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Executive Compensation, Corporate Governance and Corporate Performance: A Simultaneous Equation Approach

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Abstract

This paper investigates the association between executive compensation and performance. It uniquely utilises a comprehensive set of corporate governance mechanisms within a three-stage least squares (*3SLS*) simultaneous equation framework. Results based on estimating a conventional single equation model indicate that the executive pay and performance sensitivity is relatively weak, whereas those based on estimating a *3SLS* model generally suggest improved executive pay and performance sensitivity. Our findings highlight the need for future research to control for possible simultaneous interdependencies when estimating the executive pay and performance link. The findings are generally robust across a raft of econometric models that control for different types of endogeneities, executive pay and performance proxies.

JEL Classification: G32; G34; G38

Keywords: Executive compensation; Corporate performance; Corporate governance; Simultaneous equation; Generalised method of moments (GMM); Endogeneity

1. INTRODUCTION

Jensen and Murphy (1990) suggest that through optimal contracting, executive pay, especially that involving equity/performance-linked compensation, can limit agency problems by aligning the interests of managers and shareholders. However, the recent global financial crisis precipitated by increased risk-taking and pay motives of top executives of major banks (Tung, 2010; Aebi *et al*., 2011; Lin *et al*., 2012; Paligorova, 2011; Tang, 2012; Polat and Nisar, 2013; Wesep and Wang, 2013) has reignited the debate regarding the effectiveness of executive compensation packages in mitigating agency conflicts in modern corporations (Goering, 1996; Murphy, 1997; Grundy and Li, 2010; Van Essen *et al*., 2012; Berger *et al*., 2013; Cook and Burress, 2013). Whilst a number of papers have examined the link between executive pay and corporate performance, the general conclusion is that the link is weak (Murphy, 1999; Canarella and Nourayi, 2008; Dong *et al*., 2010; Elsila *et al*., 2013; Kabir *et al*., 2013; Tiani, 2013).

A number of reasons may explain the weak findings of past studies. First, since executive pay is just one of the possible corporate governance (CG) mechanisms that companies can employ to minimise agency conflicts (Mehran, 1995; Borisova *et al*., 2012; Huang *et al*., 2012), its effectiveness may depend on the simultaneous use of other CG mechanisms (Agrawal and Knoeber, 1996; Chung and Pruitt, 1996; Beiner *et al*., 2004, 2006; Livne *et al*., 2013; O'Connor *et al*., 2013). A major implication of this is that estimating the executive pay and corporate performance sensitivity through the use of single equation modelling techniques can result in endogenous associations (Core *et al*., 1999; Larcker and Rusticus, 2010; Connelly *et al*., 2012; Gil-Alana *et al*., 2012; Bai and Elyasiani, 2013). Existing studies, however, have mainly used single equation modelling, and thereby crucially ignored endogeneity problems that may be posed by the possible simultaneous use of alternative CG mechanisms in estimating the executive pay and corporate performance sensitivity (Guest, 2009; Wintoki *et al*., 2012; Zhao, 2013).

Second, the extant literature has focused mostly on cash-based rather than equity-based executive compensation (Conyon, 1997; Benito and Conyon, 1999; Kato and Long, 2006; Buck *et al*., 2008; Shen and Zhang, 2013). In contrast, corporate performance is more sensitive to equity-based than cash-based executive compensation (Jensen and Murphy, 1990; Main et al., 1996; Cosh and Hughes, 1997; Ozkan, 2011), and this may also explain the weak findings of past studies. Third, Main (1991), Lewellen *et al.* (1992), Conyon and Murphy (2000) and Firth *et al*. (2006, 2007) show that executive pay differs substantially across countries due to variations in legal, institutional, cultural and CG practices.

However, past studies are concentrated in the UK and US, presenting comparatively similar institutional contexts (Ang *et al*., 2002; Anderson and Bizjak, 2003; Chen *et al*., 2006; Cunat and Guadalupe, 2009; Sun *et al*., 2009). In developing countries with different institutional settings, with particular regard to CG reforms, ownership structures and executive director compensation incentives, the link between executive pay and corporate performance can be expected to differ from what has been found in industrialised countries. As such, studying the association between executive pay and corporate performance in developing countries, where empirical evidence has been limited, contributes to a more complete understanding of the relationship between executive compensation and corporate performance. A major reason for the paucity of empirical evidence in developing countries, especially African countries, is the difficulty in obtaining data of sufficient frequency and duration for analysis (Okeahalam, 2004; Mangena and Chamisa, 2008; Mangena *et al*.,2012; Ntim *et al*., 2012a; Fosu, 2013).

Recent CG reforms in South Africa (SA), however, provide a unique and potentially rewarding context for such a contribution. The recent South African CG reforms incorporate the expectation that executive pay will be strongly linked to corporate performance, and also require listed firms to fully disclose executive compensation details in their annual reports, making available information that hitherto has been publicly inaccessible. This development provides the opportunity to collect data on total pay of the Chief Executive Officer (CEO), as well as on the total pay of all executives and on CG in order to investigate the association between executive compensation and performance for a sample of SA listed companies, enabling us to make a number of contributions to the extant literature.

The paper documents for the first time evidence on the levels of executive pay, as well as the association between executive compensation and corporate performance in SA. Distinct from most past studies, we provide evidence on how corporate performance is associated with both the total pay of the CEO and that of all other executives, as well as on the link between cash (i.e., salary, performance bonus, pension contribution and others) and non-cash or equity-based (i.e., granted shares, vested/exercised options and any other longer-term incentive plans) compensation and corporate performance.

In addition, we make a methodological contribution by explicitly addressing the potential endogeneity problems that may arise from the possible simultaneous use of director pay and other CG mechanisms. Specifically, we employ data available on five CG mechanisms, including board size, percentage of non-executive directors (NEDs), leverage, block ownership, and institutional ownership, in addition to financial performance and total executive pay, in order to develop a system of seven simultaneous equations, which are estimated by using three-stage least squares (*3SLS*). Unlike conventional single equation modelling, our design has the advantage of allowing simultaneous interdependencies to exist among executive pay, performance and the CG mechanisms, by permitting each mechanism to simultaneously affect executive pay, but also allowing executive pay to affect the choice of each mechanism.

Our results are threefold. First, using a sample of SA listed firms, our results based on estimating a conventional single equation model suggest that the executive pay and corporate performance sensitivity is relatively weak, ranging from 0.025 for the total cash compensation of all executives to 0.098 for total CEO pay. Second, the results indicate that the executive pay and corporate performance sensitivity is stronger for non-cash based pay than cash-based compensation, as well as CEO pay being more sensitive to performance than those of lower placed executives.

Third, and distinct from existing studies, results based on estimating a *3SLS* within a simultaneous equation model that dynamically allows for simultaneous interdependencies among executive pay, corporate performance and the CG mechanisms generally suggest an improvement in the executive pay and corporate performance sensitivity, ranging between 0.163 for total pay of all executives and 0.197 for total CEO compensation. Our results highlight the need for future research to take into account a set of CG mechanisms in addition to executive pay and performance within a simultaneous equation framework in estimating the executive pay and corporate performance link. The findings are generally robust across a raft of econometric models that control for different types of endogeneities and firm-level fixed-effects, as well as different types of executive pay, CG and corporate performance proxies.

The remainder of the paper is organised as follows. The next section discusses CG and executive pay practices within the SA institutional framework. The following sections review the prior literature on executive compensation and corporate performance, discuss the research design, report empirical results and additional analyses, with the conclusion containing a summary and conclusion.

2. CORPORATE GOVERNANCE, EXECUTIVE PAY AND THE SOUTH AFRICAN INSTITUTIONAL FRAMEWORK

Attempts at improving CG practices in SA companies began with the publication of the first King Report in 1994 (King I) (Armstrong *et al*., 2006). In particular, King I emphasised the importance of properly functioning corporate boards of directors, as well as adopting many of the standards and principles that were contained in a plethora of national and international CG codes, especially those of the UK's 1992 Cadbury Report (Rossouw *et al*., 2002). However, while King I suggested that executives' remuneration should be recommended by a Remuneration Committee (RCOM), it failed to address the composition and independence of the committee, as well as the structure and possible involvement of shareholders in the determination of executive pay (Rossouw *et al*., 2002; Ntim *et al*., 2012a, b).

During the late 1990s, the country experienced a number of high profile corporate failures, such as the collapse of the Macmed, Leisurenet and Nedbank companies, which were attributed mainly to poor CG practices, including increased executive compensation (Okeahalam, 2004; Sarra, 2004). These domestic problems in combination with increased international attention on CG (Rossouw *et al*., 2002; Mangena and Chamisa, 2008), resulted in a review of King I and the subsequent publication of a second King Report (King II) in 2002. Generally, King II builds on and expands many of the best CG practices of King I, including a detailed section (see subsection 2.5 of King II) that deals with executive remuneration issues. Most noticeably, it recommends that all the members of the RCOM, including the chairperson, should be independent NEDs, but the views of executives, especially those of the CEO, may be taken into account by the committee in determining executive remuneration.

An important aspect of King II is that it expects shareholders, especially institutional ones, to play an active part in setting executive pay, including the requirement that executive remuneration be approved by shareholders at an annual general meeting, in which the chairperson of the RCOM should be available to answer questions. Crucially, it suggests that companies should engage in full disclosure of executive remuneration, giving details of fees, salaries, bonuses, pension contributions, share options and any other long-term incentive plans (LTIPs) in the annual report. Of greater significance, King II recommends that a larger part of the total remuneration package of executives should be linked to executive performance in the form of equity in order to align executive interests with those of shareholders. Overall, it requires companies to develop a formal and transparent executive pay policy backed by a clear statement of the philosophy and basis for executive compensation in the annual report.

Additional to the pursuance of recent CG reforms is the feature that, unlike the UK and US but similar to most Asian and some European countries, ownership of firms is highly concentrated (Firth et al., 2006, 2007; Ntim et al., 2012a, b). Distinct from most Asian and European countries, however, the concentration[1] has mainly emerged through the creation of tall corporate pyramids and complicated cross shareholdings rather than via individual block ownerships (Barr *et al*., 1995; Connelly *et al*., 2012). The feature of ownership concentration together with the historically poor record of implementing and enforcing corporate regulations (Ntim *et al*., 2012a, b), have greatly weakened the market for corporate and managerial control in SA; giving rise to a number of agency problems, including high executive pay, often to the detriment of employees and minority shareholders (Sarra, 2004; Armstrong *et al*., 2006).

Given this background to the recent CG reforms, as well as SA's unique corporate context, the link between executive pay and performance can arguably be expected to be different from those that have been reported for developed, as well as other developing countries. The main objective of this paper, therefore, is to investigate the link between executive pay and performance following the introduction of King II.

3. PRIOR LITERATURE ON EXECUTIVE COMPENSATION AND CORPORATE PERFORMANCE

The executive compensation and performance literature has in the main developed from two major contrasting theoretical views[2]: optimal contracting and managerial power (Murphy, 1999; Bebchuk and Fried, 2003, 2004; Cheng and Firth, 2006; Van Essen *et al*., 2012). The optimal contracting view considers executive compensation packages as a result of arm's length dealing between independent corporate boards and executives that leads to the creation of efficient managerial contracts and incentives for minimising agency problems by aligning the interests of managers and shareholders (Jensen and Murphy, 1990; John *et al*., 2010; Tang, 2012; Lin *et al*., 2012). Therefore, optimal contracting predicts a strong positive link between executive compensation and performance, due to the assumption that executives have less control in determining their pay (Kato, 1997; Dong *et al*., 2010; Aebi *et al*., 2012; Borisova *et al*., 2012).

In contrast, the managerial power view considers executive remuneration arrangements as a product of close interpersonal relationships and negotiations between powerful corporate executives, especially CEOs, and weak corporate boards, which leads to the creation of inefficient managerial contracts that exacerbates agency problems by increasing the divergence of interests between managers and shareholders (Sapp, 2008; Bebchuk and Weisbach, 2010). As executives are assumed to set their own pay (Bebchuk and Fried, 2003, 2004; Van Essen *et al*., 2012), the managerial power view expects executive compensation not to be tied necessarily to corporate performance.

The empirical literature on executive compensation is not only inconclusive, but also disproportionately concentrated in the UK and US (Hubbard and Palia, 1995; Main *et al*., 1996; Conyon, 1997; Blackwell *et al*., 2007; Lee *et al*., 2008; Zheng, 2010; Ozkan, 2011; Tang, 2012; Tian, 2013; Elsila *et al*., 2003).[3] These studies generally report a positive, but a weak, link between executive pay and performance; although US studies document a relatively stronger pay and performance sensitivity than their UK counterparts (Conyon and Murphy, 2000; Sapp, 2008). Jensen and Murphy (1990) were amongst the pioneers to investigate the association between CEO compensation and share returns. They used a sample of 1,049 US firms from 1974 to 1976, and reported a positive CEO pay and performance elasticity. Specifically, they reported that for every $1,000 increase in shareholder wealth, a US CEO's income increased by around $3.25. Main et al. (1996) reported a similar, but a weaker, finding for a sample of 60 UK companies from 1981 to 1989.

However, early UK and US studies on executive compensation generally display a major limitation in that they include only a small number of control variables, especially CG mechanisms that can potentially affect the executive pay and corporate performance relationship. In response to the later problem, subsequent and more recent UK (Conyon, 1997; Benito and Conyon, 1999; Dong and Ozkan, 2008; Ozkan, 2011) and US (Mehran, 1995; Core *et al*., 1999; Chen *et al*., 2006; Tang, 2012; Lin *et al*., 2012) studies have mostly examined the executive pay and corporate performance sensitivity by controlling for a raft of CG variables, such as board and ownership characteristics. These studies generally report similar weak executive pay and corporate performance sensitivities. A limitation of these studies is that typically they also do not explicitly address the potential endogeneity problems that may arise from the possible simultaneous use of alternative CG mechanisms and executive pay by firms to contemporaneously minimise agency problems in a simultaneous equation framework. This may explain the noticeably weak executive pay and corporate performance coefficients that have been reported by past studies (Agrawal and Knoeber, 1996; Beiner *et al*., 2004, 2006; Huang *et al*., 2012).

A small number of non UK and US studies have generally reported a positive and in contrast, a comparatively stronger, but less robust, association between executive pay and corporate performance. This indicates that the executive pay and corporate performance elasticity may not only differ due to company-specific characteristics, but also due to country-level institutional and cultural features. For example, Sapp (2008) reports a positive and higher sensitivity between executive pay and corporate performance for 416 Canadian firms from 2000 to 2005 compared with similar UK and US firms. Studies by Kaplan (1994), Kang and Shivdasani (1995), Kato (1997), Angel and Fumas (1997), and Brunello *et al*. (2001) using German, Japanese, Spanish and Italian companies, respectively, find a similar positive and relatively strong association between executive pay and corporate performance.

Further, and of direct relevance, the results of a limited number of studies conducted in a number of developing countries are largely consistent with the non UK and US evidence. For instance, using a sample of 601 Chinese firms from 2000 to 2003, Buck *et al.* (2008) report a positive and higher sensitivity between CEO pay and total shareholder return than those reported for UK and US companies. Their results are also generally consistent with those of previous and recent Chinese studies by Kato *et al*. (2006), Firth et al. (2006, 2007), and Conyon and He (2011, 2012), as well as those conducted in the emerging markets of Bulgaria and India by Jones and Kato (1996) and Kumar and Kaura (2002), respectively. Due to an apparent lack of sufficient data (Okeahalam, 2004; Ntim *et al.*, 2012a, b), there is an acute lack of empirical evidence from Africa in general, and SA in particular. Our study, therefore, seeks to extend the existing literature to African context by investigating the association between total executive pay and corporate performance for a sample of SA listed companies within a unique simultaneous equation framework.

4. RESEARCH DESIGN

4.1. Data Considerations

Our sample is drawn from all 291 non-financial firms[4] listed on the Johannesburg Securities Exchange (JSE) Ltd as at 31/12/2007. Table 1 presents a summary of the sample selection procedure.

Insert Table 1 about here

Panel *A* in Table 1 shows the industrial composition of all non-financial firms that were listed on the JSE, whilst Panel *B* summarises the composition of the final sampled firms. The data used in this study are derived from two separate sources. The first is the total executive pay and CG data extracted from company annual reports downloaded from the *Perfect Information Database*. Unlike most prior studies that have focused purely on CEO pay (Jensen and Murphy, 1990; Zheng, 2010), we collect data on the total pay of both the CEO and all other executives. The second source of the financial data is *Datastream*. Firms included in our final sample met two criteria: availability of a firm's executive pay data for all years from 2003 to 2007 and the accessibility to a company's financial and CG data from 2002 to 2006.[5]

These criteria were set for a number of reasons. First, the labour intensive nature of the manual collection of the executive pay and CG data introduced sample size limitations, and as such, we limited the sample to firms where consecutive year data were available. Second, and following previous studies (Core et al., 1999; Chhaochharia and Grinstein, 2009), our criteria ensured that the conditions for a balanced panel analysis were satisfied.[6] Third, examination of five-year data with both cross-sectional and time series properties may be useful in ascertaining whether the observed cross-sectional link between executive pay and corporate performance is robust over time.

Finally, the sample begins in 2002 because there is limited data coverage in the *Perfect Information Database/Datastream* on SA companies prior to that year, and crucially because King II came into effect in 2002. The sample ends in 2007 because it is the most recent year for which data is available. As presented in Panel *B* of Table 1, the sample consists of a total of 169 firms out of the initial 291 firms[7] over five firm-years from eight industries that met the data criteria for our analysis.

4.2. Model Specification: Executive Pay-Corporate Performance Sensitivity

Total pay of all executives (*TPAY*) and the CEO (*CEOPAY*) are our main dependent variables, and following recent studies (Jensen and Murphy, 1990; Blackwell et al., 2007; Ozkan, 2011; Tang, 2012), *TPAY/CEOPAY* is broadly defined as total cash (including base salaries, performance bonuses, pension contributions and others) and total non-cash or equity-based compensation (made up of granted shares, vested/exercised options[8] and any other long-term incentive plans). The widely used total shareholder return (*TSR*) is our main corporate performance proxy, but as a robustness check, we also employ return on assets (*ROA*) and Tobin's Q (*Q*) as alternative accounting and market-based corporate performance measures, respectively.

Also, following past studies (Conyon, 1997; Core *et al*., 1999; Lee *et al*., 2008; Jones and Wu, 2010; Lin *et al*., 2012), we include a number of CG and financial variables as controls, including the number of board meetings (*NBMs*), director ownership (*DOWN*), director ownership squared ($DOWN^2$) (to test for non-linear relationships), the presence of an independent remuneration committee (*RCOM*), CEO role duality (*DUAL*), firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), sales growth (*SGR*), capital expenditure (*CAPX*), industry (*INDUST*) and year (*YD*) dummies. Table 2 contains full definitions of all the variables used.

Insert Table 2 about here

As we estimate a lag structure, a fixed-effects model has the advantage of capturing unobservable firm-level differences, such as executive talent and firm complexity (Main *et al*., 1996; John *et al*., 2010;

Borisova *et al*., 2012), and as such we follow previous studies (Benito and Conyon, 1999; Sapp, 2008; Chhaochharia and Grinstein, 2009) in estimating a fixed-effects model specified as follows:

$$TPAY_i = \alpha_0 + \beta_1 TSR_i + \sum_{j=1}^{7} \beta_j CG_i + \sum_{k=1}^{6} \beta_k CONTROLS_{it} + \delta_i + \varepsilon_i \quad (1)$$

where: *TPAY/CEOPAY* refers to total pay of all executive directors/total CEO pay; *TSR* is total shareholder return; CG refers to the corporate governance variables, including the number of board meetings (*NBM*), director ownership (*DOWN*), director ownership squared ($DOWN^2$), the presence of an independent remuneration committee (*RCOM*), CEO role duality (*DUAL*), cross-listing (*CROSLIST*) and audit firm size (*BIG4)*; *CONTROLS* refers to the control variables for sales growth (*SGR*), capital expenditure (*CAPX*), firm size (*LNTA*), dividend payment status (*DIV*), industry (*INDUST*); year (*YD*); and δ refers to the firm-specific fixed-effects, consisting of a vector of 168 dummy variables to represent the 169 sampled firms.

4.3. Three-Stage Least Squares, Executive Pay, Alternative Corporate Governance Mechanisms and Possible Interdependencies

It has been suggested that the use of alternative CG mechanisms by companies in mitigating agency problems implies that they may need to interrelate (i.e., either as complements or substitutes) in order to be effective, and thus single equation regression models as specified in (1), for example, can lead to spurious coefficients (Agrawal and Knoeber, 1996; Chung and Pruitt, 1996; Beiner *et al*., 2004, 2006). We attempt to address this criticism of previous studies by including five alternative CG mechanisms, namely board size (*BSIZE*), the percentage of non-executive directors (*NEDs*), leverage (*LEV*), block ownership (*BLKOWN*), and institutional ownership (*INSOWN*) (Table 2 fully defines these variables) in addition to *TPAY/CEOPAY* and *TSR* to develop a system of seven simultaneous equations. We then use *3SLS* technique to simultaneously estimate equations (2) to (7) along with equation (8) specified below.[9]

The rationale is to consider *TPAY/CEOPAY* as endogenous along with the CG variables, permitting each CG mechanism to affect *TPAY/CEOPAY*, but also allowing *TPAY/CEOPAY* to affect the choice of each *CG* mechanism. For example, activism by large institutional shareholders can effectively limit executive compensation despite increased corporate performance (Hartzell and Starks, 2003; Dong and

Ozkan, 2008) and thus, the executive pay and corporate performance sensitivity may simultaneously depend on the percentage of *INSOWN*, and possibly the other CG variables. A description of how the system of seven equations[10] is developed is presented in the following subsections: 4.3.1 to 4.3.7.

4.3.1. Total shareholder return (TSR). Past CG studies (Brown and Caylor, 2009; Leung and Horwitz, 2010) suggest that *BSIZE*, *NEDs*, *LEV*, *BLKOWN* and *INSOWN* do affect corporate performance, and as such we assume that *TSR* will be determined by the five CG mechanisms, together with *TPAY/CEOPAY* and the exogenous variables. Smaller firms have better growth opportunities (Beiner *et al*., 2004; Tang, 2012), and thus we predict that firm size (*LNTA*) and audit firm size (*BIG4*) will be negatively related to *TSR*. Firms with greater investment opportunities tend to grow faster and are more likely to receive higher market valuation (Barnhart and Rosenstein, 1998; Ghosh, 2007), and hence we expect sales growth (*SGR*) and capital expenditure (*CAPX*) to be positively related to *TSR*. Dividend payment status (*DIV*) signals a healthy cash flow position (Beiner *et al*., 2006), whereas cross-listing (*CROSLIST*) indicates better future investment and growth opportunities (Ntim *et al*., 2012a), and therefore we hypothesise that *DIV* and *CROSLIST* will correlate positively with *TSR*. We expect *TSR* to vary across different industries (*INDUST*) and years (*YD*). We denote all eight exogenous variables together as *EXOGENOUS*, and therefore the first equation to be estimated in the system is specified as:

$$\begin{aligned} TSR_i = \alpha_0 + \beta_1 BSIZE_i + \beta_2 NEDs_i + \beta_3 LEV_i + \beta_4 BLKOWN_i \\ + \beta_5 INSOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{8} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \qquad (2)$$

4.3.2. Board size (BSIZE). Corporate boards perform important functions, including monitoring, disciplining and compensating management to align their interests with those of shareholders (Beiner *et al*., 2006; Ntim *et al*., 2012a). Increased communication and coordination problems associated with larger boards limits their effectiveness and this may be shown in the form of higher executive pay (Ozkan, 2011). In fact, Core *et al*. (1999), Sapp (2008) and Ozkan (2011), respectively, report that larger US, UK and Canadian boards pay their CEOs relatively more than their smaller counterparts, and hence board size (*BSIZE*) is employed as the dependent variable in the second equation in the system. Larger firms have bigger boards and complex issues to address (Beiner *et al*., 2006), and as such we predict that firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*) and the number of board meetings (*NBM*) will be positively related to *BSIZE*.

Larger firms have lower growth and investment opportunities (Agrawal and Knoeber, 1996; Borisova *et al*., 2012), and thus we expect sales growth (*SGR*) and capital expenditure (*CAPX*) to correlate negatively with *BSIZE*. As larger firms are subjected to greater media and public scrutiny (Conyon, 1997; Ntim *et al*., 2012a), we hypothesise that *BSIZE* will be positively associated with the presence of an independent remuneration committee (*RCOM*) and a CG committee (*CGCOM*) (see Table 2), but negatively related to *CEO* role duality (*DUAL*) and director ownership (*DOWN*). We also expect *BSIZE* to vary across different industries (*INDUST*) and financial years (*YD*). Labelling all 12 exogenous variables together as *EXOGENOUS*, the second equation to be estimated in the system is specified as:

$$\begin{aligned} BSIZE_i &= \alpha_0 + \beta_1 TSR_i + \beta_2 NEDs_i + \beta_3 LEV_i + \beta_4 BLKOWN_i \\ &+ \beta_5 INSOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{12} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \quad (3)$$

4.3.3. Percentage of non-executive directors (NEDs). Greater independence associated with non-executive directors (*NEDs*) potentially puts them in a better position to effectively prevent executives from expropriating shareholder wealth in the form of excessive compensation (Mehran, 1995; Leung and Horwitz, 2010; Huang *et al*., 2012). However, Core *et al*. (1999) and Ozkan (2011), respectively, report that US and UK companies with more *NEDs* paid their CEOs more than those with smaller *NEDs*, while the findings of Chhaochharia and Grinstein (2009) indicate that larger outside board representation leads to a reduction in the pay of US CEOs. King II encourages SA boards to have a majority of *NEDs*, and therefore the dependent variable of the third equation in the system is the percentage of *NEDs*.

Larger firms have greater visibility and are more attractive to prospective directors (Agrawal and Knoeber, 1996), and as such it is hypothesised that *NEDs* will be positively related to firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), the presence of an independent remuneration committee (*RCOM*) and a CG committee (*CGCOM*), but negatively associated with CEO role duality (*DUAL*) and director ownership (*DOWN*). We predict that sales growth (*SGR*) and capital expenditure (*CAPX*) will correlate negatively with *NEDs*, as smaller companies have better growth and investment prospects (Agrawal and Knoeber, 1996). We also expect *NEDs* to vary across different industries (*INDUST*) and over-time (*YD*). Naming all 11 exogenous variables together as *EXOGENOUS*, the third equation to be estimated in the system is specified as:

$$\begin{aligned} NEDs_i = \alpha_0 + \beta_1 TSR_i + \beta_2 BSIZE_i + \beta_3 LEV_i + \beta_4 BLKOWN_i \\ + \beta_5 INSOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{11} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \tag{4}$$

4.3.4. Leverage (LEV). Pas studies (Jensen, 1986; Cunat and Guadalupe, 2009; Lin *et al*., 2012) suggests that greater debt usage can serve as a good CG mechanism by reducing agency problems, such as perquisite consumption often associated with managers having excess cash flows, and therefore, leverage (*LEV*) is utilised as the dependent variable in the fourth equation in the system. As larger firms have greater agency problems, they can be expected to use more debt to induce extra monitoring by lenders (Agrawal and Knoeber, 1996; Sun *et al*., 2009; Grundy and Li, 2010) and hence, we predict a positive relationship between *LEV* and firm size (*LNTA*), audit firm size (BIG4), and cross-listing (*CROSLIST*).

Beiner *et al*. (2006) indicate that dividend payment signals the availability of internal funds as an alternative to debt financing, and thus we hypothesise a negative link between *LEV* and dividend payment status (*DIV*). Also, debt usage can increase financial distress and limits the capacity to utilise growth and investment opportunities (Jensen, 1986) and accordingly predicts that sales growth (*SGR*) and capital expenditure (*CAPX*) will relate negatively to *LEV*. We also expect debt usage to vary across different industries (*INDUST*) and years (*YD*). Labelling all eight exogenous variables together as *EXOGENOUS*, the fourth equation to be estimated in the system is specified as:

$$\begin{aligned} LEV_i = \alpha_0 + \beta_1 TSR_i + \beta_2 BSIZE_i + \beta_3 NEDs_i + \beta_4 BLKOWN_i \\ + \beta_5 INSOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{8} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \tag{5}$$

4.3.5. Block ownership (BLKOWN). Greater block ownership (*BLKOWN*) can serve as a substitute for good CG mechanisms by limiting executive compensation (Ozkan, 2011; Connelly *et al*., 2012). Indeed, Mehran

(1995), Core *et al*. (1999), Sapp (2008) and Ozkan (2011) respectively, report that US, Canadian and UK firms with greater block ownership pay their CEOs significantly less, compared to those with smaller block ownership. Given the inherent pervasiveness of block ownership in SA, mainly due to complicated cross shareholdings and pyramidical structures (Barr *et al*., 1995; Armstrong *et al*., 2006; Ntim *et al*., 2012a and b), we employ *BLKOWN* as the fifth dependent variable in the system.

Agrawal and Knoeber (1996) suggest that it is more attractive to invest in firms with higher growth and investment prospects, and thus we expect that sales growth (*SGR*) and capital expenditure (*CAPX*) will be positively associated with *BLKOWN*. We expect *BLKOWN* to be negatively related to firm size (*LNTA*), the presence of a remuneration committee (*RCOM*) and a CG committee (*CGCOM*), but to correlate positively with director ownership (*DOWN*) and CEO role duality (*DUAL*), as it costs more to buy a portion of a larger firm (Ang *et al*., 2002; Anderson and Bizjak, 2003; Beiner *et al*., 2006). We also predict that *BLKOWN* will vary across different industries (*INDUST*) and years (*YD*). Referring to all nine exogenous variables together as *EXOGENOUS*, the fifth equation to be estimated in the system is specified as:

$$\begin{aligned} BLKOWN_i = \alpha_0 + \beta_1 TSR_i + \beta_2 BSIZE_i + \beta_3 NEDs_i + \beta_4 LEV_i \\ + \beta_5 INSOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{9} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \quad (6)$$

4.3.6. Institutional ownership (INSOWN). Greater activism and monitoring by institutional shareholders can improve the executive pay and performance sensitivity (Hartzell and Starks, 2003; Tang, 2012; Ntim *et al*., 2012a). However, while Hartzell and Starks (2003) and Dong and Ozkan (2008), respectively, report that US and UK companies with greater institutional ownership paid their CEOs significantly less than those with smaller institutional ownership, the results of Zheng (2010) suggest that institutional ownership has no impact on CEO compensation in a sample of US firms. However, King II urges institutional shareholders to play active roles in setting executive pay in SA firms and hence, the dependent variable in the sixth equation of the system is institutional ownership (*INSOWN*).

Beiner *et al*. (2006) suggest that it is more profitable to hold shares in firms with better growth and investment opportunities, and thus sales growth (*SGR*) and capital expenditure (*CAPX*) are hypothesised to relate positively to *INSOWN*. Larger firms are attractive to institutions (Agrawal and Knoeber, 1996; Lin *et al*., 2012; Ntim *et al*., 2012a) and thus, *INSOWN* is expected to be positively associated with firm size (*LNTA*), audit firm size (*BIG4)*, cross-listing (*CROSLIST*), the presence of a remuneration committee (*RCOM*) and a CG committee (*CGCOM*), but to be negatively linked to CEO role duality (*DUAL*). We also expect *INSOWN* to vary across different industries (*INDUST*) and years (*YD*). Labelling all 10 exogenous variables together as *EXOGENOUS*, the sixth equation to be estimated in the system is specified as:

$$\begin{aligned} INSOWN_i = \alpha_0 + \beta_1 TSR_i + \beta_2 BSIZE_i + \beta_3 NEDs_i + \beta_4 LEV_i \\ + \beta_5 BLKOWN_i + \beta_6 TPAY_i + \sum_{j=1}^{10} \beta_j EXOGENOUS_i + \varepsilon_i \end{aligned} \tag{7}$$

4.3.7. Total executive/CEO pay (TPAY/CEOPAY), corporate performance (TSR) and CG Mechanisms. To examine the association between total executive/CEO pay (*TPAY/CEOPAY*), corporate performance (*TSR*) and the CG mechanisms, *TPAY/CEOPAY* is employed as the dependent variable in the final equation in the system. We also add all the control variables included in equation (1), which are combined as *CONTROLS.* Therefore, the final equation to be estimated in the system is specified as:

$$\begin{aligned} TPAY_i = \alpha_0 + \beta_1 TSR_i + \beta_2 BSIZE_i + \beta_3 NEDs_i + \beta_4 LEV_i \\ + \beta_5 BLKOWN_i + \beta_6 INSOWN_i + \sum_{j=1}^{12} \beta_j CONTROLS_i + \varepsilon_i \end{aligned} \tag{8}$$

5. EMPIRICAL RESULTS AND DISCUSSION

5.1. Descriptive Statistics

Table 3 contains descriptive statistics of the two main components of total executive pay for all firm-years, as well as for each of the five firm-years. Panels *A* and *B* report statistics relating to total and average pay of all executives (*TPAY*), respectively, while Panel *C* presents similar figures for the CEO (*CEOPAY*). The table indicates that *TPAY* and *CEOPAY* have generally increased considerably over the five-year period investigated. The mean total *CEOPAY* increased by about 92% from R1.89m ($0.22m) in 2003 to R3.64m ($0.42m) in 2007, suggesting an approximate annual growth rate[11] of 18%. This appears to support the widely held view, especially within the SA financial press (Okeahalam, 2004; Sarra, 2004; Ntim *et al*., 2012a) that corporate executives continue to receive substantial pay increases that are well above the average national growth rate in pay. Similar growth and distribution patterns can be observed for the total and average pay of all executive directors presented in Panels *A* and *B* of Table 3, respectively. However, the level of an average pay of a corporate executive is observably lower than that of an average pay of a CEO. For example, and on average, CEOs receive about R1m ($0.12m) more in total compensation than the average corporate executive with the statistics exhibiting greater variability in average CEO pay than average corporate executive pay.

Insert Table 3 about here

We note that whilst the absolute levels of top executive pay in SA are relatively lower than those reported in developed countries, such as the UK and US (Main *et al*., 1996; Conyon and Murphy, 2000; Zheng, 2010; Ozkan, 2011; Cook and Burress, 2013; Elsila *et al*., 2013; Kabir *et al*., 2013), evidence of increasing levels of executive pay is generally consistent with their results. Noticeably, and despite King II's suggestion that equity should form a larger part of executives pay in order to align their interests with those of shareholders, total cash pay continue to form a substantial portion of total executive pay. For instance, the average total non-cash pay of all executive directors of R1.61m ($0.19m) is only 13% of the average total pay of R12.89m ($1.49m). However, it is noticeable that in spite of accounting for a small proportion of total executive pay, average total non-cash pay is on the increase, and in the case of *CEOPAY*, has even grown considerably faster (over 20% annually) than total CEO cash pay.

Insert Table 4 about here

Table 4 presents descriptive statistics for the endogenous (Panel *A*) and exogenous (Panel *B*) variables used. All values generally indicate a wide spread. For example, and similar to the findings of Chhaochharia and Grinstein (2009), total shareholder return (*TSR*) ranges from -48% to 236% with an average of 28%, indicating that most of the sampled firms are profitable.[12] The median board size (*BSIZE*) of 10 is lower than a corresponding number of 13 reported by Core et al. (1999) for a sample of US firms, while the average of 57% non-executive directors (*NEDs*) is in line with the 62% reported by Lee et al. (2008) for a sample of US companies. The mean institutional ownership (*INSOWN*) of 74% is consistent with the 63% reported by Zheng (2010) for a sample of US firms, whereas the average block ownership

(*BLKOWN*) of 62% is considerably higher than the 20% reported by Ozkan (2011) for a sample of UK firms. CEO age ranges from a minimum of 34 years to a maximum of 76 years with an average of 55 years. This supports previous evidence that CEOs, on average, tend to be matured and experienced individuals (Ozkan, 2011; Elsila *et al*., 2013). Similarly, CEO tenure ranges between a minimum of zero (less than six months) and maximum of 28 years with median tenure of six and half years, and thereby providing support for the similar findings of past studies (Ozkan, 2011; Bai and Elyasiani, 2013; Cook and Burress, 2013).

Strikingly, on average, only 14% of our sampled firms have independent remuneration committee (*RCOM*), far lower than the 66% reported by Brown and Caylor (2009) for a sample of US companies. In contrast, the descriptive statistics indicate that 23% (77%) have combined (separated) the roles of CEO and Chairman (*DUAL*); a figure close to the 18% (82%) found by Conyon and Murphy (2000) for a sample of UK companies. The other endogenous and exogenous variables all show wide variation, suggesting that the sample is sufficiently made up of a mixture of small and large firms, and thus minimises any incidences of sample selection bias (Livne *et al*., 2013; O'Connor *et al*., 2013; Shen and Zhang, 2013).

5.2. Executive Pay and Corporate Performance Sensitivity

5.2.1. Results based on estimating firm fixed-effects. Table 5 contains a fixed-effects regression of cash, non-cash and total executive pay on corporate performance, as proxied by *TSR* and the control variables. Columns 2 to 4 present results relating to the total pay of all executive directors (*TPAY*), whereas Columns 5 to 7 report similar estimates for the CEO (*CEOPAY*). The results generally show that there is a positive and significant (at least at the 5% level) association between corporate performance and executive pay in SA, but consistent with the findings of past studies, the coefficients are small, ranging from 0.025 for cash pay of *TPAY* to 0.098 for total *CEOPAY*. Conyon (1997) and Ozkan (2011), respectively, report share returns and CEO pay sensitivity of 0.061 and 0.095 for samples of UK firms. Similarly, Hubbard and Palia (1995) and Hartzell and Starks (2003) respectively, report *TSR* and CEO compensation sensitivity of 0.099 and 0.093 for samples of US companies. Noticeably, and on average, the link between equity-based executive pay and corporate performance is stronger than for cash-based pay.

For example, while the association between *TSR* and total cash pay of all executives is 0.025, that with non-cash pay is higher at 0.054, implying that a 10% increase in *TSR* will be associated with only a 0.25% increase in executive directors' cash-based pay, but a 0.54% increase in their equity-based pay, *ceteris paribus*. This provides support to the recommendations of King II and the findings of previous studies (Main *et al*., 1996; Conyon and Murphy, 2000; Ozkan, 2011), which report a higher relationship between share returns and non-cash CEO compensation than CEO cash pay. This finding is not theoretically surprising as equity-based pay, such as stocks and options, are more tied to corporate fortunes than cash-based compensation, such as salaries and pension contributions that are most often predetermined (Jensen and Murphy, 1990; Murphy, 1999; Berger *et al*., 2013) and less sensitive to performance.

A major implication of this finding is that the structure rather than the levels of pay appears to be more effective in linking executive/CEO pay to corporate performance. This is because whereas the absolute levels of non-cash pay (see Table 3) are far lower than those of cash pay, it appears to have a stronger link with corporate performance than cash pay. The results in Table 5 also suggest that irrespective of the compensation proxy used, the association between *TSR* and *CEOPAY* appears to be stronger than that with *TPAY*. This offers empirical support to the findings of Sapp (2008) and Tang (2012) for samples of Canadian and US companies, respectively.

One explanation is that CEOs perform larger and strategic roles with a higher possibility of being dismissed following poor corporate performance than lower placed executives (Kang and Shivdasani, 1995; Blackwell *et al*., 2007; Tiani, 2013), and consequently CEO pay is expected to be higher and more tied to corporate performance to compensate for the associated extra responsibilities and risks. It is also consistent with tournament theory (Sapp, 2008; Lee *et al*., 2008; Zhao, 2013), which suggests that CEOs are paid more to stimulate healthy competition among lower placed executives for the position of the CEO, ultimately resulting in the exertion of greater effort and improved corporate performance.

The coefficients on most of the control variables in Table 5 also show the expected signs. For instance, firm size (*LNTA*) and audit firm size (*BIG4*) are significant and positively related to *TPAY*/*CEOPAY* with relatively larger coefficients, as expected, providing support to the widely documented evidence that firm size is the single most important determinant of executive pay (Conyon and Murphy, 2000; Jones and Wu, 2010; John *et al*., 2010; Lin *et al*., 2012). The theory that larger firms are more complex to manage, implies the need for higher quality managers capable of making frequent and significant decisions, but such talented managers are both scarce and highly mobile who can largely be attracted with competitive pay packages (Murphy, 1999; Sapp, 2008). Consistent with past studies (Mehran, 1995; Core *et al*., 1999; Chen *et al*., 2006; Huang *et al*., 2012), our results show that director ownership (*DOWN*) is associated with significantly lower executive/CEO compensation, suggesting an alignment of executive interests with those of shareholders that minimises managerial expropriation.

However, we do not find any evidence of a significant non-monotonic link between director ownership squared ($DOWN^2$) and executive/CEO pay as reported by Lee *et al*. (2008) and Ozkan (2011). The results also indicate that the presence of an independent remuneration committee (*RCOM*) impacts negatively on executive/CEO pay, indicating that independence of the committee improves executive monitoring (Chhaochharia and Grinstein, 2009; Dong *et al*., 2010). This is also in line with the suggestions of King II, as well as the findings of Conyon (1997) and Sapp (2008) for samples of UK and Canadian firms, respectively. The significant and positive association between CEO duality (*DUAL*) and CEO non-cash pay/total (*CEOPAY*) implies that firms that combine the roles of CEO and chairman pay their CEOs more, offering support to the recommendations of King II and the results of Core *et al*. (1999), but inconsistent with those of Benito and Conyon (1999) who find a statistically insignificant association between *DUAL* and CEO pay. In theory, higher CEO pay reflects extra responsibilities associated with role duality and also increased influence of the CEO over the board and remuneration committee (Conyon and Murphy, 2000; Sun *et al*., 2009; Conyon and He, 2011, 2012; Bai and Elyasiani, 2013).

As expected, the results indicate that higher capital expenditure (*CAPX*) and dividend payment (*DIV*) impact negatively on executive/CEO pay, implying that the two corporate decisions reduce cash flows available to managers to expropriate in the form of excessive compensation (Jensen, 1986; Beiner *et al*., 2006), but that faster growing firms (*SGR*) appear to pay their executives significantly more, to presumably reward them for their superior managerial initiative and the company's improved cash flow position. Consistent with the findings of Sapp (2008) for a sample of Canadian firms, our results suggest that cross-listed (*CROSLIST*) firms paid their executives/CEOs significantly more than their non-cross-listed counterparts. The increased firm size and complexity of operations usually associated with cross-listing, in theory, requires lucrative pay packages to successfully attract managers of international quality (Sapp, 2008; Tang, 2012; Elsila *et al*., 2013; Kabir *et al*., 2013; Livne *et al*., 2013).

In contrast to the results of Core et al. (1999), we do not find any evidence that a busier corporate board, as measured by the number of board meetings (*NBM*), significantly impacts positively or negatively on executive/CEO pay. Finally, and unlike Conyon and Murphy (2000), Sapp (2008), Shen and Zhang (2013), Tiani (2013), Wesep and Wang (2013), our results (which are not reported, but available on request) do not suggest any significant differences in executive/CEO pay across different industries (*INDUST*). We do, however, find evidence of significant differences in pay across different years (*YD*) with executive/CEO pay being highest (displaying the largest significant coefficient) in 2007.

5.2.2. Results based on the 3SLS and alternative corporate performance proxies. As previously noted, past studies have estimated executive pay and performance sensitivity by using single equation modelling as specified in equation (1), for example, without taking into account possible simultaneities among the variables within a simultaneous equation framework, and potentially leading either to endogenous associations (Gil-Alana *et al*., 2010; Larcker and Rusticus, 2010) or misleading coefficients (Agrawal and Knoeber, 1996; Beiner *et al*., 2006). Unlike OLS, *3SLS* uses generalised least squares to estimate robust coefficients by controlling for cross-equation correlation among the errors (Gujarati, 2003; Lee *et al*., 2008; Wooldridge, 2010), and thereby allows each mechanism to simultaneously affect executive pay, but also permitting executive pay to affect each mechanism (Agrawal and Knoeber, 1996; Barnhart and Rosenstein, 1998; Ghosh, 2007). Thus, to adequately account for the presence of such potential endogenous links, we estimate equations (2) to (8) as a system of simultaneous equations that allows for possible simultaneous interrelationships among *TPAY*/*CEOPAY*, *TSR* and the five CG variables using *3SLS*.

However, to be certain that the *3SLS* methodology is appropriate, we first test for the existence of endogenous or simultaneous links among executive pay, performance, and the five CG variables using the Durbin-Wu-Hausman test (see Beiner *et al*., 2006, p. 27 for a detailed description of the procedure). Applied to equation (8), the test rejects the null hypothesis of no endogeneity at the 1% level. Therefore, we conclude that the *3SLS* technique is appropriate and that our initial results from equation (1) may be misleading (in terms of bias and inconsistency).

Tables 6 and 7 contain results from estimating (2) to (8) as a system of simultaneous equations using *3SLS.*[13] Table 6 reports results relating to *TPAY*, whilst Table 7 presents similar findings for *CEOPAY*. Most importantly, the coefficients on *TPAY* and *CEOPAY* reported in Column 8 in both tables, remain positive and statistically significant. It is also clearly observable that, irrespective of the executive pay measure used, the link between *TSR* and *TPAY/CEOPAY* has considerably improved. For example, the association between *TSR* and *CEOPAY* has increased from 0.098 for the single equation model in Table 5 to 0.197 for the simultaneous equation model in Table 7.

While this difference is not substantially large compared to those reported by other studies (Main *et al*., 1996; Conyon, 1997; Firth *et al*., 2006; Sapp, 2008; Lin *et al*., 2012; Tang, 2012), it at least suggests that allowing for the existence of possible simultaneous interdependencies among *TPAY/CEOPAY*, *TSR* and the CG mechanisms results in an improvement in the executive pay and corporate performance elasticity. In addition, the findings reported in Column 8 of Tables 6 and 7 indicate that larger boards (*BSIZE*) pay their executives significantly more. This supports the results of Core et al. (1999) and Ozkan (2011) and is also consistent with the interpretation that larger boards are a sign of weak CG in the form of poor monitoring and disciplining of managers, resulting in managerial expropriation through excessive executive pay.

In contrast, the results suggest that greater debt usage (*LEV*) and higher institutional ownership (*INSOWN*) are associated with significantly lower *TPAY/CEOPAY*, providing support to the results of John et al. (2010) and Hartzell and Starks (2003), respectively. Theoretically, debt usage induces extra managerial monitoring by creditors in addition to reducing the agency problem of expropriation of 'free cash flows' by opportunistic managers (Jensen, 1986; Beiner *et al*., 2006; Ghosh, 2007; Aebi *et al*., 2011).

Similarly, due to their information and knowledge advantages, institutional shareholders can mitigate agency problems by engaging in greater managerial monitoring and disciplining that can lead to lower executive compensation (Dong and Ozkan, 2008; Zheng, 2010; Lin *et al*., 2012; Huang *et al*., 2012).

The findings reported in Tables 6 and 7 further suggest significant interdependencies (either complementarities or substitutabilities) among *TPAY/CEOPAY*, *TSR* and the five CG variables, providing support for our simultaneous equation design, as well as highlighting the need for future researchers to take into account a comprehensive set of CG mechanisms within a simultaneous equation framework, when estimating the executive pay and corporate performance link. For instance, the results reported in Column 2 of both tables show that the coefficient on *TPAY/CEOPAY* is positive and significant, implying that better corporate performance is not only associated with higher pay, but that there is also a reverse association (i.e., higher executive pay also seems to motivate managers to strive for better corporate performance).

Additionally, the findings presented in Column 2 of both tables indicate that *BSIZE*, *NEDs* and *INSOWN* impact positively on *TSR*, whereas *LEV* and *BLKOWN* are negatively related to corporate performance. Within the SA corporate context, while larger boards may be weak at monitoring executives, they are likely to be better placed to attract critical resources, such as finance, business contracts and contacts that may enhance corporate performance (Okeahalam, 2004; Ntim *et al*., 2012a). The presence of *NEDs* improves board independence and monitoring (Leung and Horwitz, 2010; John *et al.*, 2010) whereas, due to their larger ownership stake and greater financial strength, higher *INSOWN* reduces agency problems through greater managerial monitoring (Hartzell and Starks, 2003, Ozkan, 2011). The significant negative relationship between *TSR* and *LEV* does not support the ‘free cash flow’ and capital structure theories (Agrawal and Knoeber, 1996; Beiner *et al*., 2006), but appears to suggest that greater use of debt increases financial stress and reduces a firm’s capacity to exploit profitable growth opportunities (Jensen, 1986), whilst the negative link between *TSR* and *BLKOWN* implies that block owners can collaborate with managers to expropriate corporate resources at the expense of minority shareholders (Agrawal and Knoeber, 1996; Beiner *et al*., 2006; Borisova *et al*., 2012; Bai and Elyasiani, 2013; Berger *et al*., 2013).

Consistent with our expectations, the results reported in Column 3 of Tables 6 and 7 indicate that *BSIZE* is significant and positively related to *TSR*, *NEDs*, *TPAY/CEOPAY*, *LEV* and *INSOWN*. This reveals the existence of reverse associations among *BSIZE*, *TSR* and *TPAY/CEOPAY*, as well as suggesting that *BSIZE*, *NEDs*, *INSOWN* and *LEV* are complementary CG mechanisms. The findings contained in Column 4 of both tables show that *NED*s are positively associated with *BSIZE* and *LEV*, providing further support for the presence of simultaneous complementarities among them, as larger boards will invariably lead to higher proportion of *NEDs* with better capacity and reputation to raise and use more debt.

In line our with our expectations, the results in Column 5 of both Tables 6 and 7 suggest that *LEV* is negatively related to *TSR*, but positively associated with *BSIZE* and *NEDs*, supporting the existence of a reverse substitutive link between *LEV* and *TSR* (i.e., higher debt usage is associated with lower corporate performance, but also more profitable firms appear to use less debt), but reverse complementary associations among *LEV*, *BSIZE* and *NEDs*. Consistent with predictions, the findings presented in Column 6 of both tables indicate that *BLKOWN* is positively related to *INSOWN*, implying that because it costs more to buy shares in larger firms, block shareholders are more likely to be institutions (Agrawal and Knoeber, 1996; Beiner *et al*., 2006; Connelly *et al*., 2012; Wesep and Wang, 2013; Zhao, 2013).

In contrast, the reverse positive link between *BLKOWN* and *LEV* is not consistent with our expectation that firms with a dominant block owner are less likely to use debt. The results reported in Column 7 of both Tables 6 and 7 suggest that *INSOWN* is positively related to *TSR*, *BSIZE* and *BLKOWN*, but negatively associated with *TPAY/CEOPAY*, indicating the existence of a reverse substitutability link between *INSOWN* and *TPAY/CEOPAY* (i.e., greater *INSOWN* appears to be associated with lower *TPAY/CEOPAY*, but also firms that pay their executives lower seem to have higher *INSOWN*). Also, the coefficients on the exogenous variables reported in both tables generally depict the predicted signs. For example, *CROSLIST*, *DIV* and *SGR* are positively related to *TSR*, whereas *LNTA* and *CAPX* are negatively related to *TSR* as expected. The signs of the coefficients on the exogenous variables for *BSIZE*, *NEDs*, *LEV*, *BLKOWN*, *INSOWN* and *TPAY/CEOPAY* are generally in line with our theoretical expectations.

6. ADDITIONAL ANALYSES

To examine the robustness of our results, we conduct a number of additional analyses, primarily regarding the use of alternative corporate performance measures (*ROA* and *Q*), alternative econometric methods (estimating a generalised method of moments – GMM, and testing for changes and interaction effects), the use of an alternative CG proxy (incorporating a composite CG index - *CGI*), and including additional control variables (CEO age – *CEOAGE*, and CEO tenure - *CTENURE*).[14]

First, to ascertain whether our results are sensitive to the corporate performance proxy used, we re-run equation (1) using return on assets (*ROA*) and Tobin's Q (*Q*) as accounting and market based alternative corporate performance measures, respectively, which have been used widely within the executive compensation literature (Mehran, 1995; Lee *et al*., 2008; Sapp, 2008; Chhaochharia and Grinstein, 2009; Elsila *et al*., 2013), and are considered to be appropriate. Table 8 contains estimated results based on *ROA*, whilst Table 9 reports findings based on *Q*. Although, a number of minor sensitivities can be observed with regard to the magnitude of some of the coefficients, the results in both tables are essentially similar to those reported in Table 5 for *TSR*, suggesting that our results are fairly robust.

A particularly interesting comparison shows that irrespective of the executive pay proxy used, the results suggest that there is a stronger link between *TPAY/CEOPAY* and *ROA* than with *Q* or *TSR*. This is consistent with the findings of previous studies (Kang and Shivdasani, 1995; Core *et al*., 1999) and indicates that accounting profits are more directly related to executive pay than market performance. The signs and significance of the coefficients on the control variables reported in Tables 8 and 9 remain virtually the same as those reported in Table 5. For instance, the coefficients on *CAPX*, *DOWN* and *RCOM* contained in Tables 8 and 9 remain significant and negatively related to *TPAY/CEOPAY*, whereas *CROSLIST*, *SGR* and *LNTA* are still significant and positively associated with *TPAY/CEOPAY*.

Second, it has been suggested that it is difficult to obtain appropriate instruments that can be used in estimating our system of *3SLS* that can adequately address the presence of potential endogeneity problems (Chenhall and Moers, 2007a, b; Van Lent, 2007; Larcker and Rusticus, 2010; Wooldridge, 2010). Therefore, one way of avoiding such potential endogeneity problems when estimating the pay-for-performance elasticity is to run the regression using changes in the variables rather than levels (Jensen and

Murphy, 1990; Morey *et al*., 2009; Conyon and He, 2011, 2012). The main advantage of this approach is that estimating first-differences of the variables can eliminate any firm-specific hetereogeneities, and thereby allowing a much more precise estimation of the pay-for-performance sensitivity. Hence, we re-estimate equation (1) by using changes instead of levels of the executive compensation and performance variables. Statistically significant and positive effect of the ∆*TSR* on ∆*CEOPAY* is discernible in Model 1 of Table 10, thereby implying that our evidence of a positive association between *CEOPAY* and *TSR* is not significantly sensitive to endogeneity problems that may arise from firm-specific hetereogeneities. The noticeable decrease in the coefficient (0.020) on the ∆*TSR* compared with the one (0.098) on the *TSR* in Model 6 of Table 5 is generally consistent with previous evidence that suggests that first-differenced variables tend to predict *TSR* less strongly than their levels counterparts (Jensen and Murphy, 1990; Morey *et al* ., 2009; Conyon and He, 2011, 2012; Elsila *et al*., 2013).

Third, although we have made explicit efforts at mitigating potential endogeneity problems regarding the association between executive compensation and corporate performance by estimating fixed-effects and lagged structure models, Wintoki *et al*. (2012) suggest that the relationship may still be confounded by the presence of dynamic endogeneity. In particular, the dynamic endogeneity problem arises if future values of our corporate performance measure (*TSR*) may be influenced by current values of the executive pay proxy (*CEOPAY*), which in turn may be associated with past values of the *TSR*. Whereas it has been widely assumed that estimating fixed-effects can address such endogeneity problems (i.e., unobserved hetereogeneity, simultaneity, and dynamic endogeneity), it has been demonstrated recently that if our explanatory variable (*TSR*) is related to past values of our dependent variable (*CEOPAY*), then implementing the fixed-effects estimation procedure may produce biased coefficients (Guest, 2009; Wooldridge, 2010; Mangena *et al*., 2012; Wintoki *et al*., 2012; Elsila *et al*., 2013; Fosu, 2013).

Thus, Wintoki *et al*. (2012) suggest that the above econometric problems relating to unobserved hetereogeneity, dynamic endogeneity, and simultaneity can be resolved by using a dynamic panel GMM estimator. Briefly, this dynamic panel GMM estimator was developed in series of studies by Holtz-Eakin *et al*. (1988), Arellano and Bond (1991), Arellano and Bover (1995), and Arellano and Bond (1998). Wintoki *et al*. (2012) indicate that the GMM estimator has at least three advantages over traditional OLS or fixed-effects estimator. First, and distinct from ordinary least square (OLS) estimator, the GMM estimator has the capacity to capture firm-level fixed-effects, and thereby adequately addressing any potential endogeneities that may arise from unobserved firm specific hetereogeneities. Second, and different from traditional fixed-effects estimator that assumes strong exogeneity (i.e., not robust to autocorrelation and hetereoscedascity) between current and past values, the GMM estimator permits current values of the explanatory variable (i.e., *TSR*) to be affected by past values of the dependent variable (i.e., *CEOPAY*). Finally, distinct from both OLS and fixed-effects estimators, if the economic structure and process underlying the generation of the variables is dynamic – in our case, if current values of the *TSR* variables are related to past values of the *CEOPAY*, then a GMM estimator can make it possible to use past values of the dependent and independent variables as valid instruments to adequately account for the presence of potential dynamic and simultaneous endogeneities. Hence, a key advantage of the GMM estimator is that it relies on internal instruments derived from historical values of the dependent and independent variables to be used, and thereby crucially eliminating the need for external instruments.

Consequently, we employ a dynamic GMM estimator to re-regress the link between executive pay and corporate performance to accurately account for the existence of potential dynamic and simultaneous endogeneities. In particular, we use the two-step difference-GMM estimator developed by Arellano and Bond (1991) to re-estimate the pay-for-performance sensitivity. The primary procedure is made up of two steps. First, we take first differences of the *TSR*, *CEOPAY*, and CG/control variables to remove any bias that may arise from firm specific unobserved hetereogeneities. Second, we re-estimate equation (1) in the first differenced form using lagged values of the *TSR*, *CEOPAY*, and CG/control variables as instruments for current changes in the same set of variables. This also involves including past values of the dependent variable (*CEOPAY*) as part of the explanatory variables, and given our relatively limited dataset, the variables are instrumented with up to two lags of their own levels. Statistically significant and positive association between the *TSR* and *CEOPAY* is observable in Model 2 of Table 10, suggesting that our evidence is robust to the presence of potential dynamic and simultaneous endogeneity problems. With respect to the specification tests, the *p*-value of the AR(1) test suggests that autocorrelation is present in the first-differenced regression residuals, implying that the inclusion of the first lag of our dependent variable (*CEOPAY*) in our model seems appropriate. However, the *p*-value of the AR(2) test indicates that the null hypothesis of no second-order autocorrelation cannot be rejected. Further, both the Sargan (not robust to hetereoscedasticity) and Hansen (robust to hetereoscedasticity) tests of over-identification restrictions fail to reject the null hypothesis that our instruments are valid. Similarly, the difference-in-Hansen test of exogeneity of the instruments does not reject the null hypothesis that the instruments are exogenous.

Fourth, it has been argued that the pay-for-performance sensitivity may be strengthened or weakened depending on the quality of CG, implying that CG may have an interaction effect on the connection between *TSR* and *CEOPAY* (Conyon and He, 2011, 2012; Michiels *et al*., 2013). That is, in firms with better governance and monitoring structures, the pay-performance nexus may be expected to be strong and vice-versa. Therefore, to test for potential interaction effects of CG on the pay-for-performance sensitivity, re-estimate equation (1) by including interaction variables between our performance proxy (*TSR*) and each of the other five alternative CG variables (*TSR***BSIZE*, *TSR***NEDs*, *TSR***LEV*, *TSR***BLKOWN*, and *TSR***INSOWN*). Additionally, we include each alternative CG variables (*BSIZE*, *NEDs*, *LEV*, *BLKOWN*, and *INSOWN*) on its own in our interaction effects model. Statistically significant and positive effect of the *TSR* on the *CEOPAY* in Model 3 of Table 10 is easily discernible. Observably, the pay-for-performance sensitivity has increased from 0.098 in Model 6 of Table 5 to 0.125 in Model 3 of Table 10, implying that interacting our CG variables with our performance measure appears to have enhanced the pay-performance nexus. More precisely, *BSIZE* has a significant positive influence on the link between executive pay and performance, whereas *NEDs* and *INSOWN* have a significant negative effect on the same association.

Fifth, Larcker and Rusticus (2007) suggest that CG is a complex concept with different aspects. It is, therefore, difficult for single CG mechanisms, such as *BSIZE*, *NEDs*, *BLKOWN*, and *INSOWN* to fully capture the varied aspects of CG on their own, and thereby leading to potential endogeneity problems arising mainly from measurement errors. One way of addressing potential endogeneity problems that may be caused by such measurement errors is to construct a broad or composite CG index that incorporates different aspects of CG, such as board and directors issues, ownership issues, anti-takeover issues, and accounting and transparency issues, amongst others (Beiner *et al*., 2006; Larcker and Rusticus, 2007; Morey *et al*., 2009; Ntim *et al*., 2012a). To address potential endogeneity problems that may arise from such measurement errors, we re-estimate equation (1) by including a broad CG index (*CGI*) containing 50 individual CG provisions extracted from the 2002 King Report on Corporate Governance for SA relating to five different governance aspects, namely: (i) board and directors; (ii) accounting and auditing; (iii) risk management, internal audit and control; (iv) encouraging voluntary and enforcement; and (v) integrated sustainability reporting issues (non-financials issues). The detailed CG provisions are contained in the Appendix of Ntim *et al*. (2012a, p. 102). Statistically significant and positive effect of the *TSR* on the *CEOPAY* is noticeable in Model 4 of Table 10, which also contains the *CGI*, implying that our previous evidence of positive effect of *TSR* on *CEOPAY* seems robust to potential endogeneous problems that may arise from measurement errors. Noticeably, the *CGI* also has a statistically significant and positive (0.136) effect on the pay-for-performance sensitivity. Further, we include the *CGI* in both our changes and interaction effects models (Models 5 and 6 of Table 10, respectively) with the findings remaining essentially the same as those in Models 1 and 3 of Table 10, respectively.

Finally, prior studies suggest that CEO age and tenure can influence the level of CEO pay (Ozkan, 2011; Bai and Elyasiani, 2013; Cook and Burress, 2013; Elsila *et al*., 2013). We, therefore, re-estimate equation (1) by including CEO age (*CEOAGE*) and CEO tenure (*CTENURE*) as additional control variables in Model 7 of Table 10, with the evidence suggesting a statistically significant and positive effect of the *TSR* on the *CEOPAY*. Further, consistent with the findings of past studies (Ozkan, 2011; Bai and Elyasiani, 2013; Cook and Burress, 2013), the coefficients on both *CEOAGE*, and *CTENURE* are positive and statistically significant, suggesting that older and long-serving CEOs received significantly higher pay than their younger and less experienced counterparts. Overall, the additional analyses suggest that our results are robust to different forms of endogeneity problems, including unobserved dynamic hetereogeneity and simultaneity, as well as different alternative executive pay, CG and performance proxies.

7. SUMMARY AND CONCLUSION

This paper investigates the association between executive pay and corporate performance, as measured by total shareholder return using a sample of South African (SA) listed firms, by uniquely taking into account a comprehensive set of corporate governance (CG) mechanisms within a three-stage least squares (*3SLS*) simultaneous equation framework. We examine the link between cash and non-cash or equity-based compensation, as well as the association between both total CEO pay and corporate performance and between the total pay of all executives and corporate performance.

Consistent with past studies (Conyon, 1997; Murphy, 1999; Firth *et al*., 2006, 2007; Lin *et al*., 2012; Tiani, 2013), our results based on estimating a conventional single equation model indicate that the executive pay and corporate performance elasticity is relatively small, ranging from 0.025 for cash compensation of all executives to 0.098 for total (cash and equity) CEO pay, and implies that the 2002 King Report's (King II) attempt at linking executive pay more closely to performance has not been completely successful. We also find that the executive pay and performance sensitivity is stronger for equity-based pay than for cash-based compensation, providing support to the results of previous studies (Jensen and Murphy, 1990; Conyon and Murphy, 2000; Ozkan, 2011; Huang *et al*., 2012; Conyony and He, 2011, 2012). In addition, the results indicate that CEO pay is more sensitive to performance than those of lower placed executives, consistent with the relatively risky and strategic nature of the CEO post (Ang *et al*., 2002; Sapp, 2008; Sun et al., 2009; Tan, 2012; Bai and Elyasiani, 2013; Elsila *et al*., 2013).

Distinct from existing studies, the results based on estimating a *3SLS* regression within a simultaneous equation model that dynamically allows for simultaneous interdependencies by taking into account a number of CG mechanisms, including board size, percentage of non-executive directors, leverage, block ownership and institutional ownership, generally suggest improved executive pay and corporate performance sensitivity, ranging between 0.163 for total pay of all executive directors and 0.197 for total CEO compensation. Our results appear to justify our research design, as well as highlighting the need for future research to take into account a comprehensive set of CG mechanisms within a simultaneous equation framework, which permits each mechanism to affect executive pay, but also allows executive pay to affect each mechanism when estimating the executive pay and corporate performance sensitivity.

In fact, our *3SLS* results suggest the existence of significant simultaneous interdependencies among executive pay, corporate performance and the CG mechanisms, including the existence of a reverse association between executive pay and corporate performance (i.e., evidence that better performing firms pay their executives higher, but also that highly paid executives appear to work harder to generate higher performance). The *3SLS* results also show that higher institutional ownership and debt usage are associated with lower executive pay, consistent with institutional shareholders' and creditors' role in reducing agency problems by engaging in extra managerial monitoring. In addition, we find that larger boards pay their executives significantly more, evidence which is consistent with larger boards being a sign of weak CG in the form of poor communication, decision-making and managerial monitoring. The results are generally robust across a raft of econometric models that control for different types of endogeneities, including unobserved hetereogeneity, simultaneity, and firm-level dynamic fixed-effects, as well as different types of executive pay and corporate performance proxies.

In conclusion, while our study contributes to the extant literature with particular regard to SA, our findings also have important policy and regulatory implications for both SA and more generally. Evidence of a stronger link between corporate performance and equity-based compensation provides support to the recommendations of King II that non-cash pay should form a substantial portion of total executive compensation in order to align executive interests with those of shareholders. However, evidence of a limited use of equity-based pay, especially CEO pay, compared with cash-based compensation suggests that compliance and enforcement may need to be further strengthened. Apart from regulatory enforcement, our results further indicate that greater activism by institutional shareholders may help strengthen the executive pay and corporate performance link.

Finally, whilst our evidence is important and robust, some caveats are deemed appropriate. Due to data limitations, our analysis is restricted to five alternative CG mechanisms. As data coverage improves, future studies may need to consider other CG mechanisms, such as data on the market for corporate control, in estimating the executive pay and corporate performance sensitivity. Different types of institutional owners exist, such as active, short-term, long-term, government, foreign, and domestic institutional owners. It would have, therefore, been appropriate to have examined how different institutional owners influence the pay-for-performance sensitivity. However, due to lack of data, we have been unable to do test such a relationship. Therefore, future research may improve their findings by investigating how different types of institutional owners influence the pay-for-performance elasticity. Similarly, due to data limitations, our total CEO pay measure does not include a CEO's change in wealth arising from stock ownership and dividends. Incorporating such changes in CEO wealth in the total CEO pay package by future researchers may enhance their findings. Finally, due to data access problems, our sample period is limited to pre-2008 financial crisis, which was largely a rising or "bull's" market. However, during the 2008 global financial crisis, a large number of stock markets, especially those in the developed countries suffered large falls in stock prices, resulting in a falling or "bear's" market. Thus, it is possible for the pay-performance link to be weaker in a "bear's" market, but stronger in a "bull's" market. Future research may, therefore, improve the insights from their empirical findings by replicating our results over both the bull and bear markets.

NOTES

1. For example, the six largest pyramidical groups (namely, the Anglo American-De Beers, Rembrandt, Sanlam, Old Mutual, Liberty Life Insurance and Anglovaal Groups) control over 70% of the value of all shares listed on the Johannesburg Securities Exchange, with the Anglo American-De Beers Group controlling 17 of the 20 largest quoted firms (Barr *et al*., 1995, p. 1; Okeahalam, 2004; Fosu, 2013).
2. We note that other competing theories, such as equity fairness and the 'Lake Wobegon Effect' have emerged recently. Lee et al. (2008) provide a detailed review of a number of possible alternative theoretical explanations.
3. Murphy (1999), Core et al. (2003) and Van Essen et al. (2012) provide comprehensive reviews of this literature.
4. As financials and utilities are subject to different regulations and also differ in capital structure (Mangena and Chamisa, 2008; Ntim *et al*., 2012a), and following past studies (Blackwell et al., 2007; Dong et al., 2010), we exclude 111 financials and utilities, leaving us with 291 companies to be sampled.
5. Current year executive pay, especially bonus decisions, is based on previous year's performance. Additionally, executive actions take time to reflect in accounting and share price performance (Jensen and Murphy, 1990; Main et al., 1996). Thus, to avoid endogeneity problems, as well as following previous studies (Conyon, 1997; Hartzell and Starks, 2003; Ozkan, 2011), we introduce a one year lag between total executive pay and corporate performance in such a way that this year's total executive pay depends on previous year's corporate performance and CG structures.
6. Some of the advantages for using panel data include having both time-series and cross-sectional observations, as well as less multicollinearity among the variables (Gujarati, 2003; Wooldridge, 2010).
7. As Panel *B* in Table 1 indicates, for the remaining 122 companies, one or more years' financial data and annual reports were not available in *Datastream/Perfect Information Database*. In addition, for lack of sufficient number of observations in three industries, namely health care, oil & gas, and telecommunications industries with three, one and three listed firms, respectively, observations from these industries were merged with the closest remaining five major industries. As a result (see Panel *B* in Table 1), the three health care firms were added to the consumer services industry, the one oil & gas firm was included in the basic materials industry, while the three telecommunications companies were included in the technology firms.
8. The option compensation is calculated by using the standard Black-Scholes [1973] option pricing model, Executive compensation disclosure rules in SA require all share-based executive options to be disclosed in the annual report at their grant date. However, a considerable number of share-based executive options granted in SA are not normally exercised, and are, therefore, allowed to expire. Thus, to accurately capture total executive compensation, we include only the value of all vested/exercised options in our valuation of share-based executive options. We do not, however, include a CEO's change in wealth from stock ownership and dividends in our calculation of total executive compensation because the data required is not currently available.

9. The theoretical expectation is that by permitting simultaneous interdependencies among the variables, the simultaneous equation approach will produce more consistent coefficients (Gujarati, 20003; Wooldridge, 2010) and indeed, the main evidence from the mainstream CG literature where it has been applied widely is that it is better specified and more robust in addressing potential endogeneity problems (Agrawal and Knoeber, 1996; Chung and Pruitt, 1996; Barnhart and Rosenstein, 1998; Crutchley, 1999; Beiner *et al*., 2004, 2006; Ghosh, 2007; Ntim *et al*., 2012a; amongst others).
10. As is the case in all previous studies (Agrawal and Knoeber, 1996; Chung and Pruitt, 1996; Barnhart and Rosenstein, 1998; Crutchley, 1999; Beiner *et al*., 2004, 2006; Ghosh, 2007; Elsila *et al*., 2013), and will be explained further, the endogenous-exogenous dichotomisation of the variables used in our system of equations is mainly based on prior theoretical and logical predictions, as well as practical and data availability reasons (Chenhall and Moers, 2007a, b; Van Lent, 2007; Larcker and Rusticus, 2010). Therefore, and depending on what is being determined in an equation within our system, a variable may be classified as endogenous or exogenous based on previous theory, logic and practice. For example, and similar to Agrawal and Knoeber and Beiner et al. (2004, 2006), we classify firm size, sales growth, capital expenditure, year, and industry as exogenous in all our equations. By contrast, other variables are only exogenous in specific equations. For instance, and theoretically, larger firms are more likely to cross-list and be audited by a big four audit firm (Beiner *et al*., 2006), and therefore, cross-listing and audit firm size are exogenous in the *BSIZE* equation, whilst dividend payment may signal the availability of excess cash flows (Jensen, 1986), and therefore, we classify dividend payment status as exogenous in the *LEV* equation. As will be further explained, we also carried out Hausman system specification and Sargan exogeneity tests, but both tests rejected system misspecification and variable endogeneity for all seven equations. We are, therefore, confident that our system of equations is well specified.
11. This growth rate is substantially higher than the increase in the average annual SA Consumer Price Index (CPI) and employee earnings over the same period. To facilitate comparison, annual CPI values published by the International Monetary Fund for SA are 9.9%, 5.9%, 4.5%, 4% and 5% in 2003, 2004, 2005, 2006, and 2007, respectively, with a five-year average of 5.86%.
12. To minimise the effects of outliers, and following previous studies (Agrawal and Knoeber, 1996; Guest, 2009; Wintoki *et al*., 2012), we winsorise all the variables at the conventional 1% and 99% levels before estimating our regressions. However, the whole regression analyses were also run with the outliers included, and the results were essentially the same. The main rationale for winsorising is to minimise potential serious violations of the regression assumptions.
13. The order-condition for identifying a system indicates that the number of exogenous variables excluded from any equation must be greater than or equal to the number of endogenous variables included minus one (Wooldridge, 2002; Gujarati, 2003; Beiner et al., 2004, 2006). Our system of equations is made up of 13 exogenous and seven endogenous variables and therefore, at least six endogenous variables need to be excluded from any single equation to identify the system. However, following previous research (Chung and Pruitt, 1996; Beiner *et al*., 2004, 2006; Ghosh, 2007; Larcker and Rusticus, 2010), equations (2) to (8) were independently developed on the basis of theory, logic, practice, and data availability without excessive regard to meeting the order-condition. As our system cannot be jeopardised by over-identification (Gujarati, 2003; Beiner *et al.*, 2004, 2006; Larcker and Rusticus, 2010; Wooldridge, 2010), all our seven equations are over-identified. We also conducted Hausman system specification and Sargan exogeneity tests, but both tests rejected system misspecification and variable endogeneity for all seven equations.
14. We are grateful to an anonymous reviewer for these insightful suggestions. Further, and for brevity, we use only *CEOPAY* to carry out these additional analyses, but our results remain essentially the same when use *TPAY* instead of *CEOPAY*.

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Table 1. Summary of the sample selection procedure

Panel A: Industrial composition of firms listed on the JSE available to be sampled as at 31/12/2007		*No. in each industry*	*Percentage of sample*
Industrials		81	27.8
Basic materials		67	23.0
Consumer services		62	21.3
Consumer goods		36	12.4
Technology		31	10.7
Health care		7	2.4
Telecommunications		4	1.4
Oil and gas		3	1.0
Total firms available to be sampled		*291*	*100.0*
Less: Firms with no year's dataset available	28		
Firms with some years' dataset missing	94	122	41.9
Total sampled firms with full dataset		*169*	*58.1*
Panel B: Industrial composition of sampled firms with full dataset		*No. in each industry*	*Percentage of sample*
Industrials		51	30.2
Consumer services		35	20.7
Basic materials		33	19.5
Consumer goods		24	14.2
Technology		19	11.2
Health care		3	1.8
Telecommunications		3	1.8
Oil and gas		1	0.6
Total sampled firms with full dataset		*169*	*100.0*

Table 2. Summary of variables

Total executive pay and CG (endogenous) variables	
TPAY	Natural log of total cash (salary, bonus, pension contribution and others) and non-cash/equity (the value of disclosed granted shares, vested/exercised options - which is calculated by using the standard Black-Scholes [1973] option pricing model, and any other long term incentive plans) based pay of all executive directors scaled by the total number of executive directors in a financial year.
CEOPAY	Natural log of cash (base salary, performance bonus, pension contribution and others) and non-cash/equity (the value of granted shares, vested/exercised options - which is calculated by using the standard Black-Scholes [1973] option pricing model, and any other long term incentive plans) based pay of the Chief Executive Officer (CEO) in a financial year.
ROA	Percentage of operating profit (wc01250) to total assets (wc02999) in a financial year.
TSR	Natural log of continuously compounded total shareholder return made up of capital gain and dividend yield in a financial year.
Q	Ratio of total assets (wc02999) minus book value of equity (wc03501+wc03451) plus market value (mv) of equity to total assets (wc02999) in a financial year.
BSIZE	Natural log of the total number of directors on the board of a company in a financial year.
NEDs	Percentage of non-executive directors to total number of directors on a board in a financial year.
LEV	Percentage of total debt (wc03255) to total assets (wc02999) in a financial year.
BLKOWN	Percentage of common shares held by shareholders with at least 5% of the total company Shareholdings at the end of a financial year.
INSOWN	Percentage of common shares held by institutional shareholders at the end of a financial year.
Control (exogenous) variables	
NBM	Number of board meetings in a year.
DOWN	Percentage of common shares held by directors at the end of a financial year.
$DOWN^2$	Percentage of common shares held by directors squared.
RCOM	1, if a firm has a remuneration committee consisting entirely of independent non-executive directors, 0 otherwise.
DUAL	1, if the CEO is also the chairperson of the board of directors of a firm, 0 otherwise.
LNTA	Natural log of total assets (wc02999) at the end of a financial year.
BIG4	1, if a firm is audited by a big four audit firm (PricewaterhouseCoopers, Deloitte & Touche, Ernst & Young, and KPMG), 0 otherwise.
CROSLIST	1, if a firm is listed on a foreign stock market, 0 otherwise.
DIV	1, if a firm did pay out dividends in a financial year, 0 otherwise.
CAPX	Percentage of total capital expenditure (wc04601) to total assets (wc02999).
SGR	Percentage of current year's sales (wc01001) minus previous year's sales scaled by previous year's sales.
CGI	A composite corporate governance (CG) index containing 50 provisions (covering five broad CG areas, including: board, directors, and ownership issues; accounting and auditing issues; risk management, internal audit and control issues; encouraging voluntary compliance and enforcement issues; and integrated sustainability reporting or non-financial issues) from the 2002 King Report on CG for South Africa that takes a value of 1 if each of the 50 CG provisions is disclosed in the annual report, 0 otherwise; scaled to a value between 0% and 100%. The detailed definitions of these CG provisions are contained in the Appendix in Ntim et al. (2012a:102).
CEOAGE	Natural log of the age (in years – must spent at least six months or more in a financial year with the firm) of a firm's CEO at end of a financial year.
CTENURE	Natural log of the number of years (must spent at least six months or more in a financial year with the firm) that a CEO has worked for a firm in his or her capacity as a CEO at the end of a financial year.
INDUST	Dummies for each of the five main industries: basic material + oil & gas; consumer goods; consumer services + health care; industrials; technology + telecommunications firms.
YD	Dummies for each of the five years from 2003 to 2007 inclusive.
CGCOM	1, if a firm has set up a corporate governance committee, 0 otherwise.

Notes: The codes in parentheses refer to *Datastream* codes for the respective accounting and market variables used in the analysis.

Table 3. Descriptive statistics of total pay of all executive directors and CEO for all (845) firm years

	All	2003	2004	2005	2006	2007
Panel A: Components of all executive directors' total pay						
Total cash pay of all executive directors (R000's)						
Mean	11,246	8,316	8,981	10,824	12,379	14,752
Median	6,891	4,835	5,899	6,796	7,493	8,964
Std. dev.	11,327	8,163	9,521	10,752	12,947	14,312
Min.	112	112	126	325	369	518
Max.	74,736	49,638	56,470	57,896	70,915	74,736
Total non-cash/equity pay of all executive directors (R000's)						
Mean	1,609	974	1,062	1,307	1,586	1,829
Median	937	521	549	706	983	1,072
Std. dev.	1,948	1,263	1,346	1,482	1,725	2,365
Min.	0	0	0	0	0	0
Max.	12,308	8,965	9,481	9,837	11,391	12,308
Total pay of all executive directors (R000's)						
Mean	12,855	9,290	10,043	12,131	13,965	16,581
Median	7,828	5.356	6,448	7,502	8,476	10,036
Std. dev.	13,692	9,426	10,867	12,234	14,672	16,260
Min.	112	112	126	325	369	518
Max	87,044	58,603	65,951	67,733	82,306	87,044
Panel B: Components of all executive directors' total pay scaled by the total number of executive directors						
Total cash pay of all executive directors scaled by total number of executives (R000's)						
Mean	1,594	1,180	1,283	1,437	1,672	2,186
Median	978	686	840	982	1,196	1,308
Std. dev.	1,610	1,159	1,356	1,610	1,895	2,265
Min.	16	16	19	44	51	75
Max.	9,593	6,038	7,065	8,347	8,958	9,593
Total non-cash/equity pay of all executive directors scaled by the total number of executive directors (R000's)						
Mean	235	142	156	189	234	263
Median	141	75	79	98	135	156
Std. dev.	285	183	194	220	248	341
Min.	0	0	0	0	0	0
Max.	1,806	1,264	1,375	1,426	1,632	1,806
Total pay of all executive directors scaled by the total number of executive directors (R000's)						
Mean	1,861	1,418	1,483	1,727	1,985	2,342
Median	1,098	746	939	1,084	1,210	1,430
Std. dev.	1,985	1,360	1,625	1,852	2,095	2,386
Min.	16	16	19	44	51	75
Max	11,340	7,512	8,574	9,432	10,203	11,340
Panel C: Components of total CEO pay						
Total cash pay of CEO (R000's)						
Mean	2,136	1,571	1,786	2,040	2,469	2,653
Median	1,341	724	873	1,061	1,537	1,892
Std. dev.	2,918	1,583	1,958	2,317	2,891	3,169
Min.	62	62	75	109	186	271
Max.	13,069	9,943	10,842	11,678	12,974	13,069
Total non-cash/equity pay of CEO (R000's)						
Mean	715	321	468	610	823	986
Median	409	139	207	364	479	591
Std. dev.	847	472	609	661	748	875
Min.	0	0	0	0	0	0
Max.	3,741	2,463	2,974	3,145	3,397	3,741
Total pay of CEO (R000's)						
Mean	2,851	1,892	2,254	2,650	3,292	3,639

Median	1,750	863	1,080	1,425	2,016	2,483
Std. dev.	3,765	2,055	2,567	2,978	3,639	4,044
Min.	62	62	75	109	286	276
Max.	16,810	12,406	13,816	14,823	16,371	16,810

Notes: Descriptive statistics of the various components of total pay of all executive directors and CEO denominated in 2003 South African (SA) rands (R), and all values are rounded to the nearest thousand. To facilitate comparison, as well as following previous studies (Main et al., 1996; Blackwell et al., 2007; Ozkan 2009; Chhaochharia and Grinstein 2009; Zheng 2010; Huang et al., 2012; Tian, 2013), all the figures have been adjusted for inflation, using the SA Consumer Price Index (CPI) to convert them to 2003 rands as the base year. The average US dollar to SA rand exchange rate in 2003 is 8.6248 with a five-year average of 9.5395. Total cash pay consists of a base salary, a performance bonus, a pension contribution and others. Total non-cash/equity pay includes the value of granted shares, vested/exercised options and any other long-term incentive plans (LTIPs).

Table 4. Descriptive statistics of the other endogenous/exogenous variables for all (845) firm years.

Variable	Mean	Median	Std. dev.	Maximum	Minimum
			Panel A: Endogenous variables		
TSR	0.28	0.25	0.89	2.36	-0.48
ROA	0.11	0.12	0.14	0.38	-0.19
Q	1.56	1.34	0.67	3.60	0.72
BSIZE	9.75	10.00	3.67	18.00	4.00
NEDs	0.57	0.58	0.15	0.84	0.17
LEV	0.18	0.16	0.14	0.56	0.05
BLKOWN	0.62	0.65	0.18	0.92	0.10
INSOWN	0.74	0.82	0.23	0.98	0.09
			Panel B: Exogenous variables		
NBM	4.70	4.00	2.18	15.00	1.00
DOWN	0.19	0.89	0.18	0.79	0.01
RCOM	0.14	0.00	0.35	1.00	0.00
DUAL	0.23	0.00	0.43	1.00	0.00
LNTA	5.86	6.02	0.48	7.83	4.24
BIG4	0.73	1.00	0.44	1.00	0.00
CROSLIST	0.22	0.00	0.41	1.00	0.00
DIV	0.67	1.00	0.47	1.00	0.00
SGR	0.12	0.14	0.26	0.89	-0.44
CAPX	0.13	0.08	0.15	0.66	0.07
CGCOM	0.32	0.00	0.47	1.00	0.00
CGI	0.61	0.64	0.19	0.98	0.06
CEOAGE	55.48	53.00	6.67	76.00	34.00
CTENURE	7.64	6.50	6.88	28.00	0.00

Notes: Variables are defined as follows: total shareholder return (*TSR*), return on assets (*ROA*), Tobin's Q (*Q*), board size (*BSIZE*), percentage of non-executive directors (*NEDs*), leverage (*LEV*), block ownership (*BLKOWN*), institutional ownership (*INSOWN*), number of board meetings (*NBM*), director ownership (*DOWN*), the presence of an independent remuneration committee (*RCOM*), CEO duality (*DUAL*), firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), sales growth (*SGR*), capital expenditure (*CAPX*), the presence of a corporate governance (CG) committee (*CGCOM*), corporate governance (CG) index (*CGI*),CEO age (*CEOAGE*), and CEO tenure (*CTENURE*). Table 2 fully defines all the variables used.

Table 5. Regression of executive pay on performance (*TSR*) and control variables.

	Dependent variable					
	All executive directors' pay			CEO pay		
Independent variable	Cash	Non-cash	Total	Cash	Non-cash	Total
Constant	2.598***	2.656***	2.965***	2.630***	2.828***	2.927***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
TSR	0.025**	0.054***	0.069**	0.046**	0.073***	0.098***
	(.041)	(.000)	(.028)	(.037)	(.000)	(.000)
NBM	-0.006	-0.008	-0.012	-0.001	-0.009	-0.016
	(.705)	(.802)	(.698)	(.906)	(.662)	(.653)
DOWN	-0.023**	-0.031**	-0.045**	-0.058**	-0.067***	-0.089***
	(.038)	(.026)	(.013)	(.011)	(.010)	(.000)
$DOWN^2$	-0.008	-0.005	-0.009	-0.012	-0.001	-0.004
	(.699)	(.763)	(.658)	(.743)	(.856)	(.789)
RCOM	-0.183**	-0.156**	-0.112*	-0.175**	-0.186**	-0.204***
	(.042)	(.049)	(.080)	(.039)	(.032)	(.007)
DUAL	0.002	0.008	0.010	0.014	0.058*	0.045*
	(.879)	(.730)	(.679)	(.255)	(.073)	(.094)
BIG4	0.165**	0.157**	0.183***	0.170**	0.185***	0.201***
	(.036)	(.040)	(.009)	(.023)	(.001)	(.000)
CROSLIST	0.137**	0.182***	0.206***	0.129**	0.195***	0.213***
	(.024)	(.001)	(.000)	(.016)	(.000)	(.000)
DIV	-0.113*	-0.180**	-0.195***	-0.134**	-0.198***	-0.210***
	(.053)	(.014)	(.001)	(.028)	(.000)	(.000)
LNTA	0.217***	0.246***	0.337***	0.225***	0.258***	0.349***
	(.001)	(.000)	(.000)	(.000)	(.000)	(.000)
SGR	0.095***	0.102***	0.140***	0.110***	0.156***	0.198***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
CAPX	-0.028**	-0.075***	-0.104***	-0.064**	-0.108***	-0.120***
	(.035)	(.008)	(.000)	(.018)	(.000)	(.000)
YD 2004	0.080***	0.052**	0.093***	0.132***	0.134***	0.139***
	(.000)	(.037)	(.000)	(.000)	(.000)	(.000)
YD 2005	0.101***	0.130***	0.114***	0.088***	0.092***	0.124***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2006	0.158***	0.160***	0.164***	0.179***	0.185***	0.203***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2007	0.231***	0.220***	0.243***	0.280***	0.295***	0.309***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
INDUST	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
F-value	7.403***	8.849***	8.526***	9.328***	9.764***	9.610***
Adjusted R^2	0.385	0.406	0.397	0.410	0.428	0.419
Number of observations	845	845	845	845	845	845

Notes: P-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust firm-*clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Variables are defined as follows: total shareholder return (*TSR*), number of board meetings (*NBM*), director ownership (*DOWN*), director ownership squared ($DOWN^2$), the presence of an independent remuneration committee (*RCOM*), CEO duality (*DUAL*), firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), sales growth (*SGR*), capital expenditure (*CAPX*), year (*YD*) and industry (*INDUST*). *YD* 2003 is captured by the constant term in the regressions. The industry dummies included were statistically insignificant and are not reported. Table 2 fully defines all the variables used.

Table 6. Regression results from a three-stage estimation of equations (2) to (8) for total director pay.

Indep. variable (*Equation*)	Dependent variable *TSR* (2)	*BSIZE* (3)	*NEDs* (4)	*LEV* (5)	*BLKOWN* (6)	*INSOWN* (7)	*TPAY* (8)
Constant	0.572	-1.938	8.906***	-0.867	10.103***	-0.875	0.891
	(.584)	(.123)	(.000)	(.401)	(.000)	(.460)	(.486)
TSR	-	0.197***	0.001	-2.573***	0.010	2.032***	0.163***
	-	(.000)	(.605)	(.000)	(.794)	(.000)	(.000)
BSIZE	0.128**	-	0.598**	0.128*	0.230	0.479**	0.121***
	(.015)	-	(.021)	(.071)	(.385)	(.043)	(.006)
NEDs	0.053*	0.131***	-	0.073*	0.020	0.042	0.001
	(.090)	(.000)	-	(.080)	(.416)	(.309)	(.726)
LEV	-0.036*	0.105**	0.052*	-	0.075**	0.001	-0.018**
	(.091)	(.019)	(.100)	-	(.048)	(.983)	(.043)
BLKOWN	-0.053*	-0.004	-0.041	0.059*	-	0.499***	0.003
	(.087)	(.290)	(.320)	(.087)	-	(.000)	(.820)
INSOWN	0.124**	0.109**	0.008	-0.001	0.379***	-	-0.693***
	(.011)	(.028)	(.763)	(.840)	(.000)	-	(.000)
TPAY	2.905***	3.540***	-0.531	-0.360	0.594	-3.753***	-
	(.000)	(.000)	(.462)	(.837)	(.486)	(.000)	-
BIG4	0.146***	0.007	3.950***	-2.815***	-	3.783***	0.105*
	(.000)	(.326)	(.000)	(.000)	-	(.000)	(.063)
CAPX	-0.130**	0.003	-0.019*	0.124***	-0.002	-0.016	0.175***
	(.043)	(.691)	(.092)	(.000)	(.857)	(.794)	(.000)
CGCOM	-	-0.193	-0.856	-	-2.320**	0.206	-
	-	(.657)	(.591)	-	(.021)	(.790)	-
CROSLIST	0.298***	0.718***	3.295***	-	-	4.164***	0.028
	(.000)	(.000)	(.000)	-	-	(.000)	(.321)
DIV	0.110**	-	-	0.042	-	-	-0.124**
	(.048)	-	-	(.915)	-	-	(.049)
DOWN	-	-0.002	-0.128	-	0.202***	-	-0.113***
	-	(.782)	(.000)	-	(.000)	-	(.000)
DUAL	-	-0.238	2.697***	-	0.187	0.636	0.031
	-	(.871)	(.000)	-	(.896)	(.648)	(.967)
LNTA	-0.143***	2.573***	4.971***	2.420***	-5.459***	5.300***	0.339***
	(.008)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
NBM	-	0.112**	-	-	-	-	-0.003
	-	(.020)	-	-	-	-	(.609)
RCOM	-	-0.047	-0.051	-	0.032	0.130*	-0.128*
	-	(.418)	(.387)	-	(.410)	(.094)	(.063)
SGR	0.116**	0.006	0.004	-0.006	0.007	0.002	0.165***
	(.042)	(.697)	(.480)	(.317)	(.333)	(.789)	(.000)
INDUST	Included	Included	Included	Included	Included	Included	Included
YD	Included	Included	Included	Included	Included	Included	Included
F-value	9.458***	10.812***	7.657***	6.528***	5.384***	6.183***	11.896***
Adjusted R^2	0.415	0.479	0.356	0.323	0.267	0.290	0.483
N	845	845	845	845	845	845	845

Notes: P-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust *firm-clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Variables are defined as follows: total shareholder return (*TSR*), board size (*BSIZE*), percentage of non-executive directors (*NEDs*), leverage (*LEV*), block ownership (*BLKOWN*), institutional ownership (*INSOWN*), total pay of all executive directors (*TPAY*), audit firm size (*BIG4*), capital expenditure (*CAPX*), the presence of a corporate governance committee (*CGCOM*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), director ownership (*DOWN*), CEO duality (*DUAL*), firm size (*LNTA*), number of board meetings (*NBM*), the presence of a independent remuneration committee (*RCOM*), sales growth (*SGR*), industry (*INDUST*) and year (*YD*). Table 2 fully defines all the variables used.

Table 7. Regression results from a three-stage estimation of equations (2) to (8) for total CEO pay.

Indep. variable (*Equation*)	*TSR* (2)	*BSIZE* (3)	*NEDs* (4)	*LEV* (5)	*BLKOWN* (6)	*INSOWN* (7)	*CEOPAY* (8)
	Dependent variable						
Constant	0.681	-2.875*	9.894***	-1.546	13.264***	-1.998	0.620
	(.465)	(.063)	(.000)	(.193)	(.000)	(.181)	(.494)
TSR	-	0.261***	0.004	-3.829***	0.006	2.108***	0.197***
	-	(.000)	(.526)	(.010)	(.901)	(.000)	(.000)
BSIZE	0.168***	-	0.760***	0.154*	0.078	0.607**	0.134***
	(.000)	-	(.000)	(.060)	(.291)	(.035)	(.000)
NEDs	0.092**	0.124***	-	0.086*	0.038	0.054	0.009
	(.046)	(.000)	-	(.057)	(.393)	(.288)	(.685)
LEV	-0.047*	0.110**	0.069*	-	0.084**	0.008	-0.023**
	(.082)	(.011)	(.083)	-	(.035)	(.873)	(.031)
BLKOWN	-0.076*	-0.008	-0.032	0.063*	-	0.510***	0.010
	(.054)	(.263)	(.367)	(.074)	-	(.000)	(.753)
INSOWN	0.243**	0.102**	0.004	-0.008	0.406***	-	-0.894***
	(.027)	(.035)	(.890)	(.784)	(.000)	-	(.000)
CEOPAY	3.682***	3.964***	-0.462	-0.217	0.516	-4.379***	-
	(.000)	(.000)	(.349)	(.579)	(.323)	(.000)	-
BIG4	0.258***	0.030	5.318***	-3.336***	-	4.975***	0.126**
	(.000)	(.641)	(.000)	(.000)	-	(.000)	(.021)
CAPX	-0.145**	0.001	-0.023*	0.136***	-0.015	-0.031	0.280***
	(.037)	(.779)	(.071)	(.000)	(.680)	(.579)	(.000)
CGCOM	-	-0.215	-1.095	-	-2.683**	0.387	-
	-	(.407)	(.154)	-	(.017)	(.879)	-
CROSLIST	0.386***	0.996***	3.730***	-	-	4.561***	0.032
	(.000)	(.000)	(.000)	-	-	(.000)	(.691)
DIV	0.129**	-	-	0.053	-	-	-0.138**
	(.037)	-	-	(.896)	-	-	(.027)
DOWN	-	-0.010	-0.143	-	0.218***	-	-0.126***
	-	(.650)	(.000)	-	(.000)	-	(.000)
DUAL	-	-0.219	3.286***	-	0.127	0.520	0.045
	-	(.393)	(.000)	-	(.943)	(.781)	(.839)
LNTA	-0.167***	2.702***	5.633***	2.805***	-6.852***	6.984***	0.345***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
NBM	-	0.102**	-	-	-	-	-0.009
	-	(.033)	-	-	-	-	(.572)
RCOM	-	-0.061	-0.076	-	0.065	0.181*	-0.147**
	-	(.383)	(.360)	-	(.374)	(.069)	(.032)
SGR	0.270***	0.001	0.014	-0.008	0.019	0.007	0.193***
	(.000)	(.896)	(.273)	(.291)	(.286)	(.752)	(.000)
INDUST	Included	Included	Included	Included	Included	Included	Included
YD	Included	Included	Included	Included	Included	Included	Included
F-value	9.718***	11.216***	7.930***	6.859***	6.084***	6.538***	12.053***
Adjusted R^2	0.424	0.482	0.371	0.340	0.289	0.317	0.496
N	845	845	845	845	845	845	845

Notes: P-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust firm-*clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Variables are defined as follows: total shareholder return (*TSR*), board size (*BSIZE*), percentage of non-executive directors (*NEDs*), leverage (*LEV*), block ownership (*BLKOWN*), institutional ownership (*INSOWN*), total CEO pay (*CEOPAY*), audit firm size (*BIG4*), capital expenditure (*CAPX*), the presence of a corporate governance committee (*CGCOM*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), director ownership (*DOWN*), CEO duality (*DUAL*), firm size (*LNTA*), number of board meetings (*NBM*), the presence of a independent remuneration committee (*RCOM*), sales growth (*SGR*), industry (*INDUST*) and year (*YD*). Table 2 fully defines all the variables used.

Table 8. Regression of executive pay on alternative performance (*ROA*) proxy and control variables.

	Dependent variable					
	All executive directors' pay			CEO pay		
Independent variable	Cash	Non-cash	Total	Cash	Non-cash	Total
Constant	3.286***	3.485***	3.741***	3.160***	3.693***	4.395***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ROA	0.030**	0.065***	0.071**	0.051**	0.084***	0.103***
	(.021)	(.000)	(.034)	(.023)	(.000)	(.000)
NBM	-0.001	-0.005	-0.019	-0.007	-0.024	-0.027
	(.736)	(.827)	(.671)	(.890)	(.536)	(.615)
DOWN	-0.018*	-0.040**	-0.053**	-0.097***	-0.026*	-0.038**
	(.069)	(.020)	(.026)	(.000)	(.059)	(.031)
$DOWN^2$	-0.001	-0.010	-0.003	-0.009	-0.004	-0.007
	(.710)	(.572)	(.703)	(.760)	(.815)	(.769)
RCOM	-0.169**	-0.160**	-0.107*	-0.161**	-0.193**	-0.219***
	(.038)	(.047)	(.094)	(.046)	(.028)	(.000)
DUAL	0.001	0.002	0.016	0.009	0.072**	0.083**
	(.907)	(.756)	(.653)	(.360)	(.046)	(.035)
LNTA	0.253***	0.306***	0.347***	0.241***	0.324***	0.351***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
BIG4	0.141**	0.182**	0.190***	0.154**	0.168**	0.216***
	(.048)	(.029)	(.000)	(.037)	(.015)	(.000)
CROSLIST	0.106*	0.120**	0.156**	0.093*	0.205***	0.224***
	(.081)	(.027)	(.019)	(.055)	(.000)	(.000)
DIV	-0.081	-0.109*	-0.146**	-0.112**	-0.150**	-0.192***
	(.106)	(.057)	(.023)	(.044)	(.012)	(.007)
SGR	0.106***	0.117***	0.163***	0.147***	0.180***	0.205***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
CAPX	-0.019*	-0.098***	-0.116***	-0.051**	-0.119***	-0.138***
	(.063)	(.000)	(.000)	(.027)	(.000)	(.000)
YD 2004	0.093***	0.067**	0.108***	0.146***	0.150***	0.178***
	(.000)	(.019)	(.000)	(.000)	(.000)	(.000)
YD 2005	0.114***	0.153***	0.139***	0.104***	0.125***	0.137***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2006	0.173***	0.186***	0.190***	0.187***	0.192***	0.211***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2007	0.249***	0.250***	0.267***	0.290***	0.315***	0.326***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
INDUST	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
F-value	7.153***	8.396***	7.865***	8.291***	8.679***	8.875***
Adjusted R^2	0.376	0.391	0.387	0.389	0.401	0.414
Number of observations	845	845	845	845	845	845

Notes: P-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust firm-*clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Variables are defined as follows: return on assets (*ROA*), number of board meetings (*NBM*), director ownership (*DOWN*), director ownership squared ($DOWN^2$), the presence of an independent remuneration committee (*RCOM*), CEO duality (*DUAL*), firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), sales growth (*SGR*), capital expenditure (*CAPX*), year (*YD*) and industry (*INDUST*). *YD* 2003 is captured by the constant term in the regressions. The industry dummies included were statistically insignificant and are not reported. Table 2 fully defines all the variables used.

Table 9. Regression of executive pay on alternative performance (Q) proxy and control variables.

	Dependent variable					
	All executive directors' pay			CEO pay		
Independent variable	Cash	Non-cash	Total	Cash	Non-cash	Total
Constant	2.431**	2.493**	2.518***	2.672***	2.769***	2.985***
	(.025)	(.018)	(.010)	(.000)	(.000)	(.000)
Q	0.028**	0.051**	0.067**	0.039**	0.060**	0.075***
	(.024)	(.036)	(.014)	(.045)	(.018)	(.000)
NBM	-0.010	-0.016	-0.027	-0.008	-0.012	-0.028
	(.671)	(.750)	(.519)	(.873)	(.654)	(.579)
DOWN	-0.034**	-0.040**	-0.038**	-0.063***	-0.075***	-0.097***
	(.028)	(.017)	(.019)	(.010)	(.000)	(.000)
$DOWN^2$	-0.011	-0.008	-0.013	-0.018	-0.006	-0.009
	(.580)	(.705)	(.629)	(.727)	(.832)	(.684)
RCOM	-0.172**	-0.129*	-0.101*	-0.188**	-0.196**	-0.217***
	(.026)	(.057)	(.098)	(.027)	(.024)	(.000)
DUAL	0.001	0.003	0.027	0.001	0.019	0.021
	(.884)	(.746)	(.494)	(.406)	(.117)	(.115)
LNTA	0.256***	0.291***	0.347***	0.274***	0.343***	0.358***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
BIG4	0.171**	0.163**	0.194***	0.183**	0.196***	0.237***
	(.029)	(.036)	(.000)	(.019)	(.000)	(.000)
CROSLIST	0.159***	0.195***	0.217***	0.160***	0.201***	0.220***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
DIV	-0.126**	-0.197**	0.218***	-0.150**	-0.224***	-0.241***
	(.041)	(.011)	(.000)	(.019)	(.000)	(.000)
SGR	0.112***	0.123***	0.162***	0.145***	0.183***	0.218***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
CAPX	-0.046**	-0.089***	-0.116***	-0.082***	0.124***	-0.130***
	(.027)	(.000)	(.000)	(.010)	(.000)	(.000)
YD 2004	0.076***	0.048*	0.087***	0.126***	0.128***	0.134***
	(.000)	(.054)	(.000)	(.000)	(.000)	(.000)
YD 2005	0.098***	0.127***	0.105***	0.091***	0.096***	0.129***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2006	0.147***	0.153***	0.159***	0.181***	0.187***	0.198***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
YD 2007	0.224***	0.218***	0.231***	0.265***	0.273***	0.290***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
INDUST	*Included*	*Included*	*Included*	*Included*	*Included*	*Included*
F-value	6.987***	7.910***	7.643***	7.894***	8.327***	8.875***
Adjusted R^2	0.368	0.385	0.369	0.378	0.390	0.409
Number of observations	845	845	845	845	845	845

Notes: P-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust firm-*clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Variables are defined as follows: Tobin's Q (*Q*), number of board meetings (*NBM*), director ownership (*DOWN*), director ownership squared ($DOWN^2$), the presence of an independent remuneration committee (*RCOM*), CEO duality (*DUAL*), firm size (*LNTA*), audit firm size (*BIG4*), cross-listing (*CROSLIST*), dividend payment status (*DIV*), sales growth (*SGR*), capital expenditure (*CAPX*), year (*YD*) and industry (*INDUST*). *YD* 2003 is captured by the constant term in the regressions. The industry dummies included were statistically insignificant and are not reported. Table 2 fully defines all the variables used.

Table 10. Additional analyses: GMM estimation, interaction and changes effects, and governance index

	Dependent variable						
	CEO pay						
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variable	ΔCEOPAY	GMM	I-EFFECT	CEOPAY	ΔCEOPAY	I-EFFECT	CEOPAY
Constant	0.134	0.275	2.860***	2.640***	0.140	2.934***	2.672**
	(.308)	(.190)	(.000)	(.000)	(.296)	(.000)	(.000)
ΔTSR_t	0.020**	-	-	-	0.025**	-	-
	(.046)	-	-	-	(.040)	-	-
TSR_t	-	0.086***	0.125***	0.104***	-	0.134***	0.106***
	-	(.000)	(.000)	(.000)	-	(.000)	(.000)
$CEOPAY_{t-1}$	-	0.429***	-	-	-	-	-
	-	(000)	-	-	-	-	-
*TSR*BSIZE*	-	-	0.296***	-	-	0.310***	-
	-	-	(.000)	-	-	(.000)	-
*TSR*NEDs*	-	-	-0.165***	-	-	-0.170***	-
	-	-	(.007)	-	-	(.000)	-
*TSR*LEV*	-	-	-0.020	-	-	-0.023	-
	-	-	(.496)	-	-	(.475)	-
*TSR*BLKOWN*	-	-	-0.013	-	-	-0.018	-
	-	-	(.785)	-	-	(.754)	-
*TSR*INSOWN*	-	-	-0.309***	-	-	-0.326***	-
	-	-	(.000)	-	-	(.000)	-
CGI	-	-	-	0.136***	-	0.096***	-
	-	-	-	(.000)	-	(.000)	-
CEOAGE	-	-	-	-	-	-	0.159***
	-	-	-	-	-	-	(.000)
CTENURE	-	-	-	-	-	-	0.116**
	-	-	-	-	-	-	(.025)
ΔCGI	-	-	-	-	0.088***	-	-
	-	-	-	-	(.000)	-	-
*TSR*CGI*	-	-	-	-	-	0.175***	-
	-	-	-	-	-	(.000)	-
OTHER CG VAR.	-	-	Yes	-	-	Yes	-
OTHER CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUST	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan *P*-value	-	(.265)	-	-	-	-	-
Hansen *P*-value	-	(.438)	-	-	-	-	-
Hansen (Diff) *P*-value	-	(.576)	-	-	-	-	-
AR(1) test *P*-value	-	(.008)***	-	-	-	-	-
AR(2) test *P*-value	-	(.195)	-	-	-	-	-
F-value	4.932***	-	9.754***	9.475***	7.340***	9.839***	9.586***
Adjusted R^2	0.214	-	0.492	0.418	0.305	0.508	0.424
N	676	676	845	845	676	845	845

Notes: Models 1 and 5 test for changes (Δ*CEOPAY*) effects, whilst Models 3 and 6 test for interaction (*I-EFFECT*) effects. Model 2 contains coefficients obtained by estimating a difference-generalised method of moments (GMM) equation. Model 4 tests for the effect of the presence of an alternative CG measure, whilst model 7 tests for the presence of additional control variables. AR (1) and AR(2) are tests for first- and second-order serial correlation in the first differenced regression residuals under the null hypothesis that there is no autocorrelation. Sargan test of over-identification restrictions and Hansen test of over-identification restrictions are under the null hypotheses that all instruments are valid. Difference-in-Hansen test of exogeneity is under the null hypothesis that instruments used are exogenous. *P*-values are in parentheses. Following Petersen (2009), the coefficients are estimated by using the robust firm-*clustered standard errors* technique. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. Table 2 fully defines all the variables used.