influence activities such that they can get a larger share of the scarce capital from the headquarters. Hence the more capital-constrained is a firm, the more severe influence problems will be. 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. However, Wulf (1998, 2002) describes that access to public debt market is the least controversial in the financial literature, which examines whether a firm is capital constrained or not. She constructs a single dummy variable which takes the value of zero if a firm has a Standard and Poor's debt rating. This highlights that the firm is either unconstrained and takes the value of one, or zero otherwise denoting that the firm is capital constrained. In order to construct this variable for Australian firms, firms which have access to public debt markets i.e. those that have S&P credit ratings are checked (see Kashyap *et al.*, 1994). 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 in firm '*i*'.

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 and to finish $cap_{i4}$ 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. The summary statistics in Table 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.

***Observation 3:*** *The sample distribution in Table 1 indicates that the majority of the firms have the highest quality credit rating and thus they will be less capital constrained. Consequently, lower influence activities are expected for Australian firms.*

All three observations combined from the firm attributes indicate that there is a greater chance of lower influence activity present in Australian firms. However, proper empirical examination of the data is required before any definitive conclusion can be reached.

(vii) Compensation incentives: Two types of compensation incentives to the division manager of the large division are considered: 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 and equity, whereas STIP consists of salary and cash bonuses which depends on achieving annual financial, safety, business and personal goals. Consequently, 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 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 influence on the one hand and on the other hand it might increase L's incentive to influence. Nevertheless, which of these effects offsets the other is a matter of empirical investigation.

$CI_{itk}$ is the compensation incentive given to L in firm '*i*', at period '*t*' for type of compensation '*k*'. '*k*' takes the values of $lltd_{it}$ and $lstd_{it}$ , which 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.

(viii) Control variables: Following Berger and Ofek (1995), information about the firm, such as growth opportunity ($go_{it}$) and overall firm profitability ($\prod_{it-1}^{F}$) are included in the empirical model as control variables in order to get a better idea about the division's investment prospects and to control for the other firm specific characteristics that may influence the investment in small segment of a firm. Without the inclusion of these control variables, the empirical model would be misspecified, and estimated coefficients would become biased due to the problem of omitted variables. $go_{it}$ is measured by the ratio of total capital expenditure of the firm to total sales of the firm and $\prod_{it-1}^{F}$ is controlled through the lag value of total profitability of the firm (Wulf, 1999, 2002). The mean and standard deviation of the overall firm profitability are 11.92 and 0.78, respectively and of the growth opportunity are -5.56 and 24.60, respectively (see Table 1).

## 4. Empirical Methodology

This section focuses on the empirical formulation of the theory discussed in section 2. Primarily two key issues are examined for Australian conglomerates. First, 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 reviewed. The following regression equation is run:

$$I_{it}^{S} = \beta_0 + \beta_1(\Omega)\prod_{it-1}^{S} + \beta_2 \prod_{it-1}^{F} + \beta_3 go_{it} + \delta_t + \varepsilon_{it} \tag{3}$$

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

In equation (3), investment in the smallest segment ( $I_{it}^{S}$ ) is regressed on past profitability ( $\prod_{it-1}^{S}$ ) of the smallest segment, which denotes the public signal. 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. As discussed in section 3.2 above, relatedness between segments ( $rel_{itj}$ ), the number of segments in the firm ( $ndiv_{itj+1}$ ) and capital constraints ( $cap_{ij}$ ) are dummy variables representing the firm attributes for influence problem. Since all firms in the sample has at least two divisions, $ndiv_{itj+1}$ is considered instead of $ndiv_{itj}$ . Growth opportunity ( $go_{it}$ ) and overall firm profitability ( $\prod_{it-1}^{F}$ ) are included as control variables, $\delta_t$ is a time dummy variable for the years 2006 to 2008 and $\varepsilon_{it}$ is the disturbance term. $rel_{it0}$ , $ndiv_{it2}$ and $cap_{i1}$ are base categories and hence are dropped from the regression[6] Here $\alpha$ is the coefficient of $\prod_{it-1}^{S}$ , which denotes the sensitivity of $rel_{it0}$ , $ndiv_{it2}$ and $cap_{i1}$ . The base year is 2005 and hence the dummy corresponding to 2005 is dropped from the estimations.

Substituting the value of $\beta_1(\Omega)$ in equation (3) yields:

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

In order to examine the first issue, the sign of $\alpha$ is important, which examines the relationship between investment incentives and the investment in the smallest segment of the firm. In other words, $\alpha$ measures the elasticity between the past profitability of S (public signal) and the current investment in S. If $\alpha$ is positive and significant, then the past profitability of S is a good indicator of

[6] If all the dummy variables are included in the regression, it leads to the "*dummy variable trap*". At this stage the regression equation cannot be solved because of perfect multicollinearity.

future performance and therefore investment in S should increase. However, $\alpha$ measures the elasticity only in the base model, where in a firm there are only two divisions or none of the divisions are much related to each other or neither of the divisions is capital constrained. This implies all the dummy variables ($rel_{itj}$, $ndiv_{itj+1}$ and $cap_{ij}$) are zero.

To test the second issue of the severity of influence problem (i.e. when public signal is noisy), now the dummy variables are considered different from zero. At this stage, it is important to inspect the sign of the coefficient, when $\alpha$ is added to each of the coefficient of the interaction terms with the dummy variables. For example, depending on the degree of relatedness captured by '*j*', $(\alpha + \alpha_j)$ measures the elasticity between past profitability of S and the current investment in the smallest division when the divisions are more related to each other (i.e. $rel_{itj}$ >0). Similarly, $(\alpha + \gamma_j)$ measures the elasticity between past profitability of S and the current investment in the smallest division when there are more than two divisions in the firm (i.e. $ndiv_{itj+1}$>0) and finally $(\alpha + \lambda_j)$ measures the elasticity to the extent that the firm is capital constraint (i.e. $cap_{ij}$ >0). If investment sensitivity is positive in any of these three cases (i.e. $(\alpha + \alpha_j) > 0$ or $(\alpha + \gamma_j) > 0$ or $(\alpha + \lambda_j) > 0$), then even in the presence of influence problem the firm would prefer to invest more in its smallest segment, provided there is higher profit in the previous period. Moreover, different values of '*j*' will generate different magnitudes of $(\alpha + \alpha_j)$, $(\alpha + \gamma_j)$ and $(\alpha + \lambda_j)$, which reflect the changes in investment sensitivity with higher or lower degree of influence activity by L. The above specification is estimated using ordinary least squares (OLS) with robust standard errors to correct for small sample bias and heteroskedasticity.

However, if the sum of these coefficients is negative, it demonstrates that investment sensitivity decreases as influence activities become more severe. In this case it is necessary to examine whether the decreasing relationship holds because of more compensation incentives used by H. Although the severity of influence activity in an organization is an exogenous variable, the headquarters can control influence activity by L through incentive compensation which is endogenously determined. Higher compensation incentives can align the division managers' incentives with those of the firm such that it would not be in the interest of L to undertake unproductive influence activities and hence private signals can become more reliable (Wulf, 2002). In order to test this third issue, compensation incentive to L ($CI_{itk}$) and the corresponding interaction term with past profitability in S is introduced in equation (4) to take into account the private cost of influence by L (*c*). $CI_{itk}$ takes the values of $lltd_{it}$ and $lstd_{it}$, which denote long-term (LTIP) and short-term (STIP) incentive payments to the division manager of large division. These compensation incentives are tested in two different models since these variables are highly correlated with each other. As a robustness measure the equation is also estimated with LTIP and STIP both included in a single equation. However, the results are not qualitatively different from the model that has only LTIP in it. Thus incorporating $CI_{itk}$ in equation (4) yields,

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

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 interpretation of the coefficient is same as explained above for the firm attributes in equation (4). $(\alpha + \eta_k)$ measures the elasticity between past profitability of S and the current investment in the smallest division when compensation incentives are provided to L (i.e. when $CI_{itk} > 0$). The sign of the coefficient on $\eta_k$ is expected to be negative, because 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 the above issue.

## 5. Empirical Results

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

Table 2 presents the estimation results for various specifications of equation (4), which tests the following two issues for Australian conglomerates: (i) how past profitability in S (public signal) affect the investment in S in current period and (ii) the relationship between severity of influence problem and investment sensitivity. Model 1 incorporates two measures of influence activities: relatedness among divisions and number of divisions. Consequently, to capture different levels of relatedness and numbers of divisions in a firm, four relatedness dummies ($rel_{it1}$, $rel_{it2}$, $rel_{it3}$, $rel_{it4}$) and four division dummies ($ndiv_{it3}$, $ndiv_{it4}$, $ndiv_{it5}$, $ndiv_{it6}$) are included in Model 1.[7] Model 2 is re-estimated from 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. Subsequently, Model 3 is a re-estimation of Model 1 by introducing another measure of influence activity, which takes into account whether the firm is capital constraint. Hence to capture different levels of capital constraints, three capital constraint dummies ($cap_{i2}$, $cap_{i3}$, $cap_{i4}$) are included in

[7] $rel_{it0}$ and $ndiv_{it2}$, which represents no relatedness among segments and two divisions in a firm, respectively, are considered as the base case when the dummies are equal to zero. The coefficient $\alpha$ represents the investment sensitivity for the base case when there is no influence activity present in the model.

Model 3.[8] Finally, control variables such as firm characteristics and time dummies are added in Model 4.

**[Insert Table 2]**

Table 2 shows that the coefficient of $\prod_{it-1}^{S}$ in all four models is positive and significant at the 5% critical level. Further Model 2 shows that the results obtained in Model 1 do not change after introduction of the control variables. Hence as past performance of S increases by 1%, investment in S increases by .25% to .27% assuming that the firm has only two divisions and they are completely unrelated to each other. In this case the dummy variables are all equal to zero. However, in order to examine how the elasticity of investment sensitivity varies as influence problems become more severe, it is necessary to look at the coefficients of the interaction terms. For example, if the number of divisions is two, but the relatedness increases from zero ($rel_{it1} = 0$) to one ($rel_{it1} = 1$), the elasticity changes from $\alpha$ to $(\alpha + \beta_1)$ in equation (4), which is -1.044 (=0.267+ -1.311) in Model 1 and -0.96 (= 0.255+ -1.215) in Model 2. In other words, because of influence activity by L, a 1% increase in past profitability in S reduces the investment in smallest division by 1.04% in Model 1 and 0.96% in Model 2. Likewise in equation (4) if the number of divisions is constant at two, but the relatedness increases to two, three and four (i.e. $rel_{it2} = 1, rel_{it3} = 1, rel_{it4} = 1$), the elasticity value changes to $(\alpha + \beta_2)$, $(\alpha + \beta_3)$ and $(\alpha + \beta_4)$, respectively. Alternatively when the number of divisions in a firm is three (i.e. $\gamma_1 \neq 0$), the elasticity between investment sensitivity and various levels of relatedness is calculated by the coefficients $(\alpha + \gamma_1)$, $(\alpha + \gamma_1 + \beta_1)$ … $(\alpha + \gamma_1 + \beta_4)$, respectively.

In contrast, the relationship between investment sensitivity and the number of divisions in a firm is observed for different values of relatedness. For example, if the relatedness is initially zero, but the number of divisions increases from two ($ndiv_{it3} = 0$) to three ($ndiv_{it3} = 1$), the elasticity changes from $\alpha$ to $(\alpha + \gamma_1)$ in equation (4), which is 1.557 (=0.267+1.290) in Model 1 and 1.389 (=0.255+1.134) in Model 2. Thus a 1% increase in past profitability in S increases the investment in smallest division by 1.56% in Model 1 and 1.39% in Model 2. Here H relies more on public signal because of higher influence activity by L. Similarly, if relatedness is constant at zero, but the number of divisions increases to four, five and six (i.e. $ndiv_{it4} = 1, ndiv_{it5} = 1, ndiv_{it6} = 1$), the elasticity changes to $(\alpha + \gamma_2)$, $(\alpha + \gamma_3)$ and $(\alpha + \gamma_4)$, respectively in equation (4). Alternatively if relatedness value is one (i.e. $\beta_1 \neq 0$), the variation in investment sensitivity for different numbers of divisions would be

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[8] $cap_{i1}$, which represents a firm has AAA rating and is not capital constraint, is dropped from Model 3 since it is considered as the base case when the capital constraint dummy is zero. Here the coefficient $\alpha$ represents the investment sensitivity when the firm faces no shortage of capital.

$(\alpha + \gamma_1 + \beta_1) \ldots (\alpha + \gamma_4 + \beta_1)$, respectively. These elasticity values corresponding to various levels of relatedness and number of divisions are calculated and reported in Table 3.

The control variables in Model 2 and 4 in Table 2, which account for firm performance, do not have any significant impact on investment sensitivity. However the significant time dummies indicate that the economy or industry wide shocks affect every firm in that particular year. This could result from a particular policy change, demand or supply changes or any other factor that affects aggregate output. Such a change will not only affect investment in the overall firm but also investment in the small division. Finally, the coefficients of the interaction term involving segment profitability and the capital constraint dummies are not statistically significant in Model 3 and Model 4. The capital constraint terms are insignificant, probably because most of the firms are large and there are not many variations in the credit ratings of firms. In the sample 67% firms have AAA credit rating, facing no capital constraints (see Table 1). Moreover, since in Table 2 for all four models the dummy groups are significant in some cases and insignificant in others, joint significance tests are conducted on each group of dummies. Results in Table 2 demonstrate that the number of divisions dummy as a group has a significant impact on investment in small segment in all four models.

**[Insert Table 3]**

Table 3 reports the sum of the coefficient of $\prod_{it-1}^{S}$ and the coefficients of the interaction terms with the dummy variables for all four models in Table 2. The *p*-values in Table 3 correspond to the joint significance test of the coefficient of $\prod_{it-1}^{S}$ and the corresponding coefficient of the interaction term with the dummy variable. Overall, Table 3 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. In practice the relatedness between segments can have positive and negative effects on investment sensitivity, both of which originate from the fact that L is more informed about the investment opportunity of the smallest division as they are more related. The positive effect counts since the large division manager's recommendation becomes more informative as the two divisions are more related. In contrast, relatedness can have negative effects since L is also more likely to engage in influence activities as the two divisions become more related. Thus the final outcome depends upon which effect is stronger. However, as long as H controls L's influence activities through additional compensation incentives, the negative effects can be mitigated, in which case H can rely more on L's recommendation in determining investment in the small division. Thus in presence of compensation incentives, relatedness among segments can negatively affect investment sensitivity. The negative relationship between investment sensitivity and relatedness among divisions in Table 3 highlights that headquarters in Australia might be successful in controlling L's influence activities through additional compensation incentives, such that there is no influence activity by large division manager. The presence of compensation incentives are examined in greater details in the next section 5.2.

Alternatively as the number of divisions in the firm increases, there is a higher chance of influence activities by L. This negative effects of influence activity are not compensated for by more information; more divisions in the firm would mean that headquarters is less likely to be informed about the investment prospect of the smallest 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 is expected (see Table 2).

Together Table 2 and 3 describe the pattern of investment sensitivity present in Australian conglomerates, with different degrees of relatedness among divisions and the numbers of divisions in a firm. This pattern can be further verified in Figures 1(a) and 1(b) by allowing either relatedness among divisions to vary or number divisions to vary, while keeping the other variable constant. Considering the regression estimates of Model 2 in Table 3,[9] Figure 1(a) illustrates the relationship between investment sensitivity and relatedness among divisions, for different values of number of divisions in a firm. Likewise, Figure 1(b) is plotted from the estimated coefficients of Model 2 in Table 3, which displays the relationship between investment sensitivity and number of divisions, for different values of relatedness.[10]

**[Insert Figure 1(a) and 1(b)]**

Figure 1(a) demonstrates that the investment sensitivity in small division follows a 'U' shaped pattern with a drop in investment sensitivity at relatedness values between 1 and 2. Changing the number of divisions from two to three or higher will shift the curve by the parameter $\gamma_j$, where '$j$' is the number of divisions. Consequently, Figure 1(b) demonstrates that the investment sensitivity in small division follows a 'N' shaped pattern with an increase in number of divisions, which peaks at 4, then reaches the bottom at 5 and followed by a recovery at 6. Changing the relatedness value from zero to one or higher will shift the curve by the parameter $\beta_j$, where '$j$' is the value of relatedness among segments. Moreover, since graphs in all different models have the same shape in Figures 1(a) and 1(b), the results in Table 3 are robust to their specifications.

[9] Model 2 is considered to be the most robust among all four specifications in Tables 2 and 3. The coefficients of $\prod_{it-1}^{S}$, relatedness dummies and number of division dummies are robust and significant in Model 2, after adding the control variables and the time dummies to Model 1. In contrast, Model 3 and 4 do not give us any additional information since the capital constraint dummies are insignificant in both cases. We have also tried plotting Figures 1(a) and 1(b) based on other models; the findings are very similar and can be obtained upon request.
[10] In plotting the series for Figures 1(a) and 1(b), the insignificant values in Table 3 are treated as zero, since they are not statistically different from zero in the estimations.

The finding is consistent with the theoretical predictions of Wulf (1998), where H allows influence activities if the firm suffers from moderate influence problems and deters influence activities at the two extremes. This is because if the divisions are completely unrelated (relatedness equals 0 in Figure 1(a)) or the number of divisions is low (lower or equal to 4 in Figure 1(b)), the cost of engaging in influence activities by L is very high with no additional benefits received by L. Thus H can rely more on public signal and the costs of satisfying incentive compatibilities are low. Moreover, when the divisions are very strongly related (relatedness equals 3 or more in Figure 1(a)) or with many number of divisions (6 or more in Figure 1(b)), there is greater chance that L will engage in influence activity and deliver corrupt private signal to H. If the costs from corrupt private signals are very high, H will rely more on public signal. Thus in these two extreme cases, H can deter influence activity by L by relying more on public signal and investment sensitivity increases.

However, the problem is worse when the divisions are moderately related (relatedness equals 1 or 2 in Figure 1(a)) or the number of divisions is few (5 in Figure 1(b)). Here once the CEO seeks advice from L, L has an incentive to move capital away from the moderately related small division towards his own division because higher internal capital will now positively affect the performance of the large division and also the firm. Here the costs of H in satisfying the incentive compatibilities are too high and thus H allows influence activity by L with a drop in investment sensitivity.

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

The findings in section 5.1 suggest that in Australia headquarters might be successful in mitigating influence activity by providing compensation incentives to L, where higher relatedness value among divisions is negatively related to investment sensitivity (Tables 2 and 3). To examine the issue further, this section presents the empirical results following equation (5), which examines the effects of compensation incentives to the manager of large division on investment sensitivity of the smallest segment in Australian firms.

The sign of the coefficient $\eta_k$ in equation (5) can be either positive or negative depending on whether H offers long term (LTIP) or short term (STIP) incentive payments to L. If H offers larger LTIP, which depend on firm performance, L will have lower incentive to distort private signal. Thus H can rely more on informative private signal and $\eta_k$ is negative. However, two opposite effects work when H offers STIP to L, because STIP depend not only on firm performance but also on division performance. If H offers a high STIP which places a higher weight on firm performance then $\eta_k$ would be negative, similar to the case of LTIP. However, if STIP is offered such that more weight is placed on division performance, then L would engage more in influence activity and H would rely less on private signal. In Australia it is very difficult to predict how much weight is actually placed on division performance vis-à-vis firm performance since such information is not readily available. Where more weight is placed on division performance STIP may fail to align the incentives of L with those of the firm. Thus H would rely more on public signal where a higher STIP will lead to an increase in investment sensitivity and $\eta_k$ is positive.

Columns (1), (2) and (3) in Table 4 respectively report the findings where $I_{it}^{S}$ is regressed on short-term incentive dummy (*lstd*$_{it}$) multiplied by past profitability of the smallest segment ($\prod_{it-1}^{S}$), long-term incentive dummy (*lltd*$_{it}$) multiplied by $\prod_{it-1}^{S}$ and together the short-term (*lstd*$_{it}$) and long-term (*lltd*$_{it}$) incentive dummies multiplied by $\prod_{it-1}^{S}$. In all three specifications, 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*$_{it}$). Finally time dummies are used to control for time-specific effects.

**[Insert Table 4]**

Table 4 shows that while the coefficient of the interaction term $\prod_{it-1}^{S}$**lstd*$_{it}$, is negative and significant, the coefficient of the interaction term $\prod_{it-1}^{S}$**lltd*$_{it}$, is not significant. Most of the signs and significance levels of relatedness dummies, division dummies and other control variables remain unchanged from that of Table 2. The joint significance tests reports that together the relatedness dummies and division dummies groups are jointly significant in presence of incentive payments to L. The above findings suggest that short-term incentive payment has a significant role in allocation of capital to the smallest segment of the firm in Australia and is the main driving force in aligning L's incentives with shareholder interests.[11] In specification 1 of Table 4 if there is no incentive payment given to L, a 1% increase in past profitability leads to a 0.629% increase in investment in the smallest division. However, in the presence of STIP the relationship between past profitability and investment will have an elasticity equal to 0.121 (=0.629 + -0.508). The above findings show the relative importance placed by head office on the noisy public signal in the presence and absence of incentives payments. 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 H to place more weight on private signals for investing in the smallest segment. Thus investment sensitivity decreases.

Moreover, after controlling for everything else such as relatedness and number of divisions in a firm, the magnitude of the public signal ($\prod_{it-1}^{S}$) increases by more than two folds in presence of incentive payments in Table 4 as compared to no incentive payments in Table 2. The coefficient of past profitability in the smallest segment increases from 0.255 in Model 2 of Table 2 to 0.629 in Model 1 of Table 4. The coefficient of past profitability in the regression estimates is smaller in Table 2 because it provides an average estimate without making any distinction whether inceptive payments

[11] Kerin (2003) reports that in Australia the LTIPs in large conglomerates are comparatively small relative to the US. This finding highlights the fact that STIPs are more common in Australia than LTIPs.

are provided to the manager of the large division. Once this bias is corrected in Table 4, the coefficient of past profitability truly captures the elasticity between the past performance and the current investment in the smallest division and the value increases.

The reasons that the short-term incentives payments may be effective in offsetting influence problems by L are as follows. 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. If their remuneration includes this information rent then they might forgo wasteful rent-seeking activity (see Schoar, 2002; Choe and Yin, 2009). Hence as the division managers receive higher short term remuneration headquarters can rely more on private information about investment in S.

**[Insert Table 5]**

Finally, the mean values of short term incentive payments to L is shown in a two way tabular form in Table 5, which captures the effects of incentive payments to L with a change in relatedness values on one hand and number of divisions on the other. In Table 5 the numbers in bold show that for any given level of relatedness, the more divisions a firm has, the more short term incentives are given to the large division managers. However, at any given number of divisions, the incentive payments are on an average highest if the divisions are either moderately related or unrelated. These findings are consistent with section 5.1 and also with Wulf (1998), where influence activity by L is found to be more severe when the firms are fairly related and number of divisions increases moderately.

## 6. Conclusion

Despite the importance of efficient allocation of firm’s internal capital on firm value, there is little empirical evidence on how influence activities by large division manager in multidivisional organizations in Australia affect the investment in their smallest division. This study contributes to the literature by examining three important issues: First, the relation between the investment in the smallest division and its past performance, defined as investment sensitivity, is examined. This investment sensitivity (public signal) is found to be positive in section 5.1, indicating that H invests more in S as past performance increases. Second, mixed evidence is found in section 5.1 between the investment sensitivity and increase in the severity of influence problems when measures such as, relatedness and division dummies are used. The results show as the number of divisions increase in a firm, the informativeness of the private signal decreases and influence problems become more severe. Thus H would not rely on compensation incentives to L and investment sensitivity (public signal) increases.

However, as the influence problem becomes more severe because of 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. This third issue, which analyses the relationship between compensation incentives and investment sensitivity, is examined in section 5.2. 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 the smallest division (private signal) as compared to noisy accounting measures (public signal). Hence, findings indicate that short-term incentives may be the main driving force in aligning large division manager's incentives with shareholder's interests in Australia.

Finally, consistent with the theoretical predictions of Wulf (1998), this paper finds that headquarters allows influence activity by large division manager if the firm suffers from moderate influence problems and deters influence activities at the other two extremes. While investment sensitivity in the smallest division follows a 'U' shaped pattern with a drop in investment sensitivity at relatedness values between 1 and 2, the investment sensitivity follows an 'N' shaped pattern with an increase in number of divisions, which peaks at 4, then reaches the bottom at 5 and followed by a recovery at 6. In presence of compensation incentives for any given level of relatedness, the more divisions a firm has, the more short term incentives are given to the large division managers. However, at any given number of divisions, the incentive payments are on an average highest if the divisions are either moderately related or unrelated.

Overall, in Australia the degree of influence activity by large division manager is not that severe compared to other OECD countries. This is indicated primarily by the three observations obtained after analyzing the sample in section 3.2. These observations point out that the smallest and largest segments in many firms are unrelated to each other, very few firms in the sample have large number of divisions and majority of the firms enjoy highest credit ratings in Australia. Thus in firms if headquarters provides proper compensation incentives such as short-term incentive payments to large division managers, there is a lesser chance of influence activities by managers of large divisions and a greater chance of efficient internal capital allocation among divisions.

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# Tables

**Table 1:** *Descriptive Statistics*

| **Variable** | **Mean** | **Standard Deviation** |
|---|---|---|
| Assets ($ in billions) | 0.405 | 1.310 |
| Log of Assets | 18.210 | 1.910 |
| Investment in small segment (Δ assets) | 0.170 | 0.840 |
| Profitability of segment | 0.140 | 0.680 |
| **Relatedness dummies** | **No. of observations in total sample** | **% of observations in total sample** |
| Related = 0 | 96 | 47.060 |
| Related = 1 | 48 | 23.530 |
| Related = 2 | 26 | 12.750 |
| Related = 3 | 20 | 9.800 |
| Related = 4 | 14 | 6.860 |
| **Number of divisions** | **No. of observations in total sample** | **% of observations in total sample** |
| Number of divisions = 2 | 68 | 32.850 |
| Number of divisions = 3 | 53 | 25.600 |
| Number of divisions = 4 | 48 | 23.190 |
| Number of divisions = 5 | 13 | 6.280 |
| Number of divisions >= 6 | 25 | 12.080 |
| **Capital constraint dummies** | **No. of observations in total sample** | **% of observations in total sample** |
| Capital 1 | 139 | 67.15 |
| Capital 2 | 25 | 12.08 |
| Capital 3 | 34 | 16.43 |
| Capital 4 | 9 | 4.350 |
| **Compensation to division managers** | **Mean** | **Standard Deviation** |
| LTIP | 0.230 | 0.780 |
| STIP | 0.870 | 1.260 |
| **Other control variables** | **Mean** | **Standard Deviation** |
| Overall firm profitability | 11.920 | 54.390 |
| Growth opportunity | -5.560 | 24.600 |
| **Time Dummies** | **No. of observations in total sample** | **% of observations in total sample** |
| 2006 | 41 | 19.810 |
| 2007 | 45 | 21.740 |
| 2008 | 44 | 21.260 |
| **Sub-Industries** | **No. of observations in total sample** | **% of observations in total sample** |
| Automobile and components | 10 | 4.830 |
| Capital goods | 61 | 29.470 |
| Consumer durables and apparel | 5 | 2.420 |
| Food Beverage and Tobacco | 41 | 19.810 |
| Healthcare equipment and services | 12 | 5.800 |
| Materials | 68 | 32.850 |
| Pharmaceuticals, Biotechnology and Life sciences | 5 | 2.420 |
| Technology, Hardware and equipment | 5 | 2.420 |

**Table 2:** *Estimations of the Effects of Severity of Influence Problems on Investment Sensitivity of the Smallest Segment*

| 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 |
| ***Joint Significance*** | | | | |
| *Relatedness dummies* | 1.430 | 1.310 | 0.950 | 0.810 |
| | [0.23] | [0.27] | [0.45] | [0.52] |
| *Number of division dummies* | 3.40*** | 3.340*** | 3.300*** | 3.250*** |
| | [0.01] | [0.01] | [0.01] | [0.01] |
| *Capital Constraint dunmmies* | | | 0.360 | 0.330 |
| | | | [0.78] | [0.80] |
| *Time dummies* | | 1.810 | | 1.700 |
| | | [0.15] | | [0.17] |

**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 $cap_{i1}$. The figures in square brackets for the joint significance test are p-values.

**Table 3:** *Calculation of Investment Sensitivity for Various Levels of Influence Activities*

| Firm Characteristics | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| $rel_{it0}$ | 0.267** | 0.255** | 0.261** | 0.249** |
| | (0.04) | (0.04) | (0.04) | (0.05) |
| $rel_{it1}$ | -1.043** | -0.960 | -1.037 | -0.953 |
| | (0.20) | (0.20) | (0.21) | (0.22) |
| $rel_{it2}$ | -1.036* | -0.946* | -0.647 | -0.680 |
| | (0.09) | (0.10) | (0.22) | (0.38) |
| $rel_{it3}$ | -0.865 | -0.519 | -0.631 | -0.608 |
| | (0.34) | (0.54) | (0.32) | (0.49) |
| $rel_{it4}$ | -0.869 | 0.052 | -0.874 | 0.067 |
| | (0.59) | (0.97) | (0.60) | (0.97) |
| $ndiv_{it2}$ | 0.267** | 0.255** | 0.261** | 0.249** |
| | (0.04) | (0.04) | (0.04) | (0.05) |
| $ndiv_{it3}$ | 1.557*** | 1.389*** | 1.491** | 1.377 |
| | (0.01) | (0.01) | (0.02) | (0.02) |
| $ndiv_{it4}$ | 2.383*** | 2.153*** | 2.388*** | 2.176 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| $ndiv_{it5}$ | -1.501 | -1.931 | -1.652 | -2.082 |
| | (0.36) | (0.24) | (0.32) | (0.22) |
| $ndiv_{it6}$ | 1.539*** | 1.504*** | 1.262** | 1.137 |
| | (0.01) | (0.01) | (0.05) | (0.11) |
| $cap_{i1}$ | | | 0.261** | 0.249** |
| | | | (0.04) | (0.05) |
| $cap_{i2}$ | | | 0.237 | -0.011 |
| | | | (0.60) | (0.98) |
| $cap_{i3}$ | | | 0.660 | 0.694 |
| | | | (0.26) | (0.24) |
| $cap_{i4}$ | | | -1.310 | -0.744 |
| | | | (0.61) | (0.82) |

**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:** *Estimations of the Effect of Compensation Incentives on Investment Sensitivity of the Smallest Segment*

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| $\prod_{it-1}^{S}$ | 0.629*** | 0.341*** | 0.665*** |
| | (5.951) | (3.748) | (5.697) |
| $rel_{it1} * \prod_{it-1}^{S}$ | -1.444** | -1.010** | -0.975** |
| | (-2.161) | (-2.464) | (-2.341) |
| $rel_{it2} * \prod_{it-1}^{S}$ | -1.720*** | -1.223** | -1.291** |
| | (-3.041) | (-2.505) | (-2.551) |
| $rel_{it3} * \prod_{it-1}^{S}$ | -1.232 | -1.600 | -1.780 |
| | (-1.066) | (-1.017) | (-1.128) |
| $rel_{it4} * \prod_{it-1}^{S}$ | -0.728 | -0.876 | -0.956 |
| | (-0.461) | (-0.541) | (-0.604) |
| $ndiv_{it3} * \prod_{it-1}^{S}$ | 1.487*** | 1.073** | 0.982* |
| | (2.666) | (2.242) | (1.970) |
| $ndiv_{it4} * \prod_{it-1}^{S}$ | 2.048*** | 2.059*** | 2.053*** |
| | (3.125) | (4.617) | (4.544) |
| $ndiv_{it5} * \prod_{it-1}^{S}$ | -2.975 | -3.748 | -3.690 |
| | (-1.485) | (-1.534) | (-1.500) |
| $ndiv_{it6} * \prod_{it-1}^{S}$ | 1.607** | 1.113* | 1.124* |
| | (2.164) | (1.761) | (1.779) |
| $\delta_{2006}$ | -0.434** | -0.308* | -0.290 |
| | (-2.114) | (-1.676) | (-1.585) |
| $\delta_{2007}$ | -0.374* | -0.245 | -0.255 |
| | (-1.851) | (-1.363) | (-1.399) |
| $\delta_{2008}$ | -0.507* | -0.277 | -0.287 |
| | (-1.968) | (-1.392) | (-1.422) |
| $\prod_{it-1}^{F}$ | 0.003 | 0.002 | 0.002 |
| | (0.681) | (0.488) | (0.535) |
| $go_{it}$ | 0.005 | 0.003 | 0.003 |
| | (0.500) | (0.253) | (0.328) |
| $\prod_{it-1}^{S} * lstd_{it}$ | -0.508*** | | -0.435*** |
| | (-3.880) | | (-3.452) |
| $\prod_{it-1}^{S} * lltd_{it}$ | | -0.010 | 0.107 |
| | | (-0.039) | (0.383) |
| *Const* | 0.439** | 0.280* | 0.289* |
| | (2.248) | (1.682) | (1.711) |
| *N* | 118 | 101 | 101 |
| *R-squared* | 0.289 | 0.362 | 0.374 |
| ***Joint Significance*** | | | |
| *Relatedness dummies* | 2.400* | 1.990* | 2.030* |
| | [0.06] | [0.10] | [0.10] |
| *No. of division dummies* | 3.86*** | 6.55*** | 6.330*** |
| | (0.01) | (0.00) | [0.00] |
| *Time dummies* | 1.630 | 0.990 | 0.920 |
| | [0.19] | [0.40] | [0.43] |

**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. The figures in square brackets for the joint significance test are p-values.

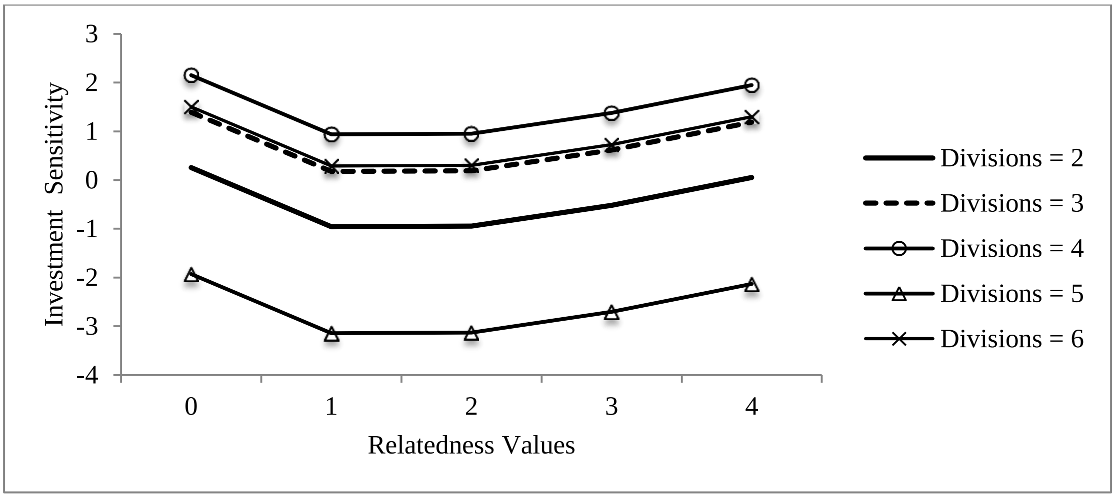
**Table 5:** *Relationship between Severities of the Influence Problems and Investment Sensitivity of the Smallest Segment in presence of Compensation Incentives*

| **Relatedness** | **Number of Divisions** | | | | |
|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 |
| 0 | 0.724 | 0.743 | **0.834** | **1.207** | 0.747 |
| 1 | **1.113** | **0.822** | 0.731 | 0.835 | **2.848** |
| 2 | 0.689 | 0.634 | | | 0.592 |
| 3 | 0.465 | | 0.659 | | 1.130 |
| 4 | 0.615 | 0.773 | 0.814 | 0.842 | |

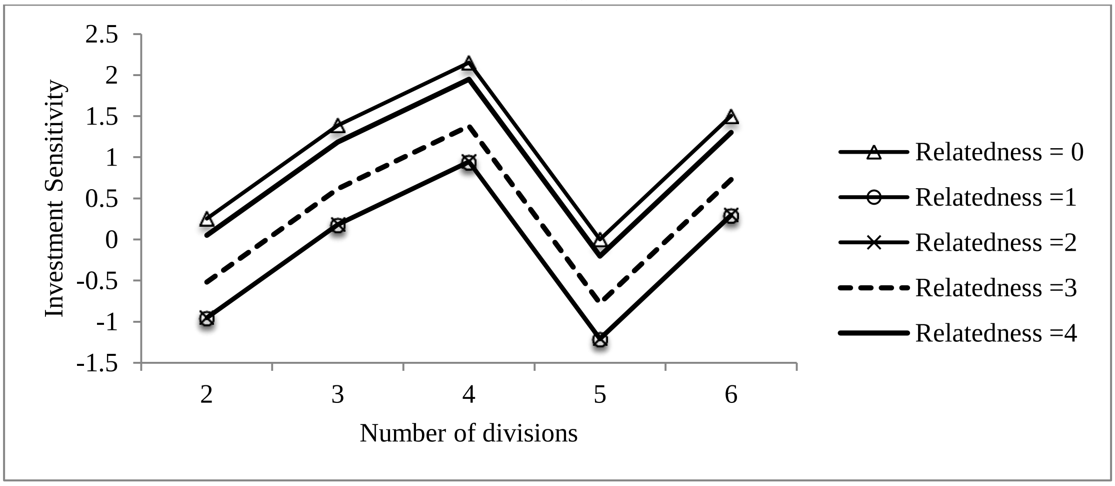
**Note:** The values represent the mean of *lstd* for different combinations of relatedness and number of divisions. The blank cells represent absence of data for *lstd*. For example, data in column 3 and row 3 shows that there is no data for *lstd* for firms with three divisions and relatedness level three.

# Figures

**Figure 1:** *Changes in Investment Sensitivity of the Smallest Segment in Australia with Severities of Influence Problems*




**(a)**




**(b)**