THE ENDOGENEITY OF EXECUTIVE COMPENSATION AND ITS IMPACT ON MANAGEMENT DISCRETIONARY BEHAVIOR OVER FINANCIAL REPORTING

Lan Sun*, Martin Hovey**

Abstract

Extant literature has emerged testing the relationship between executive compensation and earnings management and many these studies have documented that compensation contracts create strong incentives for management discretionary behavior over financial reporting. Previous studies also pointed out that executive compensation could be simultaneously co-determined with earnings management, suggesting a potential endogeneity problem may exist between discretionary accruals and compensation structure. Using a sample of all Australian Securities Exchange (ASX) listed companies comprising 3,326 firm-year observations encompassing the periods from 2000 to 2006, this study examines the endogeneity of executive total compensation and its various components. Applying a 2SLS model the results show a significantly negative association between expected fixed compensation (particularly expected salary) and upwards earnings management and a significantly positive association between expected at-risk compensation (particularly expected bonuses) and upwards earnings management. These findings suggest endogeneity exists in that fixed compensation and salaries provide disincentives for managers to practice aggressive earnings management whereas at-risk compensation and bonuses induce managers to employ income-increasing discretionary accruals to inflate reported earnings. This study found that executive compensation plays a role in determining earnings management activities. Executives may distort financial reporting to maximize their personal wealth if their incentives are not fully aligned with those of shareholders. Compensation committees, therefore, may gain some insight in designing compensation structures that balance the incentive to improve a firm's performance with the incentive to earnings manipulation.

JEL classification code: M41, M52, G34, J33, C26

Keywords: Executive Compensation, Earnings Management, Discretionary Accruals, Compensation Endogeneity, Instrumental Variables

* *UNE Business School, University of New England, Armidale, NSW 2351, Australia*
E-mail: lansun@une.edu.au
** *UNE Business School, University of New England, Armidale, NSW 2351, Australia*
E-mail: mhovey@une.edu.au

1. Introduction

According to the agency theory, agency conflicts between managers and shareholders occur when a firm's ownership and operation are separated and when managers can better access a firm's information than shareholders (Ross, 1973, Jenson and Meckling, 1976). The firm's senior management may seek to maximize their own utility at the expense of corporate shareholders or debtholders (Jenson and Meckling, 1976; Fama, 1980; Fama and Jensen, 1983). Firms therefore draw up contracts with the aim of motivating the shareholders' agent (managers) not to self-serve or make decisions that would conflict with the interests of the principal (shareholders), but contracts that motivate the agent, in a rational manner, to channel endeavors in line with the agent's best interests, even when there is a conflict between the two competing interests of the principal and the agent. Two particular contracts that firms have designed to restrict managers' actions are management compensation contracts between the firm and its managers and debt contracting between the owners/managers and the debtholders. Executive compensation contracting is the context in which earnings management behavior is most likely to be detected. Compensation contracts are often tied to reported earnings as concluded by Sibson and Company's (1991) survey which indicates that accounting earnings are almost universally used in executive compensation contracts. It is also well established that earnings directly affect CEOs bonuses and indirectly influence CEOs' equity compensation through stock prices. As Bath et al. (1999) and Skinner and Sloan (2002) state, the market highly values stocks with future growth, and accounting earnings are viewed as an important signal for future growth opportunities. Peng and Roell (2004) found that the likelihood of shareholder litigation is associated with earnings management, and such correlation is at least partly driven by earnings management induced by executive incentive remuneration. Earnings management may take place in the compensation contracting framework because it is costly for compensation committees and debtholders to "undo" earnings management. Sloan (1996) and Xie (2001) documented evidence that outsider investors are often fooled by managers' manipulation. Bradshaw *et al.* (2001) found evidence that investors do not appear to anticipate problems associated with high accruals and thus fail to see through the management's opportunistic behavior. Even if investors can see through earnings manipulation, managers may still myopically manage earnings as long as investors use earnings information to evaluate the firm. This is consistent with Shivakumar (2000) who argued that even though capital markets are not fooled by earnings management, managers are more likely to engage in earnings management prior to equity offerings. Compensation contracts create incentives for earnings management also because those contracts may not always be optimal (Grossman & Hart, 1986; Hart, 2001). While initially firms may endeavor to contract with their managers optimally, over time, managers' incentives could become misaligned with optimal levels, especially if the manager becomes entrenched. For example, when a firm is growing, more investment opportunities may be emerging and equity-based compensation may be introduced because a rapidly growing firm is predisposed to induce managers to undertake risky projects. This in turn may lead to an increase in short-term stock prices and thus a potential increase in personal gain for the manager and shareholders. The firm or its shareholders may not be able to re-contract with the CEO because the managers may not agree to reduce equity-based compensation, or alternatively because the shareholders themselves may well prefer risky investments. Further, researchers point out that empirical analysis should consider the interplay between the components of total compensation since the various elements have different risk and incentive profiles (Anderson et al., 2000).

The above discussion provides examples from the extant literature that has emerged testing the relationship between executive compensation and earnings management, and the numerous studies that demonstrate that compensation contracts create strong incentives for earnings management. Notwithstanding, there are also studies that address a potential simultaneity problem that may exist between discretionary accruals and the compensation structure. There are two schools of thought regarding this matter. On one hand, Healy (1985), Gaver et al. (1995), Holthausen et al. (1995), Guidry et al. (1999), Gao and Shrieves (2002), Baker et al. (2003), Cheng and Warfield (2005), and Bergstresser and Philippon (2006) view earnings management as driven by executive compensation contracting, whereby managers' incentives for personal wealth maximization induce opportunistic earnings management behavior to occur. This line of research typically models earnings management behavior as a function of executive compensation. On the other hand, some researchers consider the effect of earnings management on executive compensation to be the key factor. For instance, Balsam (1998), Matsunaga and Park (2001), and Shuto (2007) explored whether income-increasing discretionary accruals are positively associated with CEO cash compensation; they interpret such a relationship as evidence of pay for performance. The underlying economic argument is that the compensation committee distinguishes between the components of earnings and reward managers when they use upward earnings management to achieve the firms' earnings targets. Typically in this stream of research, executive compensation is modeled as a function of discretionary accruals.

The juxtaposition of the two approaches applied by these studies raise an issue of executive compensation being simultaneously co-determined with earnings management behavior. That is, the incentives for high compensation lead to the use of income-increasing accruals, accordingly this may in turn result in additional compensation remuneration if the firms' earnings targets are achieved. If this is the case, the compensation structure variables could be endogenous. As a consequence, the association between earnings management and executive compensation incentives could be biased because the explanatory variables fail to be independent from the error term of OLS and they are simultaneously determined along with the dependent variables (Greene, 2002).

The study applies data from Australian listed firms because in Australia, the *Corporations Law s300A*, prescribes that all listed companies' must disclose the remuneration packages of directors and the five highest paid executives in their annual report. The disclosures must contain the total reward including *fixed* remuneration such as salaries and *at-risk* remuneration, comprising short term and long term incentives. Thus, using a sample of all Australian Securities Exchange (ASX) listed companies with 3,326 firm-year observations covering the periods from 2000 to 2006, this study found that executive fixed compensation and at-risk compensations are endogenous and are simultaneously co-determined with earnings management behavior. Moreover, salary, bonus, options, shares and long term incentive plans are endogenous and thus simultaneously co-determined with upwards earnings management. To resolve the compensation endogeneity, this study adopts an instrumental approach and 2SLS results show a significantly negative association between expected fixed compensation, particularly the expected salary, and income-increasing earnings management. The results also show a significantly positive association between expected at-risk compensation, particularly the expected bonuses, and upwards earnings management. However, three equity-based compensations – option grants, shares and long term incentive plans – are not significantly associated with earnings management. These findings suggest that where endogeneity is concerned, fixed compensation and salaries provide disincentives for managers to practice aggressive earnings management. Moreover, managers are more likely to use income-increasing discretionary accruals to inflate reported earnings and thus to maximize the level of at-risk compensation and bonuses.

The evidence presented in this study has several implications. First, it will be of interest to academia as this study provides a better understanding of earnings management in terms of why firms engage in earnings management. Second, the relationship between earnings management and remuneration may be of interest to compensation committees. Compensation committees may gain some insight in designing compensation provisions that balance the incentive to improve a firm’s performance with the incentive for earnings manipulation. We found that executive compensation plays a role in determining earnings management activities. Executives may distort financial reporting to maximize their personal wealth if their incentives are not fully aligned with those of shareholders. Compensation committees, therefore, may consider an optimal compensation regime which endeavors to achieve optimal alignment.

The remainder of the paper is organized as follows. Section 2 highlights the literature and econometric background; Section 3 discusses the models and the instrumental variables approach; Section 4 describes the data and the sample selection process; Section 5 presents the empirical results; and finally Section 6 concludes the paper.

2. Literature review and econometric background

One stream of earnings management research studies executive compensation incentives and suggested that earnings management behavior is more likely to be driven by managerial incentives to maximize their compensation. One of the most widely cited papers in the literature associated with this research is Healy (1985) who introduced discretionary accruals as an innovative proxy for earnings management and found that managers directed discretionary accruals to maximize short-term bonus compensation. Gaver et al. (1995) applied a Modified Jones Model and an Industry Index Model to estimate discretionary accruals and found that when earnings before discretionary accruals fall below the lower bound, managers appear to exercise income-increasing discretionary accruals. Gao and Shrieves (2002) reported that different compensation components — salary, bonus, options, restricted stock, and long-term incentive plans — provide different incentives for earnings management. They found that bonus and option compensation are positively and significantly related to discretionary accruals, while salary is significantly negatively associated with discretionary accruals. Specifically, a manager who receives a fixed base salary would have an incentive to reduce earnings management activities since earnings management is costly — the associated costs being the reputational loss, the prospect of losing one’s employment , and the risk of increasing shareholder litigation. Cheng and Warfield (2005) considered five elements of executive equity incentives: option grants, un-exercisable options, exercisable options, restricted stock grants, and stock ownership. They found that CEOs are more likely to sell shares in the year after earnings announcements when they have a substantial amount of un-exercisable options or stock ownership. Moreover, the probability of earnings management is also greater for CEOs with a high level of un-exercisable options or ownership, and they tend to increase stock sales after earnings management. Baker et al. (2003) found firms that compensate their executive with a greater proportion of options relative to other forms of remuneration engage in downwards earnings management to reduce reported earnings before the option award date of income-decreasing discretionary accruals and thus reduce the exercise price of options. Bergstresser and Philippon (2006) found an unusual large amount of options were exercised in the years of high accruals. Likewise, insiders sell large numbers of stocks in the years of high accruals. They suggested that stock and option holdings create strong incentives for CEOs to manipulate earnings upwards. McAnally et al. (2008) suggested that option grants create strong incentives for CEOs to miss earnings benchmarks via downward earnings management. The above studies typically tested the association between discretionary accruals (the dependent variable) and executive compensations (the explanatory variables) and suggested that compensation contracts create incentives for earnings management.

The alternative primary stream of research investigates the effect of earnings management on executive compensations. For instance, Balsam (1998) found that cash flows, discretionary accruals, and non-discretionary accruals are all significant determinants of CEO cash compensation. Furthermore, the research indicates that managers typically use income-increasing discretionary accruals to increase compensation. The significant positive coefficient for this variable reveals that income-increasing discretionary accruals are given more emphasis in compensation decisions than income-decreasing discretionary accruals. Shuto (2007) estimated discretionary accruals from the Cash Flow Modified Jones model and found that managers who do not receive bonuses are more likely to exercise income-decreasing discretionary accruals.

Moreover, the research shows that non-discretionary earnings components are more value-relevant than discretionary components and shareholders are prefer these more value-relevant earnings components in evaluating executive compensation. Matsunaga and Park (2001) pointed out that CEO compensation is likely to be reduced when a firm misses an earnings benchmark because the compensation committee may view this as a signal of poor management performance. This study showed significantly negative associations between the change in CEO cash bonuses and earnings below consensus analysts' forecasts and prior year earnings. Although Matsunaga and Park's study did not involve the estimation of discretionary accruals, it has implications for studies of earnings management and executive compensation. That is, earnings benchmarks create incentives for managers to engage in earnings management as managers are penalized for lower bonuses when they missed earnings benchmarks. This stream of research investigates the effect of earnings management on executive compensations. Researchers typically model the relationship between executive compensations (the dependent variable) and discretionary accruals (the explanatory variables).

The two streams of studies raise the issue of whether executive compensation is simultaneously co-determined with earnings management behavior. While compensation induces managers to engage in opportunistic earnings management, earnings manipulation may enable managers to increase their compensation. If executive compensation is concurrently co-determined with earnings management, previous results in testing the association between earnings management and executive compensations would be biased.

It is well known that one of the key assumptions of standard linear regression analysis is that the regressors (explanatory variables) are statistically independent of the error component of the model. Given a standard linear regression model $Y = X\beta + \epsilon$, where Y denotes the $n \times 1$ vector of observations on the dependent variable, X denotes the $n \times k$ matrix of observations on the explanatory variables (regressors), β is the unknown $k \times 1$ vector of regression parameters and ϵ is $n \times 1$ vector of unobserved disturbance, it follows that the OLS estimator, $\hat{\beta}_{OLS} = \beta + (X'X)^{-1} X'\varepsilon$, is a consistent estimator of the true coefficient when E (ϵ | X) = 0. Regressors in this case are said to be exogenous, which means they are determined outside the model. However, if this assumption is not true - if the regressors vary systematically with the error term—then OLS estimated coefficients are inconsistent and biased. Regressors might fail to be independent because they are simultaneously determined along with the dependent variables. Simultaneity occurs when there is a feedback relationship between one or more of the explanatory variables and the dependent variable (Greene, 2002).

One immediate concern for the OLS bias with the research cited above is the endogeneity of executive compensation which could be simultaneously co-determined with earnings management behavior. In the presence of a simultaneity problem, regressors are said to be endogenous as E (ϵ | X) ≠ 0 and therefore lead to $\hat{\beta}_{OLS} \neq \beta$. One solution to this problem is to use the *instrumental variables approach* (IV) (Pindyck and Rubinfeld, 1981). Two-stage least-squares (2SLS) is a method applied to determine IV estimates. This method requires replacing the endogenous variable on the right-hand side of the equation with a predicted value that is constructed by regressing the endogenous variable on a set of instrumental variables. An instrumental variable must have two properties: it must be uncorrelated with the error term, and must explain part of the variability in the endogenous regressor. The best choice for the instruments of the variables could be any independent variable suitable for predicting the dependent regressors. Assuming Z_{it} represents the instruments, so the 2SLS estimator for β is $\hat{\beta}_{IV} = \beta + (X'P_Z X)^{-1} X'P_Z \varepsilon$, where $P_Z = Z(Z'Z)^{-1} Z'$, Z is an $n \times q$ matrix containing the instrumental variables. The 2SLS estimator $\hat{\beta}_{IV}$ is a consistent estimator of β when the endogenous regressor is replaced by a fitted value that is constructed from a set of instrumental variables, since these instruments should be uncorrelated with the error term, i.e. E (ϵ | Z) = 0.

In this area of research, Baker et al. (2003) were among the first to test for, and found evidence of, endogeneity in their models due to the option compensation variable. They used a two-stage least square approach to alleviate this problem. In the first stage, they regressed options on a set of instrumental variables including CEOs tenure, return on assets, change in stock price, market-to-book ratio, and an indicator variable for CEOs in their final year, plus all other exogenous variables in the discretionary accruals model. In the second stage, the fitted value of option was used to replace the original option variable in the discretionary accruals model. They argued that the main advantage of this method is that discretionary accruals are modeled on the expected rather than realized option. Since the expected option is predicted from all exogenous variables, such measure should be exogenous or independent from discretionary accruals and therefore mitigate the potential endogeneity problem. Following Baker et al. (2003), this study examines the endogeneity of executive compensation and further tests whether executive remuneration creates incentives for earnings manipulation when endogeneity is concerned.

3. Models and Instrumental Variables Approach

We use discretionary accruals as a proxy for earnings management and estimate discretionary accruals using the following variation of the Jones (1991) cash flow model.

$$TA_{it} / A_{it-1} = a_1(1/A_{it-1}) + a_2(\Delta REV_{it} / A_{it-1}) + a_3(PPE_{it} / A_{it-1}) + \Delta CF_{it} + \omega_{it} \quad (1)$$

Where TA_{it} is the total accruals for firm i for year t scaled by total assets for year t-1; total accruals are calculated as the difference between net operating income and operating cash flows; A_{it-1} is the total assets for year t-1; ΔREV_{it} is sales for firm i for year t less net sales for firm i for year t-1 scaled by total assets for year t-1; PPE_{it} is the Gross property, plant and equipment for firm i for year t scaled by total assets for year t-1; ΔCF_{it} is the operating cash flows for firm i for year t less operating cash flows for firm i in year t-1 scaled by total assets for year t-1. We obtain discretionary accruals, *i.e.* the residual from estimating equation (1) cross sectional by Global Industry Classification Standard (GICS) industry classification structure. Then we employ Kasznik (1999) matched-portfolio technique to adjust the potential measurement error that is correlated with earnings performance. The adjustment for each observation is the median value of discretionary accruals for a portfolio of firms ranked by the return on assets (ROA) which is correlated with earnings performance.

$$DA\_ADJ_{it} = DA_{it} - Median(DA)_{pt} \quad (2)$$

Where DA_{it} is the raw discretionary accruals for firm *i* for year *t* obtained as residual from equation (1); $Median(DA)_{pt}$ is the median value of the discretionary accruals for a portfolio, and *p* is the percentile ranking of raw discretionary accruals based on a firm's ROA. We test the association between earnings management and executive compensation incentives as:

$$DA\_ADJ_{it} = \alpha_0 + \alpha_1 COMP_{it} + \alpha_2 CONTROL_{it} + \sum \alpha_j IND_j + \varepsilon_{it} \quad (3)$$

Using *COMP*, *CONTROL* and *IND* to denote various compensation structure variables, control variables and the industry dummy. *COMP* is composed of two parts, a systematic part, which is its expected value *E(COMP)*, and a random part, which is the reduced form random error, that is,

$$COMP_{it} = E(COMP) + \nu_{it} \quad (4)$$

Given the endogeneity concern of the executive compensation variable, it is ν_{it} that causes the compensation structure variables to be correlated with the error term ε_{it}. If the expected compensation is known, the compensation structure variables in the equation (3) could be replaced by equation (4) to obtain,

$$\begin{aligned} DA\_ADJ_{it} &= \alpha_0 + \alpha_1[E(COMP_{it}) + \nu_{it}] + \alpha_2 CONTROL_{it} + \sum \alpha_j IND_j + \varepsilon_{it} \\ &= \alpha_0 + \alpha_1 E(COMP_{it}) + \alpha_2 CONTROL_{it} + \sum \alpha_j IND_j + (\alpha_1 \nu_{it} + \varepsilon_{it}) \\ &= \alpha_0 + \alpha_1 E(COMP_{it}) + \alpha_2 CONTROL_{it} + \sum \alpha_j IND_j + \varphi_{it} \end{aligned} \quad (5)$$

In equation (5), the regressor on the right-hand side is the expected compensation *E(COMP)*, which is predicted from the instrumental and exogenous variables. Following Baker et al. (2003), since the expected compensation is predicted from the instrumental and exogenous variables, it should not be correlated with the error term φ_{it} and therefore mitigating the endogeneity problem. Given the equation is identified, its parameters can be estimated in two steps: first, estimate the parameters of the reduced form equations by OLS and obtain the predicted values of the compensation structure variables, see equation (6); second, replace the compensation structure variables on the right-hand side of the equation (3) by their predicted values from (6) and estimate the parameters by OLS, see equation (7).

$$COMP_{it} = \delta_0 + \delta_1 Z_{it} + \delta_2 CONTROL_{it} + \sum \delta_j IND_j + \nu_{it} \quad (6)$$

$$DA\_ADJ_{it} = \alpha_0 + \alpha_1 \hat{COMP}_{it} + \alpha_2 CONTROL_{it} + \sum \alpha_j IND_j + \varepsilon_{it} \quad (7)$$

Where $COMP_{it}$ denotes the compensation structure variables. As previously mentioned, in Australia, the *Corporations Law s300A,* dictates that the remuneration packages of all listed companies' directors and the five highest paid executives must be disclosed in the annual report. These disclosures include the total reward which comprises the *fixed* remuneration and the *at-risk* remuneration which is made up of short term incentives and long term incentives. These components are: salary, fees, benefits (including motor vehicles and accommodation), fringe benefits tax, bonuses, superannuation contributions, termination payments, the value of shares and options granted and the long-term incentive plans (*Corporations Act*, 2001). We first use the aggregate level of executive compensation (*TCOMP*) which is the sum of salary, fees, benefits, fringe benefits tax, bonuses, superannuation contributions, termination payments, the value of shares and options granted, and long-term incentive plans. Second, we decompose the total executive compensation into *fixed* (*FIX*) and *at-risk* remuneration (*ATRISK*). Finally, the *at-risk* components are decomposed into bonus, options, shares and the long term incentive plan compensations (LTIPs). We also measure individual components: salaries (*SALARY*), bonuses (*BONUS*), options (*OPTION*), shares (*SHARE*) and LTIPs (*LTIP*). All compensation variables are measured in millions of dollars.

We developed instrument variables Z_{it} to estimate compensation. The choice of instruments is based on the following studies. Agency theory has long suggested that ideally executive compensation is designed to align managers' and shareholders' interests, to maximize firm value (Jensen and Meckling, 1976). Changes in CEO remuneration are found to be positively associated with changes in shareholder wealth and such positive association is commonly referred to as the pay-performance sensitivity (Coughlan and Schmidit, 1985; Murphy, 1985; Jensen and Murphy, 1990). Prior studies suggests that higher volatility of stock prices makes the stock price an imprecise measure of managerial performance and so will be associated with lower levels of equity-based compensation (Iyengar and Zampelli, 2008). Researchers argue that firms substitute equity compensation options and shares for straight cash salary in CEOs' remuneration packages when firms have financial liquidity constraints (Mehran, 1995; Yermack, 1995). Finally, from the tax reduction standpoint, equity-based compensations offer tax advantages to executives since they do not pay income tax until the year of exercise. However, cash-based compensations offer tax advantages to corporations because cash compensations are immediately tax deductible from corporation income. So the equilibrium compensation structure is to achieve net tax savings between a corporation and its managers (Scholes and Wolfson, 1992).

Accordingly, this study chooses total shareholder returns and firm values as instrumental variables (Z_{it}) to estimate the expected total compensation, fixed salary, and bonus. Total shareholder returns (*TSR*) is defined as the one year total return to shareholders plus dividends. Firm value is measured by a simplified Tobin's Q (*TBQ*), calculated as the book value of assets plus the difference between the market and book values of common stock and divided by the book value of assets (Yermack, 1995). Positive associations between compensation and total shareholder returns and firm value are expected. The instrumental variables (Z_{it}) used to predict equity-based compensation are, the volatility of the firm's stock price, financial liquidity constraints, and tax losses carried forward, in addition to total shareholder returns and firm values. They are used in predicting equity-based compensation (such as options, shares, LTIPs), total compensation and at-risk compensation which contain equity incentives. The volatility of a firm's stock price (*VOL*) is defined as the standard deviation of the previous five years of stock returns. A negative coefficient is expected for this variable. Financial liquidity constraints is measured by using a dividend dummy variable (*DIV_DUMMY*) equal to one if a firm pays zero dividends during the year; a positive sign is expected for this coefficient. Firms having tax losses carried forward generally have lower marginal tax rates. Following Clinch (1991) and Yermack (1995), a tax dummy variable (*TAX_DUMMY*) set equal to one when firms have non-zero tax losses carried forward is used, a positive coefficient is expected for this variable.

In the first stage regression, the expected total compensation and its components are estimated from the instrumental variables. These variables are documented as determinants of executive compensation but are arguably not directly related to discretionary accruals. Also, the other independent variables in modeling discretionary accruals are included with the exception of lag total accruals (*LAGTA*) because lag total accruals might reverse and affect current year discretionary accruals (Dechow et al., 2003). The estimation procedure is repeated for total compensation, fixed compensation, at-risk compensation, salary, bonuses, options, shares and long-term incentive plans, respectively. The first-stage regressions yield fitted values of compensation structure variables $\hat{COMP}_{it}$; in the second stage, the fitted values of these compensation structure variables are used to estimate the effects of executive compensation components on discretionary accruals.

We use adjusted discretionary accruals DA_ADJ_{it} as the proxy for earnings management, including absolute adjusted discretionary accruals, positive and negative adjusted discretionary accruals, respectively. $CONTROL_{it}$ denotes control variables, we control for firm size ($SIZE_{it}$), measured as the logarithm of the total assets at year *t*, as smaller firms are documented to be associated with earnings management; growth opportunity ($GROWTH_{it}$), measured by the change of sales between year *t* and *t-1* divided by total assets at year *t;* profitability (ROE_{it}), measured by net operating income divided by total equity*;* debt covenant violation (LEV_{it}), measured by total debt to total assets; Book-to-market effect ratio (BM_{it}), measured by book value of common equity to market value of common equity; Capital intensity (CIR_{it}), measured as gross property, plant and equipment divided by total assets*;* Lagged total accruals ($LAGTA_{it}$) measured as the total accruals; IND_j , industry dummy, equals to 1 if firm *i* is from GICS industry (Energy, Material, Metals and Mining, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Information Technology, Telecommunication and Utilities) and 0 otherwise; v_{it} and ε_{it} = the error terms; *i, j* and *t* denote the firm, industry and year subscripts, respectively. Table 1 below lists the definitions for all variables.

Table 1. Variable Definitions

The definitions and data items for each of the variables applied in the study are listed in the table. Compensation variables are from Connect4, all other variables are from DataStream.

Variable	Definition	Data Item
TA_{it}	Total accruals for firm *i* at year *t*, defined as the difference between net income before extraordinary items and operating cash flows	WC01551 WC04860
A_{it-1}	Total assets for firm *i* at beginning of year	WC02999
ΔREV_{it}	Change in revenues for firm *i* between year *t-1* and *t*	WC01001
PPE_{it}	Gross property plant and equipment for firm *i* at year *t*	WC02301
ΔCF_{it}	Change in operating cash flows for firm *i* between year *t-1* and *t*	WC04860
DA_ADJ	Adjusted discretionary accruals	Eq.(1 &2)
Abs (DA_ADJ)	Absolute value of adjusted discretionary accruals	Eq.(1 &2)
$TCOMP_{it}$	Dollar value of total compensation earned by CEOs during the fiscal year, measured in millions of dollars	*Total Compensation*
FIX_{it}	Dollar value of fixed compensation earned by CEOs during the fiscal year, which is the sum of salary, superannuation contributions, allowances, retirement and other benefits, measured in millions of dollars	*Salary+Super +Allowances +Retirement +Other*
$ATRISK_{it}$	Dollar value of at-risk compensation earned by CEOs during the fiscal years, which is the sum of bonus, options grants, shares grants and long-term incentive plans, measured in millions of dollars	*Bonus+Option s+Shares+LTIP*
$SALARY_{it}$	Dollar value of base salary earned by CEOs during the fiscal year, measured in millions of dollars	*Salary*
$BONUS_{it}$	Dollar value of bonus earned by CEOs during the fiscal year, measured in millions of dollars	*Bonus*
$OPTION_{it}$	Dollar value of options granted to CEOs during the fiscal year, measured in millions of dollars	*Options*
$SHARE_{it}$	Dollar value of shares granted to CEOs during the fiscal year, measured in millions of dollars	*Shares*
$LTIP_{it}$	Dollar value paid out to CEOs under the company's long term incentive plan over a period of more than one year, measured in millions of dollars.	*LTIP*
TSR_{it}	One year total shareholders returns for firm i, calculated as the change in share price between year *t* and year *t-1*, plus dividends	P WC05101
TBQ_{it}	Tobin's Q, calculated as the book value of assets plus the difference between the market and book values of common stock and divide by the book value of assets for firm *i* at year *t*	WC02999 WC08001 WC03480
VLO_{it}	The volatility of firm's stock price at year *t*, calculated as the	p

	standard deviation of the previous five years of stock returns	
DIV_DUMMY_{it}	Dividend dummy variable, equals to one if a firm pays zero dividends during the year *t*, and zero otherwise	WC05101
TAX_DUMMY_{it}	Tax dummy variable, equals one when a firm has nonzero tax loss carry-forwards in year *t*, and zero otherwise	WC01451
LEV_{it}	Leverage, measured by total debt (long term debt + short term debt) to total assets for firm *i* in year *t*	WC03251 WC03051
BM_{it}	Book-to-market effect ratio, measured by book value of common equity to market value of common equity for firm *i* in year *t*	WC03501 WC08001
CIR_{it}	Capital intensity, measured as gross property, plant and equipment divided by total assets for firm *i* in year *t*	WC02301 WC02999
$LAGTA_{it}$	Lagged total accruals for firm *i* in year *t-1*, measured as the difference between net income before extraordinary items and operating cash flows	WC01551 WC04860
ΣIND_j	Industry effects, 1 if firm *i* is from industry *j* (other than Energy), based on GICS industrial codes, and 0 otherwise	WC06010

4. Sample and Data collection

Table 2 shows the sample formation. We use all ASX listed firms in DataStream with the necessary annual accounting and market data for the period 1999 to 2006. The initial sample includes 3,914 firms with 31,312 observations. We exclude all firms in the financial sector. There are 1,832 firm observations that are excluded when industry codes are unclassified by DataStream. A further 16,910 firm observations are omitted since necessary data for accrual estimation is missing. Firms involved in restructuring activities, equaling 10 observations, are excluded. In the firm size data, the upper and bottommost 1% of the observations by extreme values of total assets are trimmed, totaling 125 observations. These sampling criteria resulted in a sample of 5,947 firm-year observations with the necessary data for discretionary accrual estimations.

Table 2. Sample Selection

Criteria	**Firm-years**
Initial financial data from DataStream (1999-2006):	31,312
Less: Financial firms	(6,488)
Industries that are not classified	(1,832)
Accruals estimation missing data	(16,910)
Firms involved in restructuring activities	(10)
Firm size outliers(trimmed at 1% and 99% levels)	(125)
Estimation sample (2000-2006):	**5,947**
Initial executive compensation data from Connect4 (2000-2006):	7,672
Merge two data bases by ASX code and by year :	10,053
Less: Missing compensation data	(2,859)
Negative options, shares and LTIP	(9)
Accruals estimation missing data	(3,723)
Total compensation outliers (trimmed at 1% and 99% levels)	(69)
Discretionary accruals outliers (trimmed at 1% and 99% levels)	(67)
Testing sample (2000-2006):	**3,326**

Executive compensation data are obtained from the Connect4 databases. We search for all Chief Executives and/or Managing Directors (CEOs/MDs) from the Board position list. The detailed disclosure includes total compensation, directors fees, bonuses, superannuation, salary, allowances, non-cash benefits, retirement payments, motor vehicle, committee fees, long-term incentive plans, options, shares and consulting fees. The status of CEOs/MDs was that they currently held the position in that particular fiscal year. Data search criteria yielded an initial executive compensation data set of 7,672 firm-year observations.

Table 3. Sample Distribution

The table provides details of data collection sample by GICS industry. Panel A shows the sample distributions of the estimation samples. Panel B shows sample distributions of the testing samples. Both tables list the frequency, percentage, cumulative frequency, and cumulative percentage for each industry. Frequency represents count of observations and cumulative frequency denotes cumulative count of observations. Percent represents the number of observation of each industry as percentage of the number of total observations. Cumulative percent denotes cumulative percentage of observations.

Panel A-Estimation Sample

GICS	Industry	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1010	Energy	429	7.21	429	7.21
1510	Material	428	7.20	857	14.41
1510	Metals & Mining	1840	30.94	2697	44.90
2010-2030	Industrials	307	5.16	3004	50.06
2510-2550	Consumer Discretionary	979	16.46	3983	66.52
3010-3030	Consumer Staples	449	7.55	4432	74.07
3510-3520	Health Care	560	9.42	4992	83.49
4510-4530	Information Technology	776	13.05	5768	96.54
5010-5510	Telecommunication & Utilities	179	3.01	5947	100.00

Panel B-Test sample

GICS	Industry	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1010	Energy	210	6.31	210	6.31
1510	Material	237	7.13	447	13.44
1510	Metals & Mining	1019	30.64	1466	44.08
2010-2030	Industrials	185	5.56	1651	49.64
2510-2550	Consumer Discretionary	548	16.48	2199	66.12
3010-3030	Consumer Staples	274	8.24	2473	74.36
3510-3520	Health Care	335	10.07	2808	84.43
4510-4530	Information Technology	433	13.02	3241	97.45
5010-5510	Telecommunication & Utilities	85	2.56	3326	100.00

Executive compensation data then were merged with discretionary accruals estimation sample by company code and by year. The merged data set contains 10,053 firm-year observations. In order to extract the data that contains both executive compensation and financial information, this study deleted 2,859 observations from which total executive compensation was missing, 9 observations of options, shares and LTIPs that had negative value. Also, 3,723 observations with missing financial data for accruals estimation were deleted. To ensure that the results are not sensitive to extreme outliers, observations in the top and bottom 1% of total compensation and discretionary accruals were eliminated. The intersection of these two databases and the selection process yielded a final testing sample of 3,326 firm-year observations covering the period of 2000 to 2006. Each of the firm-year observations in the estimation sample is assigned into one of the nine industry groups according to the GICS code. Table 3 Panel A and B shows sample distribution of estimation and testing samples, respectively. Nine GICS industry groups are Energy (1010), Material (1510), Metals & Mining (1510), Industrials (2010-2030), Consumer Discretionary (2510-2550), Consumer Staples (3010-3030), Health Care (3510-

3520), Information Technology (4510-4530), and Telecommunication & Utilities (5010-5510) are represented, containing a high proportion of Metals & Mining (1510), Consumer Discretionary (2510-2550), and Information Technology (4510-4530). Industry-wise distribution of the sample reflects the nature of the Australian economy which is dominated primarily by resource and consumer services.

5. Empirical findings

Table 4 presents descriptive statistics for the principal testing variables. The absolute value of adjusted discretionary accruals, *Abs (DA_ADJ)*, has a mean (median) of 0.1114 (0.0643). The mean (median) signed adjusted discretionary accrual (*DA_ADJ*) is -0.0038 (0.0000). The average total compensation for Australian CEOs is $540,000. The average fixed component is $350,000, which is higher than the at-risk component $160,000. Further, a large proportion of the fixed compensation is cash salary; the average CEO salary is $290,000. On average, Cash bonuses represent the second largest fraction of the total compensation package with $78,000. The average stock option grant has a fair value of $57,600, valued using the Black-Scholes option pricing model (Black and Scholes, 1973). Shares and Long-term incentive plans are comparatively small. CEOs receive share grants having an average market value of $12,300. The average Long-term incentive plan is $15,900. For the instrumental variables, the mean and median total shareholder returns (*TSR)* are 0.2826 and 0.0759 with a standard deviation of 1.0597. The volatility of a firm's stock price (*VOL*) has a mean (median) of 1.2299 (0.2489) and a standard deviation of 7.8592. Firm value is measured by Tobin's Q (*TBQ*) and the mean and median values are 2.2627 and 1.5443, respectively. The distribution of growth rates is positively skewed, showing a high growth rate (*GROWTH*), with a mean and median of 1.4637 and 0.1006. The standard deviation is also large at 16.4156, implying that some Australian firms have been rapidly growing during this period. However, profitability (*ROE*) is low, with mean and median values of -0.1290 and -0.0298, respectively.

Table 4. Descriptive Statistics

The table provides details of the descriptive statistics for main testing variables defined in Table 1 showing the number of observations, the mean, median, standard deviation, minimum and maximum.

Variables	N	Mean	Median	S.D.	Min	Max
Discretionary Accruals (% of total assets)						
DA_ADJ	3326	-0.0038	0.0000	0.1826	-0.9745	0.7168
Abs (DA_ADJ)	3326	0.1114	0.0643	0.1447	0.0000	0.9745
Compensation ($millions)						
TCOMP	3326	0.5460	0.3023	0.6949	0.0195	4.7195
SALARY	3135	0.2951	0.2107	0.2992	0.0000	3.1061
BONUS	1035	0.0780	0.0000	0.2215	0.0000	2.4400
LTIP	167	0.0159	0.0000	0.1315	0.0000	2.1130
OPTION	982	0.0576	0.0000	0.2149	0.0000	3.1729
SHARE	184	0.0123	0.0000	0.1102	0.0000	3.6241
FIX	3135	0.3515	0.2488	0.3611	0.0000	3.4908
ATRISK	1035	0.1637	0.0040	0.3940	0.0000	3.9695
Instrumental Variable						
TSR	3106	0.2826	0.0759	1.0597	-0.9687	21.5000
TBQ	3291	2.2627	1.5443	2.8717	0.1883	59.6785
VLO	2944	1.2299	0.2489	7.8592	0.0000	269.6266
DIV_DUMMY	3326	0.6386	1.0000	0.4805	0.0000	1.0000
TAX_DUMMY	3326	0.7408	1.0000	0.4382	0.0000	1.0000
Control Variable						
SIZE	3326	10.6360	10.2476	2.0585	6.0615	16.0499
GROWTH	2546	1.4637	0.1006	16.4156	-1.0000	547.0775
ROE	3326	-0.1290	-0.0298	0.4658	-7.5223	1.6375
LEV	3326	0.1557	0.0712	0.2293	0.0000	4.3394
BM	3318	0.6406	0.5124	0.8185	-22.4270	10.3268
CIR	3326	0.3383	0.2770	0.2786	0.0000	0.9922
LAGTA	2954	-0.2276	-0.0326	4.8914	-202.4092	15.0385

5.1 Test of compensation endogeneity

We used the Hausman test (Hausman, 1978) to test for compensation endogeneity. Under the assumption of the appropriateness of the instruments, the Hausman test compares the performance of the least squares estimator $\hat{\beta}_{OLS}$ to an instrumental variable estimator $\hat{\beta}_{IV}$ and thus determines the existence of an endogeneity problem. If the Hausman test rejects the null hypothesis that compensation and error term are uncorrelated, then compensation is endogenous. Hence, the least squares estimator is not consistent, but the instrumental variables estimator is consistent. However, if the null hypothesis cannot be rejected so that the compensation and error terms are uncorrelated, then compensation does not have an endogeneity problem. In this case, both the least squares estimator and the instrumental variables estimator are consistent and the least squares estimator is the more efficient estimator.

Also, 2SLS estimation requires certain conditions for identification whereby the instruments must come from those exogenous variables omitted from the equation in question and the number of omitted exogenous variables is at least as large as the number of right-hand-side endogenous variables. This ensures that the equation is identified and its parameters can be estimated consistently (Greene, 2002).

In this study, the number of instrumental variables and exogenous variables satisfies the necessary condition for identification. However, this might introduce another problem of over-identification since there are multiple instruments and in some of the models the number of instruments exceeds the number of endogenous regressors. The Basmann (1960) test is used to test the over-identifying restrictions—to see if some of the instrumental variables are correlated with the error term. The null hypothesis of this test is that the instrumental variables that do not appear in any equation have zero coefficients with error. The alternative hypothesis is that at least one of the assumed zero coefficients is nonzero. If the Basmann test is rejected, then the instruments are not appropriated and thus the Hausman test should not proceed (Godfrey and Hutton, 1994).

Table 5. 2SLS regression examining the endogeneity of total compensation

The table provides details of the results of the first-stage OLS estimation of the reduced form equations for the total compensation examining the endogeneity of total compensation. The dependent variable is TCOMP and the number of observations is 3326. In the first-stage OLS regression, total compensation is treated as endogenous and regressed on a set of instrumental variables and control variables. The lower part of the table shows the partial R-squared and the partial F-statistic from the first-stage regression. The values for the two specification tests: the Basmann test of over-identifying restrictions and the Hausman test for the endogeneity. T-statistics are given in parentheses, one-tailed tests if they have explicit predictions and two-tailed otherwise.

Independent Variables	Pred. Sign	First-Stage Dependent Variable: TCOMP	
Intercept	?	-2.2766	(-17.8498)***
Instruments:			
TSR	+	0.5303	(8.3628)***
TBQ	+	0.0300	(3.6226)***
VOL	−	-0.0028	(-0.7023)
DIV_DUMMY	+	0.1180	(2.5326)**
TAX_DUMMY	+	0.1013	(2.4106)**
Control variables:			
SIZE	+	0.2611	(29.8032)***
GROWTH	+	-0.0010	(-0.5792)
ROE	+	-0.0139	(-1.6027)
LEV	−	-0.0174	(-0.2326)
BM	−	-0.0567	(-3.2428)***
CIR	−	-0.0748	(-0.9948)
LAGTA			
Industry effects:			
Material	?	0.0256	(0.3000)
Metals & Mining	?	-0.0914	(-1.1997)
Industrials	?	0.0869	(0.9776)

Consumer Discretionary	?	0.0446	(0.5517)
Consumer Staples	?	-0.0751	(-0.8591)
Health Care	?	0.1090	(1.1904)
Information Technology	?	0.0596	(0.6882)
Tele & Utilities	?	-0.1405	(-1.2230)
N		3326	
Adjusted R-square		0.5423	
Partial R-squares		0.3028	
F-statistic		84.25 (<.0001)	
Partial F-statistic		144.42 (<.0001)	
White test		230.26 (.0017)	
DW		1.60	
Basmann: Abs (DA_ADJ)		$\chi^2 = 1.12$	(p=0.3250)
Basmann: +DA_ADJ		$\chi^2 = 1.65$	(p=0.1927)
Basmann: −DA_ADJ		$\chi^2 = 0.67$	(p=0.5130)
Hausman: Abs(DA_ADJ)		F = 0.17	(p=0.6801)
Hausman: +DA_ADJ		F = 1.42	(p=0.2342)
Hausman: −DA_ADJ		F = 0.02	(p=0.8846)

Note: . *, **, *** indicate statistical significance at the 10%, 5% and 1% respectively.

Table 5 reports the results of the first-stage OLS estimation of the reduced form equations for the total compensation. The estimated coefficients on *TSR*, *TBQ*, *DIV_DUMMY*, and *TAX_DUMMY* are statistically significant with expected signs, indicating that instrumental variables represented by total shareholder returns, firm values, financial liquidity constraints, and tax losses carried forward affect the total compensation, *TCOMP*. Thus, they are useful in estimating the expected value of the total compensation. The adjusted *R*-square of this first-stage model is 54.23% and the overall *F*-statistic is 84.25, which has a *p*-value of less than 0.0001. *F*-test is a joint test of the overall significance of a model. The *F*-test statistic is given by $F = \frac{(SST - SSE)/(K-1)}{SSE/(T-K)}$, where *SST* is the total sum of squares from the unconstrained model; *SSE* is the sum of squared errors from the unconstrained model; *K* is number of explanatory variables and *T* is sample size. The *F*-distribution has *K−1* numerator degrees of freedom and *T−K* denominator degrees of freedom (Greene, 2002). The Partial *F*-statistic is greater compared to the *F*-statistic because *K* decreases when the control variables are excluded from the model.

Although these results imply a good fit of the reduced form equation to the data in the first stage, they might overstate the true explanatory power of the instruments as the control variables also contribute to this result. After removing the control variables, the *partial* adjusted *R*-square is reduced to 30.28% and the *partial F*-statistic is increased to 144.42 with a *p*-value of less than 0.0001. In testing endogeneity, the Hausman (1978) test shows that total compensation, *TCOMP*, is not endogenous. The test does not reject the hypothesis that *TCOMP* is exogenous in all three models of absolute discretionary accruals, income-increasing discretionary accruals, and income-decreasing discretionary accruals. Also, the Basmann (1960) test for overidentifying restrictions does not reject the exogeneity of the instruments in all three models of absolute discretionary accruals, income-increasing discretionary accruals, and income-decreasing discretionary accruals. Thus, the total compensation is not endogenous.

Table 6 reports the results of the first-stage OLS estimation of the reduced form equations for the fixed compensation and at-risk compensation. For the fixed compensation, the estimated coefficients on *TSR* and *TBQ* are statistically significant with expected signs, indicating that total shareholder returns and firm values are the determinants of executive fixed compensation. The adjusted *R*-square of the first-stage model in estimating the expected fixed compensation is 51.65% and the overall *F*-statistic is 92.35, which has a *p*-value of less than 0.0001. After removing the contribution of the control variables, the *partial* adjusted *R*-square decreased to 20.59% and the *partial F*-statistic is 44.93 with a *p*-value of less than 0.0001. This implies that control variables contribute to the explanatory power as well. Particularly, firm size (*SIZE*) plays a significant role in determining executives' fixed compensation with large *t*-statistic of 29.99 and *p*-value of less than 0.0001. For at-risk compensation, five instrumental variables are used in estimating the expected value of at-risk compensation since equity components of at-risk compensation may be affected by stock price volatility, financial liquidity constraints, and tax loss in addition to total shareholder returns and firm values. Nevertheless, Table 6 shows that only total shareholder returns (*TSR*) and firm values (*TBQ*) are statistically significant and have the expected signs. Although the coefficients of stock price volatility (*VOL*), financial liquidity constraints (*DIV_DUMMY*), and tax losses carried forward (*TAX_DUMMY*) have the expected signs, they are not significant. The adjusted *R*-square of the first-stage model in estimating the expected at-risk compensation is 36.23% and the overall *F*-statistic is 40.99, which has a *p*-value of less than 0.0001. After removing the control variables, the *partial* adjusted *R*-square is 21.68% and *partial* F-statistic is 92.42.

The Hausman (1978) test is a joint test of endogeneity with both fixed and at-risk compensation included in one equation. Table 6 shows that fixed compensation and at-risk compensations are simultaneously endogenous to income-increasing discretionary accruals. The Hausman joint tests do not reject the hypothesis that fixed compensation and at-risk compensation are jointly exogenous in the absolute discretionary accruals model and income-decreasing discretionary accruals model, while the test rejects that fixed compensation and at-risk compensation are simultaneously exogenous in the income-increasing discretionary accruals model, with a 10% significance level. The Basmann (1960) tests do not reject the over-identifying restrictions so the instruments are appropriated. The underlying notion for fixed compensation and at-risk compensation endogeneity could be that firm owners use high levels of fixed remuneration as a mechanism to mitigate or constrain management opportunistic behavior. Firm owners could also reward managers with high at-risk payment if managers use upward earnings management to achieve the firms' earnings targets. Therefore, the outcomes of the tests suggest that to some extent income-increasing earnings management is simultaneously co-determined with executive fixed compensation and at-risk compensation. Fixed and at-risk compensation are endogenous to income-increasing discretionary accruals.

Table 6. 2SLS regression examining the endogeneity of fixed and at-risk compensation

This table reports the results of examining the endogeneity of executive fixed and at-risk compensation. In the first-stage OLS regression, fixed and at-risk compensation are treated as endogenous and regressed on a set of instrumental variables and control variables, respectively. The second-stage regression replaces the fixed compensation and at-risk compensation by their predicted values from the first-stage regression. E_FIX is expected fixed compensation and E_ATRISK is expected at-risk compensation. The lower part of the table shows the partial R-squared and the partial F-statistic from the first-stage regression. The values for the two specification tests: the Basmann test of over-identifying restrictions and the Hausman test for the endogeneity. T-statistics are given in parentheses, one-tailed tests if they have explicit predictions and two-tailed otherwise.

Independent Variable	**Pred. Sign**	**First-Stage Dependent variable**		**Second-Stage Dependent variable**
		FIX	**ATRISK**	**+DA_ADJ**
Intercept	?,?,?	-1.1012	-1.2403	0.1258
		(-16.45)	(-11.8085)***	(1.5012)
E_FIX	~,~,+			-0.4622
				(-2.1994)**
E_ATRISK	~,~,+			0.2682
				(2.1677)**
Instruments:				
TSR	+,+,~	0.1988	0.3625	
		(5.92)***	(8.6920)***	
TBQ	+,+,~	0.0100	0.0182	
		(2.27)***	(3.3305)***	
VOL	−,−,~		-0.0016	
			(-0.62)	
DIV_DUMMY	+,+,~		0.0497	
			(1.5909)	
TAX_DUMMY	+,+,~		0.0438	
			(1.5043)	
Control variables:				
SIZE	+,+,?	0.1342	0.1233	0.0082
		(29.26)	(17.4238)***	(0.6900)
GROWTH	+,+,?	-0.0006	-0.0003	0.0019
		(-0.69)	(-0.3040)	(1.6594)*
ROE	+,+,?	-0.0106	-0.0014	-0.0070
		(-2.33)	(-0.2433)	(-0.8414)
LEV	−,−,?	0.0770	-0.1035	0.1232

		(1.94)	(-2.0755)**	(5.8471)***
BM	−,−,?	-0.0246	-0.0380	-0.0093
		(-2.65)	(-3.2794)***	(-1.5893)
CIR	−,−,−	-0.0598	-0.0132	-0.0220
		(-1.50)	(-0.2652)	(-1.0425)
LAGTA	~,~,+			-0.0100
				(-0.6916)
Industry effects:				
Material	?,?,?	0.0497	0.0167	-0.0165
		(1.10)	(0.2922)	(-0.6876)
Metals & Mining	? ?,?	-0.0237	-0.0313	-0.0514
		(-0.59)	(-0.6222)	(-2.2521)**
Industrials	?,?,?	-0.0011	0.1433	-0.0804
		(-0.02)	(2.3961)**	(-3.0373)***
Consumer Discretionary	?,?,?	0.0795	0.0151	-0.0136
		(1.86)	(0.2793)	(-0.5230)
Consumer Staples	?,?,?	0.0068	-0.0321	-0.0507
		(0.15)	(-0.5491)	(-2.1975)**
Health Care	?,?,?	0.0331	0.1080	-0.0553
		(0.68)	(1.7925)*	(-2.0862)**
Information Technology	?,?,?	0.0491	0.0498	-0.0019
		(1.07)	(0.8707)	(-0.0817)
Tele & Utilities	?,?,?	-0.0578	-0.0436	-0.0373
		(-0.95)	(-0.5761)	(-1.3676)
N		3326		
Adjusted R-square		0.5165	0.3623	0.1718
Partial R-squares		0.2059	0.2168	
F-statistic		92.35(p<.0001)	40.99(p<.0001)	
Partial F-statistic		44.93(p<.0001)	92.42(p<.0001)	
White test		172.42	216.52	
		(0.0005)	(0.0105)	
DW		1.68	1.66	
Basmann: Abs (DA_ADJ)				χ^2 = 1.12 (p=0.3250) χ^2
Basmann: +DA_ADJ				= 1.43 (p=0.2341) χ^2 =
Basmann: −DA_ADJ				0.67 (p=0.5130)
Hausman: Abs(DA_ADJ)				F =0.13 (p=0.7174)
Hausman: +DA_ADJ				F = 2.89 (p=0.0564)
Hausman: −DA_ADJ				F= 1.03 (p=0.3569)

Note: *, **, *** indicate statistical significance at the 10%, 5% and 1% respectively.

In a similar vein, the endogeneity problem is examined for the individual compensation components. Table 7 shows that for salary, the first-stage estimation result of the expected salary is very close to that of the fixed compensation. For bonus, both the coefficients of total shareholder returns (*TSR*) and firm values (*TBQ*) are statistically significant with expected signs. The adjusted *R*-square of the first-stage model in estimating the expected bonus is 30.39% and the overall *F*-statistic is 38.27, which has a *p*-value of less than 0.0001. After removing the contribution of the control variables, the *partial* adjusted *R*-square drops to 11.65% while *partial* F-statistic increases to 112.70, with a *p*-value of less than 0.0001. This implies that control variables have explanatory power in predicting bonuses.

For options, shares and LTIPs, five instrumental variables are used in the estimation these components since they are equity based and are exposed to stock price volatility. Financial liquidity constraints and tax losses are expected to affect these payments, in addition to total shareholder returns and firm values. Table 7 shows weak results in estimating the expected value of options, shares and LTIPs. It appears that options can be explained by total shareholder returns (*TSR*) and firm values (*TBQ*). But shares and LTIPs can be explained by total shareholder returns (*TSR*) only. Although stock price volatility (*VOL*), financial liquidity constraints (*DIV_DUMMY*), and tax losses carried forward (*TAX_DUMMY*) have the expected signs, they are not significant. Moreover, the adjusted *R*-squares of the first-stage model in estimating options, shares and LTIPs are low at 9.04%, 5.89%, and 12.69% respectively.

Table 7. 2SLS regression in examining the endogeneity of individual compensation components

This table reports the results of the endogeneity of executive individual compensation components. In the first-stage OLS regression, salary, bonuses, options, shares, and LTIPs are treated as endogenous and regressed on a set of instrumental variables and control variables. The second-stage regression replaces the salary, bonuses, options, shares, and LTIPs by their predicted values from the first-stage regression. The lower part of the table shows the partial R-squared and the partial F-statistic from the first-stage regression. It also shows two specification tests: the Basmann test of over-identifying restrictions and the Hausman test for the endogeneity. T-statistics are given in parentheses, one-tailed tests if they have explicit predictions and two-tailed otherwise.

Independent Variables	**Pred. Sign**	**First Stage Dependent variable**					**Second Stage Dependent variable**
		SALARY	**BONUS**	**OPTION**	**SHARE**	**LTIP**	**+DA_ADJ**
Intercept		-0.8975 (-16.5888)***	-0.5572 (-11.1639)***	-0.3528 (-5.3837)***	-0.0390 (-1.2143)	-0.1227 (-2.9231)***	0.0184 (0.1659)
E_SALARY	~,~,−						-1.8956 (-3.6425)***
E_BONUS	~,~,+						2.4050 (3.1871)***
E_OPTION	~,~,+						0.4449 (1.2210)
E_SHARE	~,~,+						-0.1066 (-0.4959)
E_LTIP	~,~,+						0.0150 (0.2301)
Instruments:							
TSR	+,+,~	0.2264 (8.4182)***	0.1660 (6.6905)***	0.0521 (2.0040)**	0.0238 (1.8552)***	0.0985 (5.9958)***	
TBQ	+,+,~	0.0084 (2.4064)**	0.0077 (2.3897)**	0.0076 (2.2464)**	0.0005 (0.2926)	0.0004 (0.1920)	
VOL	−,−,~			-0.0001 (-0.03)	-0.0002 (-0.25)	-0.0008 (-0.79)	
DIV_DUMMY	+,+,~			0.0181 (0.9287)	0.0040 (0.4133)	0.0111 (0.9024)	
TAX_DUMMY	+,+,~			0.0097 (0.5313)	0.0070 (0.7800)	0.0052 (0.4544)	
Control variables:							
SIZE	+,+,?	0.1114 (29.9940)***	0.0592 (17.2781)***	0.0364 (8.2396)***	0.0053 (2.4526)**	0.0098 (3.4572)***	0.0412 (2.1264)**
GROWTH	+,+,?	-0.0005 (-0.6493)	-0.0004 (-0.5970)	0.0001 (0.1357)	0.0002 (0.6274)	-0.0001 (-0.2311)	0.0023 (1.9596)*
ROA	+,+,?	-0.0074 (-2.0028)**	-0.0013 (-0.3722)	0.0010 (0.2660)	-0.0003 (-0.1474)	-0.0005 (-0.2292)	-0.0093 (-1.0964)
LEV	−,−,?	0.0146 (0.4592)	-0.0229 (-0.7845)	-0.0173 (-0.5562)	-0.0143 (-0.9340)	-0.0288 (-1.4651)	0.1776 (6.3527)***
BM	−,−,?	-0.0331 (-4.4555)***	-0.0195 (-2.8424)***	-0.0075 (-1.0387)	-0.0027 (-0.7719)	-0.0048 (-1.0530)	-0.0138 (-2.2106)**
CIR	−,−,−	-0.0575 (-1.8038)*	-0.0198 (-0.6716)	-0.0100 (-0.3229)	-0.0140 (-0.9206)	0.0247 (1.2612)	-0.0544 (-2.2768)**
LAGTA	~,~,+						-0.0493 (-2.1227)**

Independent Variables	Pred. Sign	First Stage Dependent variable					Second Stage Dependent variable
		SALARY	BONUS	OPTION	SHARE	LTIP	+DA_ADJ
Industry effects:							
Material	?,?,?	0.0430	0.0380	-0.0376	-0.0039	-0.0007	-0.0373
		(1.1881)	(1.1395)	(-1.0558)	(-0.2232)	(-0.0290)	(-1.1161)
Metals & Mining	? ?,?	-0.0543	-0.0376	0.0168	-0.0140	-0.0031	-0.0656
		(-1.6802)*	(-1.2604)	(0.5349)	(-0.9093)	(-0.1577)	(-2.6980)***
Industrials	?,?,?	0.0201	0.0209	-0.0430	-0.0055	0.0943	-0.0572
		(0.5329)	(0.6011)	(-1.1516)	(-0.3007)	(3.9452)***	(-1.5441)
Consumer Discretionary	?,?,?	0.0660	-0.0135	-0.0036	-0.0044	0.0138	0.1139
		(1.9239)*	(-0.4272)	(-0.1056)	(-0.2661)	(0.6471)	(2.3640)**
Consumer Staples	?,?,?	-0.0152	-0.0112	-0.0593	-0.0016	0.0112	-0.0359
		(-0.4106)	(-0.3276)	(-1.6260)	(-0.0906)	(0.4855)	(-1.0969)
Health Care	?,?,?	0.0119	0.0274	0.0697	-0.0071	0.0065	-0.1248
		(0.3071)	(0.7638)	(1.8557)*	(-0.3873)	(0.2729)	(-3.6454)***
Information Technology	?,?,?	0.0494	0.0080	0.0048	-0.0043	0.0208	0.0563
		(1.3449)	(0.2366)	(0.1353)	(-0.2451)	(0.9235)	(1.8581)*
Tele & Utilities	?,?,?	-0.0270	0.0031	-0.0441	-0.0154	0.0121	-0.0905
		(-0.5543)	(0.0700)	(-0.9335)	(-0.6638)	(0.4044)	(-2.3067)**
N		3326					
Adjusted R-square		0.5469	0.3039	0.0904	0.0589	0.1269	0.1929
Partial R-squares		0.1593	0.1165	0.0395	0.0544	0.0672	
F-statistic		104.03(p<.0001)	38.27(p<.0001)	7.86(p<.0001)	11.39(p<.0001)	11.56(p<.0001)	7.09(p<.0001)
Partial F-statistic		161.44(p<.0001)	112.70(P<.0001)	11.39(p<.0001)	18.21(p<.0001)	24.79(p<.0001)	
White test		186.33	204.02	214.01	77	91	330.68
		(0.0019)	(0.0001)	(0.0143)	(0.1956)	(0.2247)	(0.2006)
DW		1.43	1.58	1.93	2.06	1.92	1.82
Basmann: Abs (DA_ADJ)		just identified					
Basmann: +DA_ADJ		just identified					
Basmann: −DA_ADJ		just identified					
Hausman: Abs(DA_ADJ)		F =0.99 (p=0.4230)					
Hausman: +DA_ADJ		F = 4.42 (p=0.0006)					
Hausman: −DA_ADJ		F = 0.47 (p=0.8003)					

Note: *, **, *** indicate statistical significance at the 10%, 5% and 1% respectively.

The overall *F*-statistics of options, shares, and LTIPs models are 7.86, 11.39 and 11.56, respectively. Although after removing the contribution of the control variables, the *partial* F-statistics are significant for all three models, the *partial* adjusted *R*-squares decline to 3.95%, 5.44% and 6.72% respectively. Low *partial* adjusted *R*-squares indicate that the reduced form equations in estimating options, shares and LTIPs do not have a good fit. This might be due to the weak instrumental variables selected for options, shares and LTIPs, as one cannot determine whether an executive has an appropriate level of options compensation and stock granted in a given year (Yermack, 1995). Also, a survey by Core *et al*. (2003), shows that research on equity-based compensation and incentives has produced many contradictory findings with many fundamental questions remaining unanswered.

The Hausman (1978) test is also a joint test of endogeneity when salary, bonus, options, shares and LTIPs are included in one equation. Table 7 shows that the Hausman joint tests do not reject the hypothesis that salary, bonus, options, shares and LTIPs are jointly exogenous in the absolute discretionary accruals model and negative in the discretionary accruals model. However, the Hausman joint test rejects the hypothesis that salary, bonus, options, shares and LTIPs are both exogenous in the income-increasing discretionary accruals model, and is significant at less than 1% level. As previously stated, the Hausman test in testing total compensation endogeneity shows that total compensation (*TCOMP*) is not endogenous. Here the joint test of salary, bonus, options, shares and LTIPs suggests that at least some individual components are endogenous to income-increasing discretionary accruals. The Basmann (1960) test for over-identification is not required since the total number of instruments (*TSR, TBQ, VOL, DIV_DUMMY,* and *TAX_DUMMY*) equals the number of endogenous variables (*SALARY, BONUS, OPTION, SHARE,* and *LTIP*) in the equation and the model is said to be just identified. The outcomes of the Hausman tests suggest that income-increasing earnings management is simultaneously co-determined with some components of executive compensation, with some individual components possibly being endogenous to income-increasing discretionary accruals.

5.2 Two-stage least squares estimation

The Hausman tests suggest that income-increasing earnings management is simultaneously co-determined with fixed compensation, at-risk compensation and some individual components. Thus, a 2SLS estimation is further used to model the relation between positive adjusted discretionary accruals (+*DA_ADJ*) and compensation components. Table 6 shows that the coefficient for the expected fixed compensation (*E_FIX*) is negative and becomes significant at the 5% level. This indicates that to the extent that endogeneity is concerned, managers tend to reduce opportunistic earnings management behavior as their fixed compensation increases, which is consistent with the argument that fixed compensation provides disincentives for managers to practice aggressive earnings management given the cost of earnings management. It also shows that positive adjusted discretionary accruals are positively associated with expected at-risk compensation (*E_ATRISK*), and is significant at the 5% level. This implies that management opportunistic behavior, use income-increasing discretionary accruals to inflate reported earnings, and thus maximize the level of at-risk compensation remains when endogeneity is addressed. Table 7 reports the results for the second-stage regression where income-increasing discretionary accruals is regressed on the expected (fitted) values of salary (*E_SALARY*), bonus (*E_BONUS*), options (*E_OPTION*), shares (*E_SHARE*), and LTIPs (*E_LTIP*). These are predicted from the first-stage instrumental variable regressions and control variables. Results from the 2SLS model show that income-increasing discretionary accruals are negatively associated with the expected salary (*E_SALARY*) and positively associated with the expected bonus (*E_BONUS*), and both are significant at less than the 1% level. The coefficients for expected options (*E_OPTION*) and expected LTIPs (*E_LTIP*) have a positive sign while the coefficient for expected shares (*E_SHARE*) has a negative sign. All three equity-based compensations are not significant in the second-stage regression.

The findings suggest that to the degree that endogeneity is concerned the expected salary is negatively associated with income-increasing earnings management, while the expected bonus is positively associated with income-increasing earnings management. This is consistent with the theory. On one hand, the negative association between expected salary and income-increasing discretionary accruals suggests that a fixed salary provides disincentives for managers to practice aggressive earnings management as earnings management behavior is costly. Managers tend to reduce opportunistic earnings management behavior as their fixed salaries increase. On the other hand, the positive association between expected bonus and positive adjusted discretionary accruals suggests that bonuses induce managers to engage in upward earnings management as bonuses are tied to accounting earnings performance. Managers would opportunistically use income-increasing discretionary accruals to exploit the nonlinearity in the payoffs on bonuses. Finally, the findings suggest that to the extent that endogeneity is concerned, expected options are not associated with income-increasing earnings management. One possible explanation for the insignificant coefficient for expected options could be weak instruments used in estimating options.

6. Conclusions

This paper examines the potential endogeneity between earnings management and executive compensation. Using a sample of all ASX listed companies with 3,326 firm-year observations covering the period from 2000 to 2006, the results firstly confirms that fixed compensation and at-risk compensations, as well as salary, bonus, options, shares and LTIPs, are jointly endogenous to upward earnings management. To resolve the issue of compensation endogeneity, this study adopts an instrumental variables approach. The 2SLS results from this technique show that managers decrease upward earnings management as their fixed compensation increases. Likewise, managers increase upward earnings management as their at-risk compensation and bonuses rise. However, the 2SLS results do not support the hypothesis that equity-based compensations, that is option grants, shares and LTIPs, create incentives for earnings management. These findings suggest that when endogeneity is concerned, fixed compensation and salaries provide disincentives for managers to practice aggressive earnings management. Moreover, managers are more likely to use income-increasing discretionary accruals to inflate reported earnings and thus to maximize the level of at-risk compensation and bonuses.

The evidence presented in this study has several implications. First, it will be of interest to academia as the investigation conducted by this study provides a better understanding of earnings management motivation, that is, the compensation contracting incentives. Second, compensation committees may gain some insight in designing compensation structures that balance the incentive to improve a firm's performance with the incentive to earnings manipulation. The positive effect of at-risk compensation on the magnitude and directions of earnings management has important implications for the design of executive compensation packages. In theory, a link between CEO compensation and firm performance will promote better incentive alignment and higher firm values (Ross, 1973, Jensen and Meckling, 1976). Thus, at-risk compensation may have a positive effect on firm value if the use of at-risk compensation is at an appropriate optimal level. Whenever it goes beyond the optimal level, the extent to which it is excessive could lead to earnings management. Indeed, this study found that executive compensation plays a role in determining earnings management activities. Executives may distort financial reporting to maximize their personal wealth if their incentives are not fully aligned with those of shareholders. Compensation committees, therefore, may consider what is the optimal compensation regime that can possibly reach the full alignment.

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