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Economic Determinants of Group versus Individual Compensation Schemes for Senior Executives

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Abstract:

This paper investigates firm characteristics associated with the choice of individual versus group compensation schemes for senior executives below the CEO level. We define individual compensation schemes where senior executives are compensated independently from other senior executives, where incentive compensation is linked to individual performance. In contrast, group compensation schemes are defined where senior executive compensation is jointly determined with other senior executives, with compensation linked to common incentives. This paper is motivated by limited evidence on compensation schemes for senior executives' beyond the CEO, limiting critical evaluation of senior executives' compensation. Preliminary evidence using Australian data provides support that individual compensation schemes are adopted by firms where individual senior executive inputs (effort) and outputs are separable and observable. We also find support that group compensation schemes are adopted where there are efficiencies from senior executive co-operation and interdependencies between executives, such as in integrated firms. The empirical evidence suggest that there are important differences between how firms set changes in total compensation as apposed to the mix of long and short term incentive components. The findings contribute to the ongoing debate surrounding the determination of appropriate corporate governance mechanisms in the presence of agency conflicts, and especially executive compensation schemes.

Key words: Corporate Governance; Senior Executive Compensation and incentives; Agency Theory; Group and Individual Compensation

Jel classification: G30; J33; J41; M4:

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1 Introduction

The objective of this study is to investigate firm characteristics associated with the choice of individual versus group compensation schemes for senior executives below the CEO. Individual compensation schemes are defined where senior executives are compensated independently from other senior executives, with incentive compensation linked to individual performance. In contrast, group compensation schemes are those where senior executive compensation is jointly determined with other senior executives, with incentive compensation linked to common incentive structures.

The motivation for this study is two fold. First, despite both public and academic scrutiny, little is known about how senior executives' are compensated. The link between the economic determinants of CEO compensation levels and structure (e.g., Hermalin and Wallace, 2001; Core, Holthausen and Larcker, 1999; Core and Guay, 1999; Wright, 2005) has been extensively evaluated.[1] However, the economic determinants of compensation schemes for senior executives below the CEO level has received significantly less attention. This is despite evidence that these senior executives are important to the firm. Bebchuk and Grinstein (2005) find the sum of the top five executives' compensation packages increased from 5.0% to 9.8% of net income between 1993-1995 and 2001-2003. Less than 40% of this increase is explained by factors such as increasing firm size, market performance and industry factors.[2] Also, Core and Larcker (2002) and Hillegeist and Penalva (2004) find that the level of senior executives' equity ownership and equity compensation incentives are positively associated with improvements in firm

[1] Further, the link between firm performance and CEO compensation has also been extensively documented (e.g., Murphy, 1999; Core, Guay and Larcker, 2003; Bushman, Indjejikian and Smith, 1996; Jensen and Murphy, 2004; Matolcsy and Wright, 2006).

[2] They also find that increased use of options in compensation packages does not explain the increasing levels of senior executive team compensation.

performance. On the other hand, Frye (2004) finds mixed evidence of such a relation between the level of senior executive equity compensation and firm performance. The literature to date has not investigated alternative compensation schemes for senior executives.[3] The lack of empirical evidence on the appropriateness of different compensation schemes limits critical evaluation of the efficiency of senior executives' compensation more broadly.

Second, contributing to the lack of empirical evidence on senior executives' compensation is limited data availability (Bushman and Smith, 2001), necessitating the use of proprietary and survey data sets.[4] Increased disclosure of senior executives' compensation schemes as a consequence of recent changes to reporting requirements in Australia has resulting in increased data availability and reliability.[5]

This study adopts a contracting theory perspective where the owners of the firm (shareholders or their representatives, the board of directors) contract with senior executives to reduce agency costs. It is predicted that individual compensation schemes are adopted by firms where individual senior executive's input (effort) and outputs are separable and observable. This is because a closer nexus between individual effort and pay provides incentives for senior executives to exert greater effort. Further, individual compensation schemes are expected to reduce the propensity for senior executives to free-ride. Group compensation schemes are adopted where there are expected efficiencies from senior executive co-operation and interdependencies between executives, such as in integrated firms. This is because group

[3] Notable exceptions are Main, O'Reilly and Wade (1993) and Carpenter and Sanders (2004). Main et al (1993) find a positive association between individual compensation schemes and average firm ROA. On the other hand, Carpenter and Sanders (2004) find support against individual compensation scheme as a predictor of firm performance in complex firms that require increased co-operation between senior executives.

[4] Bushman, Indjejikian and Smith (1995) are typical of studies that address executive compensation below the CEO level. They rely on limited, proprietary survey data in their study of division managers. Keating (1997) also used survey date and is limited to a sample of firms with a divisional structure, reducing the generalizability of results.

[5] The compensation details disclosed in annual reports are also more reliable than survey data because they are subject to independent auditing.

compensation schemes provide an incentive for senior executives to exert effort toward common objectives, increase information sharing and co-operation between executives as well as increasing mutual monitoring. Integrated firms are expected to benefit from increased co-operation between senior executives.

Three different methods have been developed to proxy for the type of compensation scheme adopted.[6] Although firms disclose general information about compensation schemes and the nexus between pay and performance, they are not explicitly required to specify whether there is predominantly an individual or group compensation scheme in place for the senior executives. The lack of precision in disclosures and cross sectional variation in disclosure quality introduces a level of subjectivity in identifying the type of compensation scheme in place making an objective assessment of compensation scheme type based on textual disclosures difficult. To address the level of subjectivity and precision, this study develops alternative proxies for classification of compensation schemes. Where senior executives are paid predominantly on common performance (group compensation scheme), there is correlation between executives' compensation. On the other hand, where senior executives' are paid predominantly on individual performance, there will be less of a relation between senior executive compensation payments. This allows for development of proxies based upon the level of correlation between executives' compensation levels and structure. The first method used in this study is extent changes in compensation vary between senior executives. The second method is the variation in the type of compensation used in senior executives' compensation contracts (short term cash bonus versus long term compensation). The third method is the variation in the relative weight of incentive compensation to base pay between senior executives.

[6] For a full description of how these variables are estimated, please see table two.

Firm characterised by increased observability of senior executives inputs (effort) and output are proxied by the level of industry and geographic diversification using the sum of the number of different geographic or industry segments. The level of firm integration is estimated by the level of interdependencies between geographic and industry segments, level of capital expenditure and functional organisational structure.

Preliminary findings are based on a limited sample so need to be interpreted with caution.[7] Preliminary evidence using Australian data provides support that individual compensation schemes are adopted by firms where individual senior executive inputs (effort) and outputs are separable and observable. We also find support that group compensation schemes are adopted where there are efficiencies from senior executive co-operation and interdependencies between executives, such as in integrated firms. The empirical evidence suggest that there are important differences between how firms set changes in total compensation as apposed to the mix of long and short term incentive components.

The evidence is based on a sample of 640 firm year observations drawn from the ASX Top 500 firms between 2003 and 2005. Data on senior executives and senior executives' compensation is obtained from the UTS-Accenture 'Who Governs Australia' database, while financial statement data is sourced from Aspect – Huntley databases. Information not available from these sources is obtained directly from annual reports.

This study makes a number of contributions to the literature. First, this study contributes to the ongoing debate surrounding the determination of appropriate corporate governance mechanisms in the presence of agency conflicts, and especially executive compensation schemes. Concern with senior executives' compensation is evidenced by increased disclosure requirements for executive compensation and the requirement for a non-binding resolution by

[7] Further results will be forthcoming as more data are collected.

shareholders on senior executives' compensation packages.[8] However, the efficiency of these regulatory developments is not considered in either the empirical or analytical literature. This study provides a framework for evaluating the structure of senior executives' compensation within an agency framework. This is informative not only for regulators, but also shareholders concerned with how to vote on these schemes.

Second, this study contributes to the practitioner literature by investigating the circumstances under which group or individual compensation schemes are predominantly used by firms for the senior executives. This contribution is relevant because the practitioner-based literature offers conflicting guidance on the efficiency of group versus individual compensation schemes (Autrey, 2005). Some of the practitioner-based literature champions the role of group compensation schemes to improve group task performance (Weitzel, 2002; Lawford, 2003). Others argue that it is necessary to combine both group and individual compensation schemes to induce increased group task performance (Parker, McAdams and Zielinski, 2000) or fail to consider compensation contracts at all when considering group task performance (Eppler and Sukowski, 2000; Jarzabkowski and Searle, 2004). By providing empirical evidence on the firm characteristics associated with compensation scheme choice for senior executives, this study builds an empirically tested model that can be used by practitioners in guiding the structuring of executive compensation schemes. This model also allows a critical evaluation of the practitioner-based literature.

[8] The introduction in 2005 of a non binding vote on Australian senior executives compensation contracts by shareholders makes this study timely (introduced with CLERP 9). Reports on investors exercising the new non binding vote on remuneration packages indicate that some investors are exercising this right. 35% of investors voted against the remuneration report for Investa Property Group; 19% voted against Rinker's remuneration report; 11% voted against West Australian Newspapers remuneration report (Durie, 2005). GlaxoSmithKline altered its CEO remuneration package after shareholders exercised a non binding vote against the package (Sykes, 2005).

The remainder of this study is organised as follows. Section 2 reviews relevant literature and develops the theory. Section 3 describes the research design. Section 4 reports the results (preliminary results at present) and section 5 contains the conclusions and limitations. Section 6 presents topics for further research.

2 Theory Development and Hypotheses

Agency Theory and CEO Compensation Schemes

The extant analytical and empirical literature does not provide direct insights into the relation between senior executives' compensation scheme choice (group versus individual compensation) and specific firm characteristics.[9] However, the relation between CEO compensation and firm characteristics has been considered extensively, and this forms the theoretical foundation for this study.

Consistent with a significant body of literature evaluating executive compensation schemes (and the choice of governance mechanisms more generally), this study adopts an agency theory perspective of the firm. This framework views the firm as a 'nexus of contracts' between the various providers of factors of production, and with control of the factors of production residing with the firm's management (Jensen and Meckling, 1976). This is problematic as the separation of ownership and management (control) exposes the owners of the factors of production (principals) to the risk of opportunistic behaviour by managers (agent), with resultant loss in firm value being described as an agency cost (Fama and Jensen, 1983). Subject to economic constraints, the firm minimizes total agency costs by enacting bonding and monitoring mechanisms. Executive compensation schemes are one such bonding mechanism.

[9] Key exceptions are Main, O'Reilly and Wade (1993), Henderson and Fredrickson (2001) and Carpenter and Sanders (2004) who consider tournament and equity theory with limited success.

The agency framework has provided the theoretical foundation for a substantial body of literature evaluating CEO compensation contracts.[10] This literature is based on the premise that the CEO is employed with the primary objective of increasing shareholder value. However, as CEOs are rational, they have incentives to take actions that maximise their own utility, sometimes to the detriment of shareholders (Jensen and Meckling, 1976). Agency problems arise when the CEO has goals that are not congruent with the maximizing of shareholder value. The extant literature has investigated how to align shareholder and CEO interests by minimising goal discongruence through compensation contracts and by monitoring CEO actions.

There are important cross-sectional differences in terms of levels and structure of CEO compensation contracts across different firms. Although most firms offer base salary, cash bonus and equity or options, the levels and structure of CEO pay varies between industries, countries and firm size (Murphy, 1999). The reasons behind the variation in levels and structure can be understood in part by considering the different incentives induced by variation in compensation contract design. The cash bonus is usually linked to short term performance measures over a one year period, providing an incentive for CEOs to exert effort that increases short term performance (Murphy, 1999). Equity grants are usually in the form of option grants and provide an incentive for the CEO to focus on long term performance in an effort to increase share price (Haugen and Senbet, 1981; Murphy, 1999). On the other hand, in some cases options are issued in the money as a reward for prior performance (Matolcsy, Riddell and Wright, 2005). Although both short term and long term compensation contracts encourage CEOs to take positive actions, albeit focusing on different issues, in some cases compensation contracts provide incentives for CEOs to take actions that may not benefit shareholders (Murphy, 1999). For

[10] This study does not attempt to provide a review of this literature. For comprehensive reviews of the executive compensation literature see Murphy (1999), Prendergast (1999), Bushman and Smith (2001), Conyon, Peck and Read (2001), Core, Guay and Larcker (2003) and Jensen and Murphy (2004).

example, using performance benchmarks provides an incentive for the CEO to influence the benchmark setting process in order to reduce the level of effort needed to satisfy the compensation contract. Granting executive option's provides an incentive for the CEO to encourage investment into risky projects (Wright, 2005) or backdate options (Lie, 2005) thereby increasing the value of the option contract. Given the prevalence of agency problems, the question of how to structure CEO compensation contracts has been given significant attention in the academic literature.

As different compensation structures give the CEO incentives to focus effort on different issues, firms have the opportunity to customise the CEO's compensation to minimise agency costs. Consistent with agency theory predictions, empirical evidence suggests that the underlying characteristics of the firm determine the efficiency of different CEO compensation contracts (Core, Holthausen, Larcker, 1999; Wright, 2005). For example, firms place greater emphasis on options over cash compensation where the firm is cash constrained or where there is favourable accounting treatment of option grants (Core, Guay and Larcker, 2003; Matolcsy and Wright, 2006). Also, firms with weaker governance structures are exposed to higher agency cost including opportunistic actions by the executives, such as greater CEO compensation and lower firm performance (Core *et al*, 1999). Where monitoring of the CEO is difficult, firms are more likely to offer options as a bonding mechanism, reducing the need for direct monitoring (Wright, 2005). On the other hand, firms also re-adjust CEO equity incentives toward efficient levels as firm characteristics change over time (Core and Guay, 1999). In summary, the empirical evidence suggests that CEO compensation contracts are influenced by the benefits to the firm from the specific incentives induced by the contracts, the relative cost of the contract, the

prevalence of agency problems and the relative substitutability of monitoring over bonding (Core, Guay and Larcker, 2003).

However, the above literature has focused on the CEO and has paid limited attention to the agency problems associated with senior executives below the CEO level. While the CEO is held to be ultimately accountable, in the modern corporation the management function typically rests with a senior executive team.[11] Accordingly, the issue of how compensation schemes for senior executive teams are structured to minimise agency costs is an import topic that requires address.

Agency Theory and Senior Executive Compensation Schemes

The agency problems arising with respect to the CEO extend' to the senior executives more generally. Problematically, the agency problems associated with separation of ownership and control are further increased by delegation of decision making to various levels of management within the firm (Jensen and Meckling, 1992). The reasons for the existence of delegated decision-making in firms provide insight into the agency problems associated with the senior executives below the CEO level (Jensen and Meckling, 1992; Christie, Joye and Watts, 2003). As people have physical limits to the amount of knowledge storage and information processing capacity they are unable to process limitless information efficiently (March and Simon, 1958; Simon, 1955; 1959).[12] This gives rise to decentralised decision-making because it is not efficient to assign all decisions in the firm to the CEO because the CEO lacks the knowledge required and

[11] For example, in the failed company HIH, it was '*common for monument decisions to be made on a collective or collegiate basis, or at least after interaction with other managers*' (Corporations and Markets Advisory Committee, 2005)

[12] This concept was developed by Simon (1955, 1959) and March and Simon (1958) and labelled Bounded Rationality. Bounded Rationality has been studied in a variety of contexts in both the management and psychological literature (Gigerenzer and Selten, 1999).

the information processing capacity to make all decisions in the firm efficiently (Jensen and Meckling, 1992; Christie, Joye and Watts, 2003). [13]

Efficient delegation of decision-making occurs where decision making is distributed among the executives who have the requisite specialist knowledge and incentives to make decisions in the interests of shareholders (Christie *et al*, 2003). Agency costs arise where executives with decision rights make poor decisions because they do not have the requisite knowledge. These costs can be reduced by transferring knowledge to the decision makers or by decentralising decision rights to those with the requisite knowledge (Christie *et al*, 2003). Further agency costs arise when those having the specialist knowledge do not exercising those decision rights optimally. The prevalence of agency problems at the level below the CEO induces firms to employ bonding and monitoring mechanisms to reduce these agency costs.

Where decision making is delegated to lower level executives, the ability of the board of directors and CEO to effectively monitor those executives is greatly diminished because of information asymmetries. Where monitoring is impaired, the issue of what type of compensation scheme that reduces these agency costs is of paramount importance. Compensation schemes may be designed to encourage goal congruence between the senior executives and the CEO or between the senior executives and shareholders or generally within the executive team (e.g. group compensation scheme) in an effort to reduce agency costs. Although Jensen and Meckling (1992) argue that individual or group compensation schemes may be efficient to minimise these agency problems within the firm, as yet the circumstances where these schemes would be appropriate for senior executives has not been investigated.[14] As it is likely that some firms

[13] In an economy wide context, the alienability of ownership and decision rights solves problems associated with a centralised economy by means of the price mechanism and capital markets (Jensen and Meckling, 1992).
[14] Individual compensation schemes include: individual performance evaluation schemes (Bushman, Indjejikian and Smith, 1996), schemes where the senior executive team members do not have the same performance measures as

choose elements of both schemes (Bushman and Smith, 2001), where this study refers to a firm having a compensation scheme (group or individual), it is where that compensation scheme is the one predominantly relied on for the senior executives. [15]

Senior executives compensation where individual effort is observable

The economics literature (Holmstrom, 1979; Alchian and Demsetz, 1972) provides insight into the circumstances where individual compensation schemes may be efficient for senior executives at the level below the CEO. Information economics has investigated the conditions under which contracting on measures that reflect individual effort (input) is efficient over contracting on output alone (Holmstrom, 1979).[16] Holmstrom (1979) proposes the 'informativeness principle', in cases where measures of performance provide information about executive effort are obtainable efficiently, those performance measures should be included in compensation schemes.

The CEO compensation literature supports the validity of the informativeness principle. Separable measures of output are easily identified as the CEO is responsible for the entire entity. The question becomes that of the efficiency of different measures of CEO output in capturing CEO input (Ittner, Lambert and Larcker, 2003). For example, the efficiency of accounting versus stock price in capturing CEO effort has been investigated (Bushman and Smith, 2001).

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each other or tournament incentive schemes (Lazear and Rosen, 1981). Group compensation schemes exist where each executive's compensation is not independent of compensation for other senior executives. Included in group compensation schemes are: profit sharing schemes or schemes where the senior executive team is paid using common performance measures or structures (Bushman, Indjejikian and Smith, 1995; Bushman and Smith, 2001).

[15] See appendix one for an example of this.

[16] In firms characterised by separation of ownership and control, the owners of the firm can diversify their risk by holding a portfolio. Problematically, when firms contract with an agent on output alone, the agent bears 100% of the risk and will demand a high payoff to compensate for the extra risk. It is efficient for firms to design compensation schemes that contain other measures of executive effort to reduce the level of compensation tied to output alone. By reducing the level of output related compensation risk, firms reduce the risk premium demanded by senior executives (Holmstrom, 1979).

However, the efficiency of different performance measures for executives below the CEO is problematic due to a lack of separable measures of output.

When an executive's output is separable from other executives, individual compensation may be efficient because where an individual's effort (input) and related output of a task are separable, they are also observable (Alchian and Demsetz, 1972).[17] It is efficient for the principal to contract on that individual's output where that output provides information about the individual's effort. The principal can also contract on the individual's inputs because there are performance measures that are separable to that individual which reflect individual effort. Rewards can then distributed to executives who are responsible for the output or based on observed input.

The informativeness principle suggests that individual compensation schemes are more appropriate for the senior executives in firms where there are separable measures of output. This is not an issue where the firm is comprised of discrete business units, and decision rights are allocated to the business unit executives. In these firms, decisions are assigned to the executives who have the specialised knowledge necessary to manage the discrete business unit and as such business unit performance will be informative about the individual executive's effort (Christie *et al*, 2003). Individual compensation schemes are efficient for the senior executives in firms with discrete business units because business unit performance measures are more informative about the senior executive's effort than aggregate firm performance.[18] Accordingly:

[17] Separable in this context means that the output of an executive's effort is distinguishable from the output of effort by other executives.

[18] This proposition is consistent with findings by Bushman *et al* (1995) and Keating (1997) who consider individual versus aggregate performance evaluation for divisional managers. This study extends Bushman *et al* (1995) and Keating (1997) by investigating executives above the divisional manager level and by considering firms beyond those with a divisional structure only.

H_1: Firms adopt individual compensation schemes for the senior executives where their inputs and outputs are separable and observable.

Senior executives compensation where measures of individual effort are not observable

However, establishing compensation schemes for integrated firms is problematic, as unlike CEOs, measures of performance for individual senior executives are not readily observable. In these circumstances any performance measure is impacted by a number of factors, including cost allocations or transfer pricing, and the efforts of other senior executives. Furthermore, this may encourage free riding problems, where executives provide less effort to group tasks, whist receiving rewards linked to group performance.

Insights into the nature of the free riding problem, and its resolution are provided by Holmstrom (1979; 1982) and Alchian and Demsetz (1972). Free riding (shirking) is a problem in joint production environments where executives' efforts (input) are related and output is not separable to individual executives. This circumstance results in a lack of observability of individual effort, making pay-performance contracts difficult to specify or enforce. This reduces any positive motivation to increase effort and provides an incentive to shirk because it is difficult to detect whether the executive is putting in sufficient effort. Alchian and Demsetz (1972) and Holmstrom (1982) further propose that free riding is a necessary response to firm integration, especially in large groups where the shared output relative to each individual's input effort decreases. Their solution to the free riding problem involves increasing the level of costly monitoring and bonding, such as increased management or provision of residual claims on ownership.[19]

[19] Offering diluted residual claims also induces agents to shirk, reducing the efficiency of this solution (Jensen and Meckling, 1976)

However, there are three reasons why the free riding cost may not necessarily outweigh the benefits of group compensation for senior executives' in integrated firms. First, group compensation schemes provide an incentive for mutual monitoring because each executive's payoffs are related to other executives' efforts. If one executive shirks, other executives have an incentive and legitimacy to monitor and discipline the free rider in order to increase the value of their own compensation claim (Fama and Jensen, 1983).[20] Second, the board of directors or the CEO can take actions to reduce the free rider problem such as adjusting the size of the senior executive team. Alternatively, the firm could also purchase greater monitoring to detect shirking in large executive teams who do have a group compensation scheme. In support of these arguments, the existence of partnerships provides evidence of the efficiency of group compensation schemes in some cases (Kendel and Lazear, 1992).

The third reason why the use of group compensation schemes may not be inefficient in integrated firms is because group compensation schemes provide an incentive for executive team members to engage in co-operative behaviour to increase group performance because a reward is received contingent on satisfying a common goal (Autry, 2005). Group compensation schemes also produce an incentive for executives to increase effort on knowledge sharing and group innovation where doing so is likely to increase group performance (Wruck and Jensen, 1994; Drake, Haka and Ravenscroft, 1999).[21] These incentives have been identified in the management

[20] The mutual monitoring of fellow executives may be more efficient than other monitoring mechanisms, contingent on the proximity and intimate knowledge of the firm held by senior executives relative to the board of directors and shareholders.

[21] Porter (1996) argues that integration efficiencies (synergies) resulting from co-ordinated effort to reduce cost, share knowledge and implement strategies are a necessary condition for firms to face competition. Other writers who consider 'fit' to be essential to sustainable competitive advantage include Chandler (1962), Miles and Snow (1978), Mintzberg (1979), Beer (1980), Nadler and Tushman (1988) and Beer, Voelpel, Leibold and Tekie (2005).

and management accounting literature (Hamilton, Nickerson and Owan, 2003; Kandel and Lazear, 1992; Weiss, 1987).[22]

On the other hand, individual compensation schemes provide an incentive for executives to act in self interest and expend effort on achieving individual or fractional goals. The effort expended on individual goals rather than common goals is at the expense of effort on collaboration and co-ordination (Wruck and Jensen, 1994; Hambrick, 1995; Main, O'Reilly and Wade, 1993; Carpenter and Sanders, 2004).[23] Further, under an individual compensation scheme, executives also have an incentive to inflate the value of their contribution to any joint production process whilst minimizing the contribution of others, reducing the observability of individual executive efforts. The incentives induced by a group compensation scheme suggest that a group compensation scheme is an alternative to an individual compensation scheme in a joint production environment.

The above discussion suggests that where senior executives' efforts are related (interdependent), group compensation schemes are more efficient than individual compensation schemes. This suggests that in integrated firms, where senior executives' efforts are interdependent and there are benefits to the firm from senior executive team co-operation, group

[22] Extant empirical evidence suggests that group compensation is an efficient contracting choice over individual compensation schemes in some cases (Kandel and Lazear, 1992; Hambrick, 1995; Drake, Haka and Ravenscroft, 1999; Hamilton, Nickerson and Owan, 2003). Although these studies provide empirical evidence that using group compensation is not necessarily inefficient because of the free-rider effect, it is not clear whether the findings from these studies are generalizable to senior executive teams. See appendix two for a brief summary of these studies.

[23] At the level of employees, Drago and Garvey (1997) show that individual compensation schemes lead to a decrease in co-operative behaviour. However they fail to find a positive relation between profit sharing and a measure of helping efforts. Further, the budgeting literature identifies a number of agency costs where executives act in self interest to achieve individual goals, such as the problems of political game playing (Merchant and Van der Stede, 2003). This includes putting slack into the budget among other things. For example, if a firm is considering building a new factory, executives may play political games to have the factory built within their own territory or in another's territory based on the impact on their own performance evaluation. Under a group compensation scheme, executives have an incentive to locate the factory in the most efficient location leading to achievement of group performance targets.

compensation may reduce some of the agency costs associated with discongruence within the senior executive team. Accordingly:

H_2: Firms adopt group compensation schemes for the senior executives the greater the level of firm integration.

3 Data and Research Design

3.1 Data and sample selection

The sample is taken from all firms on the S&P All Ordinaries index (Top 500) between 2003 and 2005 (the preliminary evidence presented in this paper is a subset of these firms where data is currently available). Table one panel A shows the sample selection process. Financial services firms and trusts are excluded because they are subject to different reporting and corporate governance requirements. The distinct economic characteristics of these companies may confound statistical tests. Firms are also excluded where data was not available for statistical tests. Firms with annual reports in foreign currency were also excluded for comparability reasons. The final sample is made up of 640 firm years. A breakdown of the industries for the sample firms is provided in table one panel B.

INSERT TABLE ONE

Executive compensation and corporate governance data is drawn from the UTS – Accenture Who Governs Australia database where available and hand collected where necessary directly from annual reports. Financial data was collected from Aspect – Huntly databases.

3.2 Research Design

The firm characteristics that are expected to be related to either group or individual compensation schemes are analysed first by univariate and then multivariate tests. For univariate testing, the sample is split into two groups. Univariate tests are used to test whether firm characteristics differ on average between the group compensation scheme and individual compensation scheme groups. As normality of distribution is not known, both the t-test and the Mann-Whitney U test are used to test for differences in means. The Levens's test is used to test for differences in variance between the firm characteristics of each group.

Multivariate tests are used to control for co-linearity between the independent variables. Three different left hand side variables are estimated to proxy for the extent to which executives receive predominantly group or individual compensation. As the left hand side proxy is categorical, a cross sectional Logit model is used to test for association between firm characteristics and compensation scheme (Wright, 2005). A value of zero is given to firms classified as having predominantly an individual compensation scheme and a value of one is given to firms classified as having predominantly a group compensation scheme.

3.3 Variable specification

3.3.1 Defining group and individual compensation schemes

In testing hypothesises, a measure of group and individual compensation schemes is needed. There are inherent problems in classifying different types of compensation schemes using publicly available data because annual reports do not consistently disclose the specifics of

incentive schemes, only the amounts and categories actually paid.[24] As firms do not disclose whether they have predominantly a group or individual compensation scheme, it is necessary to develop a method to classify the type of compensation scheme used.[25] Three methods are developed in this study to identify which compensation scheme is predominantly used for the senior executives.[26] Table two contains a summary of the variables.

Method 1: Variation between executives in compensation level changes

The first measure involves comparing the relative change in compensation for the senior executives between periods. The percentage change in total compensation is measured for each senior executive disclosed, excluding the CEO. The changes in total compensation for the executives are then compared to other members of the executive team to provide a measure of the extent to which senior executives' compensation is related. Firms with large variation between members of the senior executive team indicate dispersed performance evaluation

[24] For example, Bridgestone Australia Ltd (BDS, 2004) disclose that for the Specified Executives *'remuneration packages are reviewed with due regard to performance of the individuals and other relevant factors'*. Therefore individual performance is important in setting executives remuneration, with other factors also considered. On the other hand, Adelaide Brighton Ltd (ABC, 2005) require common performance targets to be met before any short term or long term incentive compensation is awarded to the Senior executives. A Profit Before Tax hurdle must be reached for short term incentives to be awarded. A total shareholder return and / or an earnings per share hurdle must be reached for long term compensation to be awarded. The Annul Report also specifies that *'participation in the LTI arrangements is only offered to the Managing Director and senior executives who are able to influence the generation of shareholder wealth and thus have a direct impact on the Group's performance against the relevant performance hurdles.'*

[25] For example, Argo Investments Limited discloses that 30% of senior executives' short term bonus is group compensation. As expected, four out of the top five executives were paid a cash bonus in 2004 and 2005. Ausmelt Limited report that short term bonuses are paid out of a bonus pool established upon achievement of a company wide performance target. The pool is distributed based upon individual performance evaluation. No executives received a cash bonus or were granted options in 2005.

[26] Extant literature does not provide a publicly available empirical proxy for group types of compensation schemes. Keating (1997) used a survey to collect division managers perceptions on the extent to which various performance measures were used by their supervisors to evaluate their performance. Bushman *et al* (1995) uses proprietary survey data obtained from Hewitt Associates LLC. Bushman *et al* (1995) unit of analysis is individual Group CEO, Division CEO or Plant managers and uses their perception of the average proportion of above level and at their level information used to evaluate the average manager at their level. Drake *et al* (1999) us a self constructed profit share scheme versus individual piece rate scheme in there experiment. Hamilton *et al* (2003) case company uses a group output piece rate versus and individual piece rate scheme. Despite the lack of a publicly available empirical proxy for a general group or individual compensation scheme, it is possible to ex post asses the variation between senior executives compensation from annual report disclosures.

structures; firms with smaller percentage changes between members are evidence of closer performance evaluation structures. Closer performance evaluation structures are consistent with groups of executives being remunerated on common performance measures (group compensation scheme). Divergent performance evaluation structures are consistent with executives being rewarded under an individual, rather than group compensation schemes.

Firms are ranked in terms of variation between the executives in total compensation changes. Group versus individual compensation scheme companies are estimated by splitting the sample at the median, with the fifty percent with the least (greatest) variation between executives labelled as group (individual) compensation scheme firms. To reduce the inherent error in estimating compensation scheme type, hypothesis tests are also conducted excluding the middle thirty three percent of firms.

Method 2: Common compensation structure

Firms are considered as having predominantly a group compensation scheme in place where the majority of executives, excluding the CEO, receive the same compensation type (cash bonus and / or equity / long term compensation). As most firms disclose compensation details for at least four senior executives, a group compensation scheme is considered to be where at least 75% of the total number disclosed receive the same type of compensation payments (further 75% is the median level of variation). This allow for the case where an executive is not covered by the group compensation scheme for part of the year. The individual compensation scheme group is classified where less than 75% of executive receive the same compensation type. A

value of zero is assigned to firms with an individual compensation scheme and a value of one is assigned to the firms with predominantly a group compensation scheme.[27]

Method 3: Variation in incentive compensation level

The third measure involves comparing the percentage of total incentive compensation (cash bonus and / or equity / long term compensation) relative to base pay between senior executives. As with Method one, the greater the similarity between executives, the more (less) likely there is a group (individual) compensations scheme. Sensitivity testing using the relative proportion of different components of incentive compensation (short term versus long term components) is conducted to increase the robustness of results.

Firms are ranked in terms of the variation between executives relative proportion of incentive compensation to base pay. Group versus individual compensation scheme companies are estimated by splitting the sample at the median, with the fifty percent with the least (greatest) variation between executives labelled as group (individual) compensation scheme firms. To reduce the inherent error in estimating compensation scheme type, hypothesis tests are also conducted excluding the middle thirty three percent of firms.

INSERT TABLE TWO

[27] To increase the validity of this proxy, sensitivity test are performed where the cut-off for the individual compensation scheme is 63 instead of 75% and the group compensation scheme cut-off is maintained at 75%. In this sensitivity test the 63 to 75% group is excluded.

3.3.2 Experimental variables

As discussed in section two, there are a number of characteristics of the firm that are likely to determine in which cases a group or an individual compensation scheme is more appropriate. Direct tests of hypothesis one and two are related to the extent that the separability and observability of senior executives' inputs and outputs is associated with the level of firm integration. This is because the concept of group versus individual compensation is a dichotomy. Proxies developed to test each hypothesis differ to allow for identification of the different factors associated with the choice of compensation scheme. The separability and observability of senior executives' inputs and outputs is estimated using the level of industry and geographic segmentation. The level of firm integration is estimated using segment interdependencies, level of capital expenditure and functional senior executive team structure. The following section develops these firm characteristics and specifies empirical proxies. Table three contains a summary of the firm characteristics and the predicted signs.

Hypothesis one: Independent variables

Industry and geographic segmentation

Firms that pursue a diversification strategy by entering a variety of industries need senior executives who specialize in those industries. Further, firms that diversify into different geographic segments, such as multinational firms, also need executives with specialized knowledge of the different segments. The effort exerted by the specialist executives is directed toward the industry or geographic segment they specialize in and the output of those executives is separable to that segment (relative to executives who contribute to multiple segments). Therefore, applying the Holmstrom (1979) informativeness principle and Alchian and Demsetz

(1972) separability of input and output proposition, it is efficient to compensate the senior executives of diversified firms using individual compensation to the extent that individual executive's input to each segment can be separated.[28] There are two studies that do consider the relation between firm diversification strategy and compensation structure at the divisional manager level (Bushman *et al*, 1995; Keating, 1997). Although these studies are consistent with the theory development above, they do not address senior executive compensation at the level just below the CEO. Further, both these studies are limited to a sample of multi divisional firm, which reduces the generalizability of results.

Australian publicly listed firms are required to make detailed geographic and industry segment disclosures, based upon the internal reporting used by the firm.[29] Thus segment reporting reflects how the company is organised and managed. The reporting of segments that differ in terms of risk and rewards (AASB 1005) allows insight into the extent of a firm's diversification strategy. The method adopted in this study to proxy for the level of industry and geographic diversification is the number of industry or geographic segments disclosed. The log of the number of segments is used as it provides a closer match with a normal distribution so as not to violate regression assumptions.

[28] For example, a mining firm who diversifies into information technology would need among the senior executives some who are experts in mining and some who are experts in technology. The experts in mining would be compensated predominantly on the performance of the mining segment. It would be counterintuitive to pay the experts in mining on the performance of the information technology segment. On the other hand, an Australian firm who diversifies to Japan would need senior executive decision makers who know the Japanese market and who can make judgments about risks and returns to the investment. They would also need to know Japanese customs and culture to adequately assess the divisional, plant and other managers in the Japanese segment. It would be efficient to contract with the senior executive team member who specialised in Japanese business, based upon the performance of the Japanese segment.

[29] According to AASB 1005 (2003) the preparation of segment disclosures first involves '*identifying business and geographical segments based on internally reported information*' and secondly determining the materiality of those segment (Eddy, Arthur and Knapp, 2001).

Hypothesis two: Independent variables

Segment interdependencies

Many firms that have separate industry and geographic segments also have segment interdependencies (Bushman *et al*, 1995). Segment interdependencies arise where the business segments are related, allowing for synergies such as transfer of knowledge and resources between segments. Further, as the level of interdependencies increases, the level of separability of effort (input) and output of those responsible for managing the segments decreases (Bushmen *et al*, 1995).[30] Also, under a group compensation scheme, executives have an incentive to realise and extend inter-segment synergies. On the other hand, under an individual compensation scheme, executives have an incentive to limit effort spill-over's and exert less effort toward co-operation with other segment executives. Furthermore, as interdependencies increase, the separability of segment performance to individual executives decreases, reducing the precision of individual performance evaluation. Therefore, the greater the interdependencies between business segments, the more efficient group compensation schemes are relative to individual compensation schemes for the senior executives.

Two measures of interdependence between segments are used in this study; the percentage of inter-segment assets eliminated on consolidation and the proportion of assets allocated to a central management function.

[30] Keating (1997) and Bushman, Indjejikian and Smith (1995) find a positive association between the level of weight placed on group relative to individual compensation for division managers and interdependence between divisions. Both of these studies are limited in their generalizability because they both focus on firms organized around divisions. Bushman *et al* (1995) and Keating (1997) is also limited to divisional manager compensation, limiting the generalizability to senior executives. This study extends Bushman *et al* (1995) and Keating (1997) in two main ways. First, this study increased the generalizablilty and importance of their findings by placing the contracting problem of manger interdependencies in the broader context of senior executives. This study also increases the generalizabilty of their results by studying a wider range of firms by addressing firms beyond those with division structure only. Secondly, this study draws on a broader theory base in developing predictions allowing predictions about factors beyond inter-segment sales between divisions.

Percentage of inter-segment assets

A proxy for interdependence between industry segments is the proportion of inter-segment asset eliminated on consolidation to total assets. This proxy is consistent with Bushman *et al* (1995) who used the level of inter-segment sales eliminated on consolidation as a proxy for intra-segment interdependencies in their study of divisional managers. Although elimination assets are used in this study because of transfer pricing issues associated with elimination sales, elimination sales are replicated in the sensitivity analysis. The larger of industry or geographic inter-segment asset eliminations is used as the firm level of inter-segment interdependence.

Proportion of assets allocated to a central management function

Another measure of inter-segment integration is the size of a firms central management function (head office). The logic behind this measure is that where a firm has a co-ordination mechanism such as a head office, it indicates there is a need for integration across departments or divisions. The size of a firm's central management function is measured as the proportion of assets specifically allocated to a central management function (head office) to total assets in the annual report primary segment disclosure note.

Where a firm has assets allocated to individual geographic and industry segments, then the firm separates input and output based on segment performance. In cases where assets are allocated to the central management function, separability of input and output diminishes as senior executives become involved across several industry segments. As the level of assets allocated to the central management function increases, there would be increasing difficulty in separating the contribution to input and related output of individual senior executives, making group compensation efficient relative to individual compensation schemes.

Level of capital expenditure

There are two reasons why group compensation schemes are efficient for firms with large capital expenditures. First, larger capital budgeting decisions are likely to benefit from increased co-operation and information sharing between senior executives during the decision-making stage. This is because large capital expenditures are an indication that important decisions, essential to the firm's competitive advantage and subsequent performance have been made, suggesting increased senior executive team involvement (Henderson and Fredrickson, 1996). Capital investment decisions often involve non-routine decisions requiring increased information sharing between decision makers (Henderson and Fredrickson, 1996) and a need for co-ordinated effort in evaluating the available investment opportunity set.[31] Therefore, a compensation scheme that encourages increased information sharing and co-ordination between senior executives may be efficient. Group compensation schemes are more likely to be appropriate where the senior executive teams are involved in making large capital budgeting decisions that are going to impact overall firm performance because of the greater agency costs of suboptimal decision making.[32]

The second reason group compensation is likely to be efficient for firm's with large capital investment is because of a need for integration between individual executives in the implementation stage. The implementation of large capital investments is likely to increase senior executives' interdependencies through increased co-ordination needs throughout the firm.

[31] For example, Chalos and Poon (2000) in a survey of 55 capital budgeting teams found that capital budgeting '*team performance improved significantly as information sharing increased*'. Unfortunately this study did not specifically investigate senior executive teams.

[32] It is also likely that use of group compensation over individual compensation schemes may reduce some of the dysfunctional behaviour and inefficient decision making associated with capital budgeting decisions as identified in the capital budgeting literature (Merchant and Van der Stede, 2003).

This is because capital expenditures require vertical co-ordination along the supply chain as new technologies and processes are integrated (Fry, 1982; Michel and Hambrick, 1992; Thompson, 1967). The need to integrate large capital investments increases the importance of co-operation in sharing knowledge, resources and skills between the senior executive team and different parts of the organization (Wood, 1986; Henderson and Fredrickson, 1996). These factors suggest that group compensation schemes will be efficient the greater the level of capital expenditure because of the need for integration and the positive benefits to the firm from increased co-operation between senior executives.[33]

The measure used to approximate the level of CAPEX is the change in total assets divided by total assets (Henderson and Fredrickson, 1996).

It is important to note that the overall level of integration of senor executive effort demanded by large capital investments will be heavily influenced by level of firm diversification. Where a firm is involved in only one industry segment, there is likely to be a greater demand for integration within the senior executive team relative to the case where the same level of investment is separable to several unrelated industry segments. Consistent with this, CAPEX is interacted with INDSEG to assess whether increasing industry diversification dilutes the efficiency of group compensation schemes for firms with large CAPEX.

Functional structure

Firms that are organised around a functional structure, rather than divisional, are more likely to have joint decision making within the senior executive team. Where firms are organised

[33] For example, during a capital budgeting meeting involving integrated decision making, one executive may come up with a suggestion for a strategic acquisition, another executive may provide the technical knowledge to plan the strategy, another executive provides market knowledge and another executive may provides technical knowledge. The output of the new strategy is reflected in total firm performance. The overall output of the management process in this case is not separable, despite the inputs being somewhat observable.

around functional lines there is a need for the executives to share knowledge necessary for efficient decision making. Much knowledge and firm specific technology such as market trends, innovations in production and distribution and forecast data is distributed among different functional divisions. Members of the senior executive team will benefit from joint decision making where functional executives contribute their specialized knowledge. If using group compensation increases the effectiveness of integrated decision making through increased incentives to cooperate, then group compensation schemes will be efficient for firms organised around a functional organisational structure. On the other hand, individual compensation schemes provide incentives for rational senior executives to contribute to joint decision only to the extent that is necessary to satisfy the individual compensation scheme.

The measure used to estimate functional structure is based on the proportion of functional senior executives disclosed in the annual report. The variable is calculated as number of senior executives whose title disclosed in the annual report identifies them as functional manager, divided by total executives. For example, if a company has a CFO, CIO, Marketing executive and two executives of discrete business units, the variable would be 60%. This is because the CFO and CIO and Marketing managers are generally heads of large functional departments such as finance, information technology or marketing.

INSERT TABLE THREE

3.3.3 Control Variables

There are a number of other factors that may explain variation in compensation scheme choice that may be co-related with the independent variables. These control factors are included in the multivariate tests.

Firm size

As a firm's internal structure becomes more complicated, there is likely a change in management structure. However larger firms also have other properties that extend beyond firm complexity, making it a noisy measure. For example, firm size has been used as a proxy for political costs, growth and investment opportunities and difficulty in direct monitoring by the board of directors (Watts and Zimmerman, 1986; Gaver and Gaver, 1993; Smith and Watts, 1992; Eaton and Rosen, 1983; Bushman, Indjejikian and Smith, 1996). Firm size is measured as the natural log of market capitalization.

Industry

Industry is associated with variation in compensation structure (Murphy, 1999). It is expected that because different industries have different economic characteristics there will be a relation between industry type and executive compensation scheme. Industry dummies are used to capture industry variation.

3.3.4 Model specification and summary

Equation one specifies the model and control variables. As the purpose of this model is to test the association between compensation contract choice and firm characteristics, unless specified in the model, RHS variables for are taken from the previous year.

$$\begin{aligned} SCHEME_{it} = {} & \alpha_0 + \alpha_1 GEOSEG_{i,t-1} + \alpha_2 INDSEG_{i,t-1} \\ & + \alpha_3 INTAS_{i,t-1} + \alpha_4 HOASSET_{i,t-1} + \alpha_5 CAPEX_{i,t} + \alpha_6 FUNKST_{i,t} \\ & + \alpha_6 SIZE_{i,t-1} + \alpha_n Industry_i + \alpha_n Year_i + \varepsilon_{i,t} \end{aligned} \quad 1$$

GEOSEG = Level of geographic diversification is the Log of the sum of the number of geographic segments disclosed in the notes to the annual report.

INDSEG = Level of industry diversification is measured using the same method as GEOSEG using the industry segment disclosure.

INTAS = Interdependencies related to inter-segment sharing or transfer of assets is measured using the greater of geographic or industry segment assets eliminated on consolidation. The measure is the log of the proportion of inter-segment assets to total assets.

HOASSET = Interdependencies related to centralised management structure is measured using the proportion of assets specifically allocated to a central management function (head office) in the primary segment disclosure to total assets.

CAPEX = Level of capital expenditure is measured by dividing the change in total assets by opening total assets.

FUNCST = Functional Structure is measured by the number of functional executives on the executive team divided by total senior executives. Functional executives are those where the annual report identifies them as having functional responsibility such as being responsible for functional departments such as marketing, finance or research and development. Functional executives do not include divisional executive who are in charge of integrated business units.

SIZE = Firm Size is measured using the log of market capitalization

INDUSTRY = Dummy variable for each industry

YEAR = Dummy variable for each year

4 Results and discussion

The following results are preliminary and are limited to firm years where data availability permits. As such, the following section is limited in generalizability so should be interpreted with caution.

4.1 Descriptive statistics

Tables four and five panel A reveals that the sample size for these preliminary statistics is reduced by limited data availability.[34] As this study is incomplete, data collection and transformation is not complete, limiting the preliminary results here reported. For example, compensation to enable estimation of compensation scheme using method two is limited to 520firm years and data on the number of industry segments is collected for 610 firm years, whereas the functional structure variable is only available for 150 firm years at this stage. Panel

[34] Data for the complete sample will be collected and analyzed as part of this research project.

B shows that the sample firms are from a range different industries with the largest representation from industrials firms, making up 37.7% of the sample firm years. Data has been Winsorised to reduce the influence of outliers on reported results.

Analysis of the dependent variables reveals that although each of the three methods are correlated, there are differences. To reduce the inherent imprecision in method one and three, the middle thirty three percent of observations have been removed for correlation analysis. All methods are positively correlated, although the level of correlation in method two is relatively low (see table five panel c). This is consistent with there being different factors influencing the setting of compensation structure as apposed to setting compensation levels (Wright, 2005). The level of correlation between method one and three is higher, the data also suggests that different factors influence the setting of total compensation as apposed to the level of incentive compensation. Although these are interesting empirical findings, it is beyond the scope of this paper to investigate the different factors contributing to the variation between the three methods.

Although the correlations in table five panel B are generally consistent with the theory development, there is a surprising result. The existence of a group compensation scheme (method two) is positively associated with firm size (0.171, p. <.001), and level of inter-segment assets (0.112, p. <0.10). Contrary to expectations, group compensation schemes are also positively related to the level of industry diversification (0.75, p. <0.10).

The level of diversification (both industry and geographic) is negatively associated with the level of capital expenditure (-0.082, p. <001 and -0.145, p. <05 respectively). GEOSEG is negatively associated with FUNCST (-.284, p. 0.001) and positively associated with INDSEG (0.174, p. <0.001). INTAS is negatively associated with GEOSEG (-0.132, p. <0.05) but positively associated with INDSEG (0.274, p. <0.001). The existence of multiple correlations

between the independent variable may introduce a multicollinearity problem.[35] Although these correlations will bias against finding a result, collinearly diagnostics show that the VIF factor is less than 1.58 for all variables in model one (using OLS), suggesting that although collinearity is present, the level of collinearity is not likely to disturb the direction of coefficients in a regression estimation model.

INSERT TABLE FOUR

INSERT TABLE FIVE

4.2 Univariate tests

Univariate test do support hypothesis one where group versus individual compensation is estimated using method one and three (see table six). However hypothesis one is not supported using method two. As reported in table six panel A and C, for method one and three, industry is significantly higher for firms identified as having predominantly an individual compensation scheme. However, the level of geographic segmentation is only significantly higher for individual compensation scheme firms when measured using method two. Where compensation scheme choice is estimated using method two, both industry and geographic segmentation is lower for firms identified as having predominantly an individual compensation scheme. Although the geographic segmentation mean is not significantly different, the variance is at the 10% level. The level of industry diversification is significantly lower in both parametric and non parametric tests.

[35] As all correlations are below 0.8, it is unlikely that the multicollinearity bias is material (Hinton, Brownlow, McMurray and Cozens, 2004, p. 323)

Univariate tests are supportive of hypothesis two. The mean level of CAPEX, INTAS, HOASSET and FUNCST are all greater for group compensation scheme companies, as predicted. With the exception of FUNCST, they are significantly different, either in variance or mean values (albeit at the 10% level for CAPEX and HOASSET). However FUNCST is not significantly different in any of the univariate tests. To the extent that CAPEX, INTAS, HOASSET capture the separability of senior executive input output, they provide indirect evidence in support of hypothesis one.

INSERT TABLE SIX

4.3 Multivariate tests

These results need to be considered with caution as the sample size is reduced considerably because data for the full sample has not been collected (n. of 91). As the industry dummies are not significant in any of the regressions, results are not reported.

Method one has been used to estimate the left hand side variable for all models in table seven panel A. All models are significant (Hosmer and Lemeshow goodness of fit test greater than 0.05) and have explanatory power (Nagelkerke R Square between 0.111 and 0.531). Consistent with univariate tests, table seven panel A provides evidence in support for both hypothesis one and two as that INDSEG and FUNCST are consistently significant and in the predicted direction. However, GEOSEG, INTAS, HOASSET and CAPEX are not significant or in the direction predicted.

Method two has been used to estimate the left hand side variable for all models in table seven panel B. All models are significant (Hosmer and Lemeshow goodness of fit test greater

than 0.05) and have explanatory power (Nagelkerke R Square between 0.136 and 0.389). Consistent with univariate tests, preliminary results from multivariate tests do not support hypothesis one. The level of industry and geographic segmentation is consistently in the opposite direction to that predicted. It is also significant at the 10% level (two tailed) in model two when the interaction between INDSEG and CAPEX is controlled for. Preliminary multivariate tests do provide support for hypothesis two. INTAS, HOASSET and CAPEX are all in the predicted direction and consistently significant in at least three out of the four Logit regressions. The reason CAPEX is not significant in model one may be because of the sample size reducing the power of the test and because the interaction between INDSEG and CAPEX was not controlled for. As with the univariate tests, FUNCST is not significant in any models. Also, to the extent that CAPEX, INTAS, HOASSET capture the separability of senior executive input output, they provide indirect evidence in support of hypothesis one.

Method three has been used to estimate the left hand side variable for all models in table seven panel C. All models are significant (Hosmer and Lemeshow goodness of fit test greater than 0.05) and have explanatory power (Nagelkerke R Square between 0.095 and 0.571). Consistent with univariate tests and method one, table seven panel A provides evidence in support for both hypothesis one and two as INDSEG and FUNCST are consistently significant and in the predicted direction. However, GEOSEG, INTAS, HOASSET and CAPEX are not significant or in the direction predicted.

INSERT TABLE SEVEN

These preliminary findings suggests that it is the potential for synergies between senior executives in integrated firms, rather than the observability of senior executive inputs and output as captured by the level of industry and geographic diversification or FUNCST, that is the determining factor in whether firms chose individual or group compensation schemes for the senior executives.

4.4 Sensitivity analysis

As the model developed includes variables that have been untested in the context of the hypothesises, a number of different specifications are developed to increase the robustness of the results. Because this study is incomplete, sensitivity analysis is specified but not reported. The classification of group versus individual compensation scheme groups is subject to sensitivity. Hypothesises are retested using different specification of the cut off for identifying group and individual compensation scheme firms for all methods. For example, for Method two, 63% as apposed to 75% commonality is used to differentiate those firms who use predominantly group or individual compensation schemes. Further, the sample is also split into three groups and the firm characteristics are compared excluding the middle group, where it is difficult to determine the compensation scheme in place.

Alternative specifications for the right hand side variables are outlined below and in tables eight and nine.

Industry and Geographic segmentation

A Herfindahl index of diversification is used as an alternative method to the sum of the number of segments disclosed. The Herfindahl index of diversification is calculated by taking

the sum of the square of the proportion of each of the segment sales. The sum of squares is divided by total firm sales (Bushman, Chen, Engel and Smith, 2004). This index may provide a more comprehensive measure of diversification than a simple count. A Herfindahl index is calculated for both industry and geographic segmentation.

Segment interdependencies: Percentage of inter-segment sales

An alternative proxy for interdependence between industry and geographic segments is the proportion of inter-segment sales to total sales. The larger of industry or geographic inter-segment sales is used as the firm level of inter-segment interdependence. The level of inter-segment sales was also used by Bushman *et al* (1995) as a proxy for intra-segment interdependencies in their study of divisional managers. The reason that inter-segment asset eliminations are used as the primary variable in this study is because the effect of transfer pricing on inter-segment sales is unclear.

Level of capital expenditure

The average of three years of CAPEX is included in tests of hypothesises to differentiate between firms who make large one-off capital investments and firms who regularly make large CAPEX. Further sensitivity testing includes using net capital expended on property plant and equipment from the cash flow statement instead of CAPEX.

INSERT TABLE EIGHT

Executive share ownership

Where the CEO and other top executives own a large parcel of shares, their interests are aligned to shareholders (Ittner, Lambert and Larcker, 2003), reducing the need for incentive compensation. The number of shares that the entire executive team, excluding CEO, multiplied by the share price at the end of the financial year is used as a proxy for the relative incentive level of executive team share ownership. A separate variable is used for CEO share ownership is specified in table nine.

INSERT TABLE NINE

Further sensitivity testing will be carried out to control for multi-collinearity between the level of segmentation, firm size and compensation scheme choice. The Logit model is retested using maximum likelihood estimation. Also, firms where it is difficult to determine the compensation scheme type are included in an ordered Logit regression.

5 Conclusion and limitations

As the reported results are limited to a restricted sample where limited data is currently available, results are to be interpreted with caution.

The empirical evidence presented provides mixed evidence in support of hypothesis one. Where compensation scheme type is estimated using method one and three, firms that choose individual compensation have a greater level of industry diversification, consistent with the hypothesis that firms adopt individual compensation schemes for the senior executives where their inputs and outputs are separable and observable. However, this is not the case for firms

with increased geographic diversification or where method two is used to estimate compensation scheme type.

Both univariate and multivariate tests provide support for hypothesis two, however there is an empirical difference between how firms set compensation levels (change in total compensation and relative level of incentive pay) as apposed to structure (short versus long term compensation) with reference to industry diversification. Where method two is use to estimate compensation scheme choice, univariate and multivariate tests provide support for hypothesis two in terms of capital expenditure, inter-segment assets, existence of a head office. However, in the case of the level of functional structure, no support is offered. When compensation scheme choice is estimated using method one and three, only the level of functional structure is associated with the choice of group compensation schemes.

These preliminary findings suggests that it is the potential for synergies between senior executives in integrated firms, rather than the observability of senior executive inputs and output as captured by the level of industry and geographic diversification that is the determining factor in whether firms choose individual or group compensation schemes with reference to the level of commonality in compensation structure (method two) for the senior executives. However when firms set the level of commonality between senior executive incentive bonus level (method three) and change in total compensation (method one) it is the level of industry diversification and functional structure that are the determining factors.

6 Future research

The following topics are questions raised from the above study.

6.1 Mutual monitoring as a governance mechanism

It is expected that use of group compensation schemes relative to individual compensation schemes is increasing as difficulty in direct monitoring increases. Difficulty in direct monitoring of executives is proposed to be related to the information asymmetry between the board and executives, reducing the ability of the board to effectively contract with executives (Bushman and Smith, 2001) and increasing in the potential for adverse selection risk. The difficulty in monitoring executives is increasing in the complexity of the firm, decreasing quality of performance measurement measures such as accounting numbers and increasing growth options (Bushman and Smith, 2001; Core and Guay, 2001; Ittner, Lambert and Larcker, 2003). Where the board of directors have difficulty in observing effort, to reduce shirking, they can either increase the monitoring mechanisms like purchasing more auditing, or increase bonding mechanisms such as awarding equity, both of which are costly. On the other hand, by introducing a group compensation scheme, directors provide an incentive for executives to monitor the effort levels of other executives because the attainment of common performance targets is related to the sum of effort by all executives. Group compensation schemes may be used as a substitute for direct monitoring by the board through increasing mutual monitoring by the executive team who are in a better position than the board to monitor effort and output because of the information asymmetry. Effort expended by executives engaging in mutual monitoring and peer pressure incurs costs to the firm.

6.2 Accounting verse other performance measures in group compensation schemes

Research into the efficiency of accounting and other performance measures in group or individual compensation schemes for senior executives would be consistent with the CEO compensation literature and a natural extension of this study.

6.3 Different contexts in the relation between firm characteristics and individual and group compensation schemes

The model developed in the study could be replicated at the divisional manager level to allow greater comparability with earlier literature like Bushman *et al* (1995) and Keating (1997).

6.4 Alternative specification of variables

The model developed in the study could be replicated and extended though different approaches. For example, survey research may uncover nuances in the predicted relations and suggest further proxies for replication and refinement of the model.

Table 1: Sample characteristics

Panel A: Sample selection

Index	2003	2004	2005	Total
Index	2003	2004	2005	Total
Population	493	496	485	1474
Financial Services Firm	107	114	113	334
Missing Annual Report data / Trusts / Annual Report in Foreign Currency	199	178	123	500
Sample firms	187	204	249	640

Panel B: Industry representation [a]

Industry	Percentage of sample
Energy	5.6%
Materials	27.3%
Industrials	37.7%
Consumer Staples	8.1%
Health Care	10.0%
Information Technology	7.3%
Telecommunications Services	2.2%
Utilities	1.7%

[a] Based on 640firm years.

Table 2: Group versus Individual compensation scheme proxies

Variable	Description
Method 1: Variation between executives in compensation level changes	The total level of compensation paid to each executive is calculated for each year. The percentage change in total compensation between years for each executive is then calculated. A measure of variation between the senior executive team is calculated (standard deviation). Firms are ranked according to the level of variation between executives and split at the median. Firms with the least (greatest) variation between executives are classified as having a group (individual) compensation scheme.
Method 2: Common compensation structure (short term cash bonus and / or equity / long term compensation)[36]	Firms are classified as having predominantly a group compensation scheme where at least 75% of the senior executives receive the same compensation type (short term cash bonus and / or long term compensation / equity). All other firms where executives do not receive the same compensation type (short term cash bonus and / or long term compensation / equity) are classified as having predominantly an individual compensation scheme.
Method 3:Variation in incentive compensation level	The relative percentage of incentive compensation (short term cash bonus and long term compensation / equity). to base pay is calculated. A measure of variation between the senior executive team is calculated (standard deviation). Firms are ranked according to the level of variation between executives and split at the median. Firms with the least (greatest) variation between executives are classified as having a group (individual) compensation scheme.

[36] Table four contains preliminary findings on whether sufficient variability is observed in practice to allow the above classification to work. The preliminary results show 46% of firms had a group compensation scheme and 42% had individual compensation schemes. 12% of firms paid no bonus or equity compensation during the year.

Table 3: Firm characteristics that are expected to determine when using a group compensation scheme is more efficient than an individual compensation scheme for senior executives.

Variable	Variable Name	Proxy Used	Predicted sign (+ is group and – individual compensation scheme)
Geographic segmentation	GEOSEG	Natural log of the sum of the number of geographic segments disclosed in the notes to the annual report.	-
Industry segmentation	INDSEG	Natural log of the sum of the number of industry segments disclosed in the notes to the annual report.	-
Inter-segment Interdependencies: Geographic and Industry Segment interdependence	INTAS	The proportion of inter-segment assets to total assets in the segment disclosure note. The larger of geographic or industry inter-segment assets.	+
CAPEX expenditure one year	CAPEX	Change in total assets divided by opening total assets.	+
Inter-segment Interdependencies: Proportion of assets allocated to the central management function	HOASSET	The proportion of assets specifically allocated to a central management function (head office) to total assets in the primary segment disclosure.	+
Functional Structure	FUNCST	Number of functional executives on the executive team divided by total senior executives. Functional executives are those who are in charge of functional departments such as marketing, finance or research and development or generalist managers. Functional executives do not include divisional executive who are in charge of integrated business units.	+

Table 4: Percentage firms using predominantly group versus individual compensation schemes for the senior executives [a]

	Number of firm years	Percentage of sample
Group compensation scheme Over 75% of executives receive the same compensation structure (short term cash bonus and / or long term compensation / equity).	**270**	**45.5%**
Individual compensation scheme At least one executive receive bonus or equity but less than 75% of executive received a common compensation structure (short term cash bonus and / or long term compensation / equity).	**250**	**42.2%**
No executive received a short term cash bonus and / or long term compensation / equity.	**73**	**12.3%**
Total	**593**	**100%**

[a] The sample is based on 640 firm years, however there are 47 firm years excluded where details of less than 3 executives are disclosed. SCHEME (Method 2) is where at least 75% of the top senior executives receive the same type of compensation payments, being either short term cash bonus and / or long term compensation / equity (Method 2). All other firm years are classified as having an individual compensation scheme, where less than 75% of the senior executives receive the same type of compensation payments, being either short term cash bonus and / or long term compensation / equity (Method 2).[37]

[37] To test whether there is a relation between compensation type over time, the compensation types of executives was compared with their type in 2002. Using available data on 62 firms, the proportion of executives receiving a certain compensation type in 2002 is significantly correlated with the same compensation type in 2004 at the 0.01 level (.531using a Spearman's Correlation).

Table 5: Descriptive statistics and correlation table [a]

Panel A – Descriptive statistics

						Percentiles		
	N	Mean	Std. Deviation	Median	Minimum	25th	75th	Maximum
GEOSEG[b]	606	2.34	1.40	2	1	1	3	6
INDSEG[b]	610	2.36	1.50	2	1	1	3	6
CAPEX	636	13.2%	28.0%	7.9%	-46.5%	-2.8%	26.8%	71.7%
INTAS	333	0.009	0.015	0	0	0	0.017	0.036
HOASSET	333	0.018	0.098	0	0	0	0	1.033
FUNCST	150	0.45	0.28	0.4	0	0.25	0.617	1
SIZE[b] (000's)	623	1,281,660	4,644,407	206,603	525	89,477	779,055	63,520,645

Panel B – Correlation table dependent variables [c]

		SCHEME (Method3)	SIZE	CAPEX	GEOSEG	INDSEG	INTAS	HOASSET	FUNCST
SCHEME (Method3)	Correlation	1.000	**0.171**	0.064	0.010	**0.075**	**0.112**	0.044	0.067
	p-value (2-tailed)		*0.000**	*0.147*	*0.818*	*0.095***	*0.061***	*0.463*	*0.454*
	N	520	508	516	491	495	279	279	127
SIZE	Correlation	**0.181**	1.000	-0.013	**0.195**	**0.365**	**0.137**	0.014	-0.071
	p-value (2-tailed))	*0.000**		*0.746*	*0.000**	*0.000**	*0.014**	*0.808*	*0.396*
	N	508	623	622	590	594	322	322	144
CAPEX	Correlation	0.055	0.012	1.000	**-0.145**	**-0.082**	0.076	0.003	-0.029
	p-value (2-tailed)	*0.212*	*0.768*		*0.000**	*0.044**	*0.169*	*0.956*	*0.722*
	N	516	622	636	602	606	329	329	149
GEOSEG	Correlation	0.017	**0.194**	**-0.137**	1.000	**0.174**	**-0.132**	-0.008	**-0.284**
	p-value (2-tailed)	*0.706*	*0.000**	*0.001**		*0.000**	*0.016**	*0.882*	*0.000**
	N	491	590	602	606	603	329	329	147
INDSEG	Correlation	**0.075**	**0.345**	-0.066	**0.166**	1.000	**0.274**	0.003	-0.082
	p-value (2-tailed)	*0.097***	*0.000**	*0.106*	*0.000**		*0.000**	*0.963*	*0.322*
	N	495	594	606	603	610	328	328	149
INTAS	Correlation	**0.098**	**0.142**	0.053	**-0.102**	**0.275**	1.000	0.040	0.049
	p-value (2-tailed)	*0.101***	*0.011**	*0.334*	*0.065***	*0.000**		*0.469*	*0.611*
	N	279	322	329	329	328	333	333	111
HOASSET	Correlation	0.076	**0.098**	-0.035	0.074	-0.056	-0.069	1.000	0.096
	p-value (2-tailed)	*0.204*	*0.080**	*0.527*	*0.179*	*0.311*	*0.208*		*0.317*
	N	279	322	329	329	328	333	333	111
FUNCST	Correlation	0.088	-0.038	0.019	**-0.254**	-0.013	0.031	-0.001	1.000
	p-value (2-tailed)	*0.327*	*0.649*	*0.818*	*0.002**	*0.874*	*0.748*	*0.990*	
	N	127	144	149	147	149	111	111	150

Panel C – Correlation table dependent variables [c d e f]

		Method 1 (excluding middle 33%)	**Method2**	**Method 3** (excluding Middle 33%)
Method 1	Correlation	1	0.153*	0.443*
(excluding	*p-value* (2-tailed)		*(0.011)*	*(0.000)*
middle 33%)	N	306	276	187
Method2	Correlation	0.153*	1	0.107**
	p-value (2-tailed)	*(0.011)*		*(0.053)*
	N	276	520	329
Method 3	Correlation	0.443*	0.107**	1
(excluding	*p-value* (2-tailed)	*(0.000)*	*(0.053)*	
middle 33%)	N	187	329	329

*, ** Significant at the 0.01, and 0.05 level respectively.

[a] The sample is based on 640 firm years. SCHEME (Method3) is where at least 75% of the top senior executives receive the same type of compensation payments, being either cash or equity (Method 2). All other firm years are classified as having an individual compensation scheme, where less than 75% of the senior executives receive the same type of compensation payments, being either cash or equity (Method 2); GEOSEG is the Log of sum of the number of geographic segments disclosed in the notes to the annual report; INDSEG is measured using the same method as GEOSEG using industry segment sales; INTAS is measured using the greater of geographic or industry segment assets eliminated on consolidation (shared assets) divided by total assets. The measure is log transformed; HOASSET is measured using the proportion of assets specifically allocated to a central management function (head office) in the primary segment disclosure to total assets; CAPEX is measured by dividing the change in total assets by opening total assets; FUNCST is measured by the number of functional executives on the executive team divided by total senior executives. Functional executives are those where the annual report identifies them as having functional responsibility such as being responsible for functional departments such as marketing, finance or research and development; SIZE is measured using the log of market capitalization.

[b] Before variable is converted using the natural log.

[c] The top right of the table reports Pearson correlation coefficients and bottom left Spearman correlation coefficients.

[d] The method one classification for predominantly group compensation schemes is based on variation between executives in compensation level changes. See table two for specification how the variable is estimated. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[e] The method two classification for predominantly group compensation schemes is where at least 75% of the top senior executives receive the same type of compensation payments, being either cash bonus or equity / long term compensation. All other firm years are classified as having an individual compensation scheme, where less than 75% of the senior executives receive the same type of compensation payments, being either cash or equity. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[f] The method three classification for predominantly group compensation schemes is based on the variation between executives in incentive compensation levels relative to base pay. See table two for specification how the variable is estimated. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

Table 6: Univariate test of economic determinants of group versus individual compensation scheme companies [a b]

Panel A Method one estimated using the similarity between executives in changes in total compensation between years [c]

	Predicted	Individual Compensation Scheme group		Group Compensation Scheme group		Levene's Test for Equality of Variances		t-test for Equality of Means		Mann-Whitney U test	
	Direction	N	Mean	N	Mean	F	*(p-value)*	t	*(p-value)*	Z	*(p-value)*
GEOSEG	-	218	0.707	221	0.676	0.157	*(0.693)*	0.544	*(0.293)*	-0.627	*(0.265)*
INDSEG	-	221	0.757	220	0.631	1.208	*(0.272)*	2.106	*(0.018)**	-2.044	*(0.020)**
INTAS	+	127	0.008	118	0.010	5.482	*(0.020)**	-1.024	*(0.153)*	-0.764	*(0.445)*
HOASSET	+	127	0.015	118	0.008	3.226	*(0.074)***	0.899	*(0.370)*	-0.141	*(0.888)*
CAPEX	+	226	0.147	231	0.128	3.834	*(0.051)**	0.747	*(0.455)*	-0.607	*(0.544)*
FUNCST	+	59	0.395	51	0.517	1.168	*(0.282)*	-2.298	*(0.012)**	-2.159	*(0.015)**

Panel B Method two estimated using the similarity in bonus and long term compensation structure [d]

	Predicted	Individual Compensation Scheme group		Group Compensation Scheme group		Levene's Test for Equality of Variances		t-test for Equality of Means		Mann-Whitney U test	
	Direction	N	Mean	N	Mean	F	*(p-value)*	t	*(p-value)*	Z	*(p-value)*
GEOSEG	-	239	0.690	252	0.702	3.295	*(0.070)***	-0.230	*(0.818)*	-0.378	*(0.705)*
INDSEG	-	239	0.654	256	0.750	0.031	*(0.861)*	-1.671	*(0.095)***	-1.659	*(0.097)***
INTAS	+	144	0.007	135	0.010	15.059	*(0.000)**	-1.878	*(0.031)**	-1.642	*(0.050)**
HOASSET	+	144	0.012	135	0.019	1.759	*(0.093)***	-0.735	*(0.231)*	-1.272	*(0.102)***
CAPEX	+	248	0.123	268	0.158	0.007	*(0.466)*	-1.454	*(0.073)***	-1.249	*(0.106)*
FUNCST	+	64	0.438	63	0.475	0.263	*(0.305)*	-0.752	*(0.227)*	-0.985	*(0.162)*

Panel C Method three estimated using the similarity between executives in relative percentage of compensation paid in cash bonus plus long term compensation [e]

	Predicted	Individual Compensation Scheme group		Group Compensation Scheme group		Levene's Test for Equality of Variances		t-test for Equality of Means		Mann-Whitney U test	
	Direction	N	Mean	N	Mean	F	*(p-value)*	t	*(p-value)*	Z	*(p-value)*.
GEOSEG	-	234	0.763	231	0.658	2.059	*(0.152)*	1.855	*(0.032)**	-1.814	*(0.035)**
INDSEG	-	237	0.803	232	0.632	0.002	*(0.965)*	2.889	*(0.002)**	-2.806	*(0.003)**
INTAS	+	139	0.008	121	0.009	0.563	*(0.454)*	-0.303	*(0.381)*	-0.135	*(0.446)*
HOASSET	+	139	0.020	121	0.008	5.074	*(0.025)**	1.165	*(0.245)*	-0.576	*(0.565)*
CAPEX	+	245	0.146	244	0.124	0.228	*(0.633)*	0.938	*(0.348)*	-1.097	*(0.273)*
FUNCST	+	60	0.389	58	0.505	1.605	*(0.208)*	-2.290	*(0.012)**	-2.206	*(0.014)**

*, ** Significant at the 0.05, and 0.10 level respectively.

[a] t-statistics are reported one tailed for variables where there is a directional hypothesis and the coefficient is in the predicted direction (INTAS; HOASSET; CAPEX; FUNCST) and two tailed for the remaining variables (Intercept; GEOSEG; INDSEG; SIZE).

[b] GEOSEG is the Log of sum of the number of geographic segments disclosed in the notes to the annual report; INDSEG is measured using the same method as GEOSEG using industry segment sales; INTAS is measured using the greater of geographic or industry segment assets eliminated on consolidation (shared assets) divided by total assets. The measure is log transformed; HOASSET is measured using the proportion of assets specifically allocated to a central management function (head office) in the primary segment disclosure to total assets; CAPEX is measured by dividing the change in total assets by opening total assets; FUNCST is measured by the number of functional executives on the executive team divided by total senior executives. Functional executives are those where the annual report identifies them as having functional responsibility such as being responsible for functional departments such as marketing, finance or research and development; SIZE is measured using the log of market capitalization.

[c] The method one classification for predominantly group compensation schemes is based on variation between executives in compensation level changes. See table two for specification how the variable is estimated. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[d] The method two classification for predominantly group compensation schemes is where at least 75% of the top senior executives receive the same type of compensation payments, being either cash bonus or equity / long term compensation. All other firm years are classified as having an individual compensation scheme, where less than 75% of the senior executives receive the same type of compensation payments, being either cash or equity. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[e] The method three classification for predominantly group compensation schemes is based on the variation between executives in incentive compensation levels relative to base pay. See table two for specification how the variable is estimated. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

Table 7:
Estimated Logit binomial regression models of the choice between group versus individual compensation schemes for the senior executives. [a b]

Model 1: $SCHEME_{it} = \alpha_0 + \alpha_1 GEOSEG_{i,t-1} + \alpha_2 INDSEG_{i,t-1} + \alpha_3 INTAS_{i,t-1} + \alpha_4 HOASSET_{i,t-1} + \alpha_5 CAPEX_{i,t} + \alpha_6 FUNKST_{i,t} + \alpha_6 SIZE_{i,t-1} + \alpha_n Industry_i + \alpha_n Year_i + \varepsilon_{i,t}$

Model2: $SCHEME_{it} = \alpha_0 + \alpha_1 GEOSEG_{i,t-1} + \alpha_2 INDSEG_{i,t-1} + \alpha_3 INTAS_{i,t-1} + \alpha_4 HOASSET_{i,t-1} + \alpha_5 CAPEX_{i,t} + \alpha_6 CAPEX_{i,t} \times INDSEG_{i,t-1} + \alpha_7 SIZE_{i,t-1} + \alpha_n Industry_i + \alpha_n Year_i + \varepsilon_{i,t}$

Panel A Method one estimated based on variation between executives in compensation level changes [c]

		Regression coefficients (*p-value*)							
		Model 1	Model 1 excluding FUNCST	Model 2	Model 1	Model 1 excluding FUNCST	Model 2	Model 2	Model 2 excluding FUNCST
Variables in the Equation [c]	Predicted sign				Excluding middle 33%	Excluding middle 33%	Excluding middle 33%	Standard off Deviation of 10% used as cut	Standard Deviation of 10% used as cut
Intercept		105.539	-13.286	105.749	-75.800	-10.893	-75.668	84.889	-22.527
		(1.000)	*(1.000)*	*(1.000)*	*(1.000)*	*(1.000)*	*(1.000)*	*(1.000)*	*(0.999)*
GEOSEG	-	0.265	0.089	0.278	0.066	-0.151	0.070	-0.830	-0.349
		(0.611)	*(0.725)*	*(0.299)*	*(0.937)*	*(0.333)*	*(0.934)*	*(0.135)*	*(0.152)*
INDSEG	-	-0.652	-0.661 *	-0.713	-2.119 *	-0.956 *	-2.145 *	1.315	0.206
		(0.114)	*(0.006)*	*(0.122)*	*(0.026)*	*(0.006)*	*(0.030)*	*(0.238)*	*(0.612)*
INTAS	+	26.339	18.739 *	26.249	44.881	42.271 *	44.265	35.562 **	18.708 **
		(0.112)	*(0.035)*	*(0.112)*	*(0.115)*	*(0.002)*	*(0.122)*	*(0.084)*	*(0.074)*
HOASSET	+	-6.278	-2.284	-6.327	-142.658	-1.333	-143.062	-178.022	-3.645
		(0.220)	*(0.422)*	*(0.437)*	*(0.998)*	*(0.679)*	*(0.998)*	*(0.998)*	*(0.557)*
CAPEX	+	1.328	-0.126	1.097	-0.156	-1.945 *	-0.243	3.283 **	0.030
		(0.150)	*(0.825)*	*(0.254)*	*(0.931)*	*(0.016)*	*(0.909)*	*(0.057)*	*(0.488)*
FUNCST	+	2.212 *		2.264 *	2.721 **		2.726 **	0.267	
		(0.036)		*(0.036)*	*(0.093)*		*(0.092)*	*(0.427)*	
INDSEG * CAPEX	-			0.419			0.243	-4.600 **	-1.511
				(0.827)			*(0.938)*	*(0.065)*	*(0.119)*
SIZE	?	-0.783	-0.095	-0.792	-0.568	-0.256	-0.577	-1.021	-0.407
		(0.142)	*(0.703)*	*(0.139)*	*(0.495)*	*(0.457)*	*(0.493)*	*(0.255)*	*(0.245)*
Nagelkerke R Square		0.356	0.121	0.356	0.531	0.242	0.531	0.292	0.111
n		77	231	77	47	142	47	77	231

Panel B: Method two estimated using the similarity in bonus and long term compensation structure [d]

Regression coefficients (*p-value*)					
Variables in the Equation [c]	Predicted sign	Model 1	Model 1 excluding FUNCST	Model 1 excluding SIZE	Model 2
Intercept		92.102 *(1.000)*	119.393 *(0.999)*	100.434 *(1.000)*	89.23 *(1.000)*
GEOSEG	-	0.484 *(0.266)*	0.364 *(0.118)*	0.555 *(0.204)*	.465 *(0.294)*
INDSEG	-	0.623 *(0.173)*	0.244 *(0.316)*	0.883 * *(0.040)*	.997 ** *(0.063)*
INTAS	+	39.842 * *(0.021)*	17.388 * *(0.035)*	36.623 * *(0.028)*	43.483 * *(0.015)*
HOASSET	+	11.197 * *(0.020)*	1.213 *(0.215)*	11.072 * *(0.020)*	11.695 * *(0.020)*
CAPEX	+	1.351 *(0.106)*	0.984 * *(0.028)*	1.418 ** *(0.090)*	2.882 * *(0.024)*
FUNCST	+	0.147 *(0.443)*		0.002 *(0.499)*	-.218 *(0.837)*
INDSEG * CAPEX	-				-2.754 * *(0.052)*
SIZE	?	0.560 *(0.239)*	0.445 ** *(0.061)*		.615 *(0.203)*
Nagelkerke R Square		0.36	0.136	0.349	0.389
No. of observations		91	264	93	91

Panel C: Method three estimated based on the variation between executives in incentive compensation levels relative to base pay [e]

Regression coefficients (*p-value*)								
Variables in the Equation [c]	Predicted sign	Model 1	Model 1 excluding FUNCST	Model 2	Model 1 Excluding middle 33%	Model 1 excluding FUNCST Excluding middle 33%	Model 2 Excluding middle 33%	Model 2 Standard Deviation of 10% used as cut-off
Intercept		-107.756	5.780	-112.088	-10.838	-17.470	-14.600	84.581
		(1.000)	*(0.404)*	*(1.000)*	*(1.000)*	*(1.000)*	*(1.000)*	*(1.000)*
GEOSEG	-	0.900**	0.260	0.928**	1.387	0.217	1.301	0.339
		(0.081)	*(0.277)*	*(0.088)*	*(0.110)*	*(0.486)*	*(0.133)*	*(0.512)*
INDSEG	-	-0.722**	-0.283	-0.387	-1.440*	-0.429**	-1.383*	-0.756**
		(0.071)	*(0.128)*	*(0.240)*	*(0.039)*	*(0.086)*	*(0.047)*	*(0.089)*
INTAS	+	29.202	12.924**	43.740*	3.798	5.179	12.311	14.209
		(0.106)	*(0.096)*	*(0.048)*	*(0.452)*	*(0.338)*	*(0.359)*	*(0.262)*
HOASSET	+	-8.448	-2.600	-8.392	-16.900	-2.897	-15.989	-8.834
		(0.374)	*(0.298)*	*(0.387)*	*(0.283)*	*(0.448)*	*(0.306)*	*(0.394)*
CAPEX	+	-0.183	-0.672	2.627**	1.587	-0.076	2.598	1.419
		(0.875)	*(0.209)*	*(0.072)*	*(0.207)*	*(0.910)*	*(0.141)*	*(0.194)*
FUNCST	+	2.360*		1.747**	4.093*		3.805*	1.338
		(0.035)		*(0.103)*	*(0.028)*		*(0.039)*	*(0.156)*
INDSEG * CAPEX	-			-4.748*			-2.247	-0.992
				(0.013)			*(0.224)*	*(0.303)*
SIZE		-1.222*	-0.547*	-1.169*	-1.336**	-0.769*	-1.098	-1.155**
		(0.028)	*(0.028)*	*(0.049)*	*(0.102)*	*(0.014)*	*(0.202)*	*(0.068)*
Nagelkerke R Square		0.383	0.095	0.450	0.563	0.165	0.571	0.381
n		83	245	83	58	165	58	83

*, ** Significant at the 0.05, and 0.10 level respectively.

[a] t-statistics are reported one tailed for variables where there is a directional hypothesis and the coefficient is in the predicted direction (INTAS; HOASSET; CAPEX; FUNCST) and two tailed for the remaining variables (Intercept; GEOSEG; INDSEG; SIZE).

[b] All aggregated firm year observations are from the sample of 640 firm years where data was available at the time of compilation. GEOSEG is the Log of sum of the number of geographic segments disclosed in the notes to the annual report; INDSEG is measured using the same method as GEOSEG using industry segment sales; INTAS is measured using the greater of geographic or industry segment assets eliminated on consolidation (shared assets) divided by total assets. The measure is log transformed; HOASSET is measured using the proportion of assets specifically allocated to a central management function (head office) in the primary segment disclosure to total assets; CAPEX is measured by dividing the change in total assets by opening total assets; FUNCST is

measured by the number of functional executives on the executive team divided by total senior executives. Functional executives are those where the annual report identifies them as having functional responsibility such as being responsible for functional departments such as marketing, finance or research and development; SIZE is measured using the log of market capitalization; INDUSTRY is a dummy variable for each industry; YEAR is a dummy variable for each year.

[c] The method one classification for predominantly group compensation schemes is based on variation between executives in compensation level changes. See table two for specification how the variable is estimated. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[d] The method two classification for predominantly group compensation schemes is where at least 75% of the top senior executives receive the same type of compensation payments, being either cash bonus or equity / long term compensation. All other firm years are classified as having an individual compensation scheme, where less than 75% of the senior executives receive the same type of compensation payments, being either cash or equity. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

[e] The method three classification for predominantly group compensation schemes is based on the variation between executives in incentive compensation levels relative to base pay. See table two for specification how the variable is estimated. Reported results exclude firms where no senior executive receive any incentive compensation. Values of 0 and 1 are assigned individual and group compensation firms respectively.

Table 8: Alternative specification of firm characteristics for sensitivity testing

Variable	Alternative Variable Name	Alternative specification
GEOSEG	GEOHERF	Geographic diversification is measured using a Herfindahl index of diversification calculated using the geographic segment disclosure note (Bushman *et al*, 2004). The index is calculated using the sum of the square of each geographic segment sales. The sum the squares is then divided by total firm sales, providing a measure of geographic segmentation between 0 and 1. The index approaches 0 the greater the level of diversification.
INDSEG	INDHERF	Industry diversification is measured using the same method as GEOHERF using industry segment sales.
INTAS	INTSAL	Interdependencies related to inter-segment transactions is measured using the greater of geographic or industry segment sales eliminated on consolidation (Bushman *et al*, 1995). The measure is the proportion of inter-segment sales to total sales.
FUNCST	DIVST	Divisional structure is measured by the number of divisional executives on the executive team divided by total senior executives. Divisional executives are those where the annual report identifies them as having divisional responsibility such as being responsible for an integrated business unit.
FUNCST	$FUNCST^{ExIAnyDiv}$	This FUNCST after any executive with dual functional and divisional roles are removed.
CAPEX	CFCAPEX	Net capital expended on property plant and equipment from the cash flow statement divided by total assets.
CAPEX	$CAPEX^{3yr}$ OR $AvCFCAPEX^{3yr}$	Average of 3 years of CAPEX Average of 3 years of CFCAPEX

Table 9: Alternative control variables for sensitivity testing

Variable	Variable Name	Proxy Used
Executive share ownership	EXECEQ	Total shares controlled by all executives (except the CEO) during the year multiplied by share price at end of the year, divided by market capitalisation.
	CEOEQ	Total shares controlled by the CEO during the year multiplied by share price at end of the year, divided by market capitalisation.

Appendix one: Example of compensation and segment disclosure in reports

TOLL Holdings

Short Term Incentives

Short-term incentives typically require the achievement of goals relating to annual Business Unit/Division/Group performance, or achieving strategic objectives. Currently, the criteria relate to achievement of a mixture of budgeted EBIT, NPAT, revenue, EPS growth, cash based returns on assets, debtors days outstanding and safety measures. Payments made are usually delivered as a cash bonus or superannuation contributions.

Long Term Incentives

Long-term incentives through the shareholder approved Senior Executive Option Plan focus on linking executive reward with overall Group performance.

Options granted to 31 October 2002 are only exercisable on the satisfaction of specific hurdle criteria. The Company's Total Shareholder Return (TSR) must exceed a 35% increase over a three year period from the date of grant and diluted EPS growth must at least be equal to the ASX 200 Industrials (excluding banks), during the period from grant date to the end of the qualifying period (generally a three year period).

Options granted from 9 September 2004 are only exercisable on the satisfaction of specific hurdle criteria with regard to the Company's TSR relative to the ASX 100 excluding banks, oil and gas and metals and mining companies over a 3 year period commencing 1 July 2004. All options will vest if the Group's TSR percentile ranking is greater than 75%, i.e. the Group is ranked in the top 25%. Between 50% and 75%, a pro-rata allocation is vested. Below 50%, no options will vest.

Group Performance

In assessing whether the performance hurdles for each grant of options have been met, the Group receives independent data, at the end of the vesting period, from its financial advisers on each hurdle. Set out below is the Group's performance in the above measures over the past 5 years.

Remuneration of Specified Directors and Specified Executives (continued)

NAME	S300A/ AASB 1046	PERIOD	PRIMARY			POST EMPLOYMENT		EQUITY COMPENSATION	TOTAL	BONUS VESTED DURING YEAR (C)	PERFOR-MANCE RELATED REMUN-ERATION	VALUE OF OPTIONS AS % OF REMUN-ERATION
			SALARY & FEES	BONUS	NON MONETARY BENEFITS	SUPER-ANNUATION	RETIRE-MENT BENEFITS	VALUE OF OPTIONS				
			$	$	$	$	$	$	$	%	%	%
Specified Executives												
John Ludeke	A,B	2005	636,729	250,000	53,271	60,000	–	298,618	1,298,618	100	42.3	23.0
	A,B	2004	516,729	100,000	53,271	60,000	–	228,333	958,333	100	34.3	23.8
Don Telford	A,B	2005	654,020	200,000	–	95,980	–	298,618	1,248,618	80	39.9	23.9
	A,B	2004	538,851	100,000	–	91,149	–	228,333	958,333	100	34.3	23.8
Terry Mallon	A,B	2005	508,169	100,000	10,855	45,000	–	266,088	930,112	100	39.4	28.6
	A,B	2004	355,271	60,000	34,179	40,000	–	171,250	660,700	100	35.0	25.9
Stephen Stanley	A,B	2005	570,000	150,000	–	30,000	–	298,618	1,048,618	100	42.8	28.5
	A,B	2004	518,750	25,000	–	30,000	–	228,333	802,083	100	31.6	28.5
Hugh Cushing	B	2005	285,906	75,000	25,392	38,702	–	106,435	531,435	100	34.1	20.0
	B	2004	265,454	60,000	25,392	36,754	–	68,500	456,100	100	28.2	15.0
Graham Lyon	A,B	2005	325,745	45,000	45,122	34,000	–	132,459	582,326	90	30.5	22.8
	A	2004	315,299	50,000	52,005	28,000	–	114,167	559,471	100	29.3	20.4
Total	B	2005	2,980,569	820,000	134,640	303,682	–	1,400,836	5,639,727			
	B	2004	2,195,055	345,000	112,842	257,903	–	924,749	3,835,549			

30. Segment Information

The Group comprises the following main business segments, based on the Group's management reporting system.

BUSINESS SEGMENTS	NETWORKS		TOLL NORTH		LOGISTICS		TOLL NZ		ELIMINATIONS		CONSOLIDATED	
	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000
Revenue												
Operating segment revenue	1,365,750	1,246,838	638,777	540,058	1,167,779	1,069,871	626,057	415,162	–	–	3,798,363	3,271,929
Other segment revenue	26,574	24,737	16,279	4,726	34,041	9,230	1,857	375	–	–	78,751	39,068
Inter segment revenue	187,239	120,114	32,905	30,673	8,298	21,669	–	–	(228,442)	(172,456)	–	–
Total Segment Revenue	1,579,563	1,391,689	687,961	575,457	1,210,118	1,100,770	627,914	415,537	(228,442)	(172,456)	3,877,114	3,310,997
Unallocated Interest and Dividend Revenue											6,351	3,001
Total Revenue											3,883,465	3,313,998
Result												
Segment Result	82,113	63,487	28,643	27,598	68,766	60,800	59,609	41,570	–	–	239,131	193,455
Share of net profit of equity accounted investment – Pacific National											51,534	41,740
Unallocated Net Interest Expense											(23,778)	(23,080)
Profit from ordinary activities before income tax expense (pre significant items)											266,887	212,115
Income tax expense (pre significant items)											(44,098)	(38,684)
Individually significant items after tax											673	–
Profit from ordinary activities after income tax expense											223,462	173,431
Depreciation and amortisation	40,209	44,070	14,022	10,058	37,835	30,133	45,068	30,198			137,134	114,459
Non-cash expense other than depreciation and amortisation	5,576	4,443	708	6,357	393	(917)	16,040	11,055			22,717	20,938

Of the total share of equity accounted investments of $54.2 million (2004: $45.1 million), $2.7 million (2004: $3.4 million) has been reallocated to business segments, leaving $51.5 million (2004: $41.7 million) unallocated.

BUSINESS SEGMENTS	NETWORKS		TOLL NORTH		LOGISTICS		TOLL NZ		ELIMINATIONS		CONSOLIDATED	
	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000	2005 $'000	2004 $'000
Assets												
Segment assets	491,990	415,168	167,609	126,617	343,252	334,821	645,342	658,861	–	–	1,648,193	1,535,467
Equity accounted investments											450,086	398,374
Unallocated corporate assets											383,974	241,028
Consolidated Total Assets											2,482,253	2,174,869
Liabilities												
Segment liabilities	214,892	179,201	72,540	54,487	137,349	126,890	365,971	317,290	–	–	790,752	677,868
Unallocated corporate liabilities											379,341	402,621
Consolidated Total Liabilities											1,170,093	1,080,489
Acquisition of non-current assets	62,508	67,709	28,477	13,959	80,774	57,130	62,632	24,726			234,391	163,524

Appendix two: Empirical evidence on group compensation schemes

Kandel and Lazear (1992) also provide empirical evidence that employees are influenced by peer pressure from fellow employees and that peer pressure is a more effective motivator in firms where profits are shared.

Hambrick (1995) reports that in one large US company, the CEO adopted a group compensation scheme in order to increase the level of co-operation and co-ordination within the senior executive team, leading to increased collaboration and '*success in their market*' within a three year period.

Drake, Haka and Ravenscroft (1999) investigate the proposition that group compensation schemes are likely to lead to greater operating performance compared to individual compensation schemes using an experiment. They found that the teams with group compensation, in combination with increased cost related information, had *'higher incentives to cooperate, they initiated more cooperative innovations, had lower production costs and higher profits'* than other groups. They find that the teams with individual compensation and increased cost related information engaged in negative self serving actions leading to self benefiting innovations and had higher costs and lower profits than any other combination of cost system and compensation scheme.

Hamilton, Nickerson and Owan (2003) found that in one large US manufacturing plant, highly productive employees were more likely to voluntarily switch from an individual piece rate compensation scheme to a group compensation schemes when given the choice. There was no difference in turnover rates for highly productive workers, despite receiving an average drop in pay of 8%. Average staff turnover rates (a measure of job satisfaction) decreased and productivity increased significantly with the voluntary adoption of a group compensation scheme

in this case. Despite the separability of input and output to individuals, group compensation in this case was an efficient choice over individual compensation.

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