

The effect of say on pay on CEO compensation and spill-over effect on corporate cash holdings: Evidence from Australia

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1 **Effect of say on pay on CEO compensation and spill-over effect on**
2 **corporate cash holdings: Evidence from Australia**

3
4 **Abstract**

5 We examine the impact of Australia's *Remuneration Amendment Act 2011* on CEO
6 compensation and its spill-over effect on cash holdings to better understand how the new
7 legislation affects the principal–agent relationship. Using a sample of ASX top 300 firms from
8 2004 to 2015, we find that the *Act* leads to more use of equity-based compensation. We also
9 document that, after the introduction of the *Act*, CEO equity-based and total compensations are
10 negatively related with cash holdings, i.e., more equity and total compensations lead to lower
11 cash holdings (a spill-over effect), indicating alignment of the principal–agent interests. We
12 praise the *Act* for the achievements. Our results are robust to different estimation techniques.
13 Our findings provide important insights for the discussion on compensation regulations.

14 *Key words:* corporate governance; say on pay; CEO compensation; cash holdings

15 *JEL Classification:* G34, G38, M42, M48

16 **1 Introduction**

17 Australia introduced a new shareholder ‘say on pay’ legislation, *Corporations Amendment*
18 *(Improving Accountability on Director and Executive Remuneration) Act 2011* (the
19 *Remuneration Amendment Act* or the *Act*, hereafter), which took effect on 1 July 2011. The
20 *Remuneration Amendment Act* sets out unique requirements that enable shareholders to register
21 their dissenting votes more effectually against CEO remuneration plans at the Annual General
22 Meetings (AGMs)¹ and that force firms to face potentially severe consequences if shareholder
23 concerns are not adequately addressed (Monem and Ng, 2013; Grosse et al., 2017). Due to its
24 unique requirements, the *Act* has undoubtedly the capacity to influence firms’ CEO
25 compensation policies directly and other related policies indirectly (Walker, 2010; Grosse et
26 al., 2017). This study examines two related research questions arising from the *Act*: (1) what
27 impact does the *Act* have on CEO compensation, in total and in composition? (2) how does
28 CEO compensation relate, after the *Act*, to corporate cash holdings – a key firm policy?

29 The *Remuneration Amendment Act*, widely known as the ‘two-strikes’ rule, provides
30 shareholders, especially the dispersed and minority groups, with a more effective mechanism
31 to register their dissent on CEO remuneration plans with a low cut-off point (i.e., a minimum
32 25% of votes) to trigger a ‘strike’ against the firm. If a firm receives a strike at two consecutive
33 AGMs, shareholders can vote at the second AGM to decide whether the board should be put
34 up for re-election: if approved, a re-election of the board will take place. The *Act* also sets out
35 clear process and actions for corporate boards to undertake to address shareholder concerns,
36 and explains the consequences if shareholder concerns are not adequately mitigated. The
37 requirements are specific and the consequences are predictable and potentially severe:
38 dissolution and re-election of boards (Monem and Ng, 2013; Grosse et al., 2017). With the
39 rigorous requirements of the *Act*, shareholders can expect to obtain their preferred ways to

¹ Although the *Act* governs director and executive remuneration, our focus is on CEO remuneration, as the latter is the main concern of excessive pay.

40 remunerate executives more easily, and firms will amend and implement remuneration policies
41 to satisfy shareholder demands.

42 Since the two-strikes rule was enacted, a few studies have investigated the effect of the
43 *Act* on CEO compensation from different perspectives. For instance, Monem and Ng (2013)
44 and Bugeja et al. (2016) examine the impact of receiving a strike on the pay–performance link,
45 and Faghani et al. (2015) and Grosse et al. (2017) investigate the association between CEO pay
46 and the incidence of receiving a strike. These studies employ strike data and matched-pair
47 design: they identify firms that receive strike (either ‘first strike’ only or ‘first strike’ and
48 ‘second strike’) and match each strike firm with a ‘non-strike’ firm to examine the impact of
49 the *Act*.

50 While these studies provide useful insight into shareholder dissent votes, they have not
51 examined the intended influence of the *Act* on CEO pay (in total and in composition) in all the
52 firms under the *Act*, given that the firms are obliged to implement the regulatory requirements.
53 It is reasonable to expect that, after the *Act* became effective, all firms (both strike and non-
54 strike firms) would endeavor to review CEO compensation and adjust, if needed, to meet the
55 *Act*’s requirements and the shareholders’ expectations, to avoid receiving dissent votes. The
56 analysis of only strike firms, matched with non-strike firms, in these studies does not preclude
57 the possibility that the *Act* has impacted the CEO compensation of the firms that are not
58 examined.² Consequently, the question regarding the impact the *Act* has on CEO compensation
59 across the market remains unanswered (Shan and Walter, 2016). We are motivated to fill this
60 research gap by investigating the impact of the *Act* on CEO compensation in terms of the total
61 pay and three main pay components: stock options, equity-based (including stock options and
62 shares) compensation and cash bonuses.³ We find that, after the *Act*, Australian firms use fewer

² Monem and Ng (2013) observe that their sample includes mostly small and less profitable firms, indicating that the strike data may not be representative of the market.

³ In Australia, CEO compensation usually reports these components: base salary, cash bonus (short term incentives), non-monetary benefits, superannuation benefits, termination benefits, equity-based payments and total remuneration (Grosse et al., 2017). In this study, we focus on cash bonus, options, equity-based compensation and total compensation.

63 cash bonuses and more equity-based compensation, resulting in an increase in total
64 compensation.

65 Corporations worldwide have considerably increased their cash holdings over the past
66 two decades (Iskandar-Datta and Jia, 2012; Amess et al., 2015) and Australian firms show
67 similar patterns (La Cava and Windsor, 2016). As excess cash holdings are considered
68 detrimental to shareholder wealth (Jensen and Meckling, 1976; Dittmar and Mahrt-Smith,
69 2007; Tong, 2010), the phenomenon has attracted enormous research interest in investigating
70 the causes and consequences of cash holdings (Amess et al., 2015). The causes are linked to
71 the management motive for holding cash, while the consequences are examined through
72 different measures, such as the value of cash holdings and firm performance. The management
73 motive for holding excess cash is in turn associated with CEO compensation incentives (Opler
74 et al., 1999; Tong, 2010; Liu and Mauer, 2011).

75 Excess cash holdings are said to be an agency problem due to managerial opportunism
76 (Jensen and Meckling, 1976). Prior studies have examined how CEO compensation incentives
77 (as an internal governance mechanism) influence corporate cash holding decisions: an efficient
78 CEO pay structure that aligns the interests of managers and shareholders can limit a firm's
79 investment in non-operational cash (e.g., Tong, 2010; Liu and Mauer, 2011). Equity-based
80 compensation (e.g., options and shares) can help overcome managers' aversion to risk, aligning
81 their interests with those of shareholders (Jensen and Meckling, 1976; Jensen and Murphy,
82 1990; Clarkson et al., 2011). With increased equity components in total compensation,
83 managers would be motivated to pursue profitable investment projects to maximize shareholder
84 value rather than to hold cash. Prior studies, which investigate the relationship between CEO
85 compensation incentives and cash holdings, document that equity-based incentives can limit
86 firms' investment in cash (e.g., Tong, 2010).

87 The *Act*'s capacity to influence CEO pay composition (resulting in fewer cash bonuses
88 and more equity-based pay) leads to changes in CEO compensation incentives. Knowing that
89 CEO's equity-based compensation better aligns management incentives with shareholders'
90 interests, we expect firms to adopt cash policies that maximize firm value and shareholder
91 wealth. Furthermore, shareholders may also take the opportunity of a dissenting vote to express
92 their concerns over other firm policies such as dividend and leverage (Grosse et al., 2017).
93 Consequently, we expect the *Act* (as an external governance mechanism) has a spill-over effect
94 on corporate cash holdings. To date, however, no empirical study examines this important
95 relationship. Our study fills this research gap by investigating the interaction effect of the *Act*
96 and CEO compensation on cash holdings.

97 Our sample consists of the top 300 capitalized firms listed on the Australian Stock
98 Exchange (ASX) for the period 2004 to 2015, yielding 3,064 firm-year observations. We
99 conduct an empirical analysis using several multivariate tests. We find the *Act* impacts CEO
100 compensation structure, in that Australian firms now use more equity-based incentives (i.e.,
101 options and shares) and fewer cash bonuses to remunerate CEOs, which also results in higher
102 total compensation. We also find, after the *Act*, that CEO's equity-based and total pay
103 incentives are negatively related to cash holdings, a key corporate policy, suggesting that higher
104 CEO equity (thus risk) incentives lead to lower cash holdings. Further, we report a positive
105 relationship between CEO incentives and the value of cash holdings after the *Act*. Overall, our
106 results indicate that the *Act* has caused positive changes to CEO equity compensation and has
107 a spill-over effect on cash holdings. Our results are robust to several econometrical techniques
108 including the ordinary least square (OLS), and fixed effect (FE). Our results are consistent and
109 robust to narrow samples, the two-step system generalized method of moments (GMM), and
110 the propensity score matching (PSM) estimators.

111 We contribute to the CEO compensation literature in the following ways. First, our
112 findings suggest that the *Act* is effective in changing the CEO compensation structure, leading
113 to more equity-based incentives and fewer cash bonuses to remunerate CEOs. This change is
114 observed across the market of large and established Australian firms, not just in firms that
115 receive strikes (which are small and less profitable, according to Monem and Ng, 2013), and
116 is consistent with shareholders' preferences. Second, the *Act* leads to an increase in CEO total
117 compensation, as a result of the increase in equity incentives more than the reduction in cash
118 bonuses, due to the risk associated with equity compensation. This finding implies that
119 shareholders do not use the two-strikes rule to target CEO total compensation (consistent with
120 Grosse et al., 2017) as long as CEO pay structure meets their expectations. Third, we
121 demonstrate in a novel piece of evidence that, after the *Act*, the relationship between CEO
122 equity (as well as total) incentives and cash holdings is negative, indicating that the *Act* has a
123 spill-over effect on cash holdings. This negative relationship indicates that the *Act* has the
124 capacity to drive the alignment of the principal–agent interests through its influence on CEO
125 compensation policies. In this regard, we praise the *Act* for its achievements. Our study,
126 therefore, provides useful insight into this unique legislation and contributes to the global
127 discussion on compensation regulations.

128 The remainder of the paper is organized as follows: Section 2 reviews related literature
129 and develops the hypotheses; Section 3 describes the research design and models; Section 4
130 presents the empirical results; and Section 5 concludes this paper.

131 **2 Related literature and hypothesis development**

132 **2.1 Background of say on pay regulations**

133 In response to public outrage over CEO excessive pay, many countries have introduced
134 say on pay regulations to enable shareholders to voice their dissent on CEO remuneration plans
135 at AGMs. For instance, the UK enacted a mandatory non-binding shareholder vote on executive

136 pay through the *Directors' Remuneration Report Regulations 2002*, and the US enacted the
137 *Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act)* in 2010.
138 Australia enacted its first non-binding say on pay reforms through the *Corporate Law*
139 *Economic Reform (Audit Reform & Corporate Disclosure) Act 2004* (CLERP 9), which took
140 effect on 1 July 2004.⁴ The non-binding nature means that firms are not required to act on
141 shareholder concerns about the executive pay, even if the majority of the votes are dissenting
142 (Monem and Ng, 2013). The evidence from the UK and Australia suggests that the non-binding
143 votes are largely ignored by firms and are not effective in curbing excessive executive pay
144 (Clarkson et al., 2011; Bugeja et al., 2016). To further empower shareholder say on pay,
145 Australia introduced the *Remuneration Amendment Act 2011* (the two-strikes rule), effective
146 from 1 July 2011.

147 Compared to the non-binding say on pay regulations, the two-strikes rule has a number of
148 unique features that enable shareholders to register their dissent over CEO remuneration plans
149 more easily and effectively. The *Act* requires only a minimum of 25% of 'no' votes to trigger
150 a strike against the firm. If a firm receives a strike at two consecutive AGMs, shareholders can
151 vote at the second AGM to decide whether the board (all directors except the CEO) should be
152 put up for re-election within 90 days of the AGM (a 'spill vote'). If 50% or more of the eligible
153 votes cast support director re-election, then re-election (a 'spill' meeting) will occur following
154 the normal 50% majority voting rule. The *Act* also sets out clear actions for boards to undertake
155 to address shareholder concerns over pay resolutions or to face consequences if the concerns
156 are not adequately addressed. The requirements are specific and the consequences are
157 potentially severe: dissolution and re-election of boards (see, Monem and Ng, 2013 and Grosse
158 et al., 2017 for further explanation of the *Act*).

⁴ See, Clarkson, Walker, and Nicholls (2011) for a summary that outlines the important regulatory events in relation to executive remuneration disclosure and practice in Australia from 1998 to 2005.

159 According to Monem and Ng (2013), the *Act* is the most significant corporate governance
160 reform that Australian firms have observed since the implementation of the ASX corporate
161 governance principles in 2003. Moreover, compared to other countries, the *Act* is regarded as
162 “an internationally competitive system of executive remuneration that is transparent and
163 accountable to shareholders” (a statement made by David Bradbury, Parliamentary Secretary
164 to the Federal Treasurer, cited in Monem and Ng, 2013, p. 240). Given the rigorous
165 requirements of the *Act*, Australia’s two-strikes rule provides a strong external governance
166 mechanism on executive pay through which shareholders can expect to obtain their preferred
167 ways to remunerate executives more easily, and firms will need to amend and implement
168 remuneration policies to satisfy shareholder demands.

169 **2.2 Remuneration Amendment Act and CEO compensation**

170 Since the inception of the *Act*, a few studies that have examined its effect on CEO
171 compensation from different perspectives have reported mixed results. Monem and Ng (2013),
172 using strike data for 2011–2012 and matching strike firms with non-strike (control) firms,
173 investigate the impact of receiving a strike on the pay–performance link. They find no relation
174 between CEO pay changes and firm performance (using stock returns) for strike and control
175 firms in 2011; however, there is a significant positive relation for both strike and control firms
176 in 2012. In addition, they find the pay–performance link for the first-strike firms of 2011 (but
177 avoided second-strike in 2012) strengthened in 2012 with lagged shareholder dissent. Their
178 findings lend some support for the positive effect of the *Act* on the pay–performance link. In
179 contrast, Bugeja et al. (2016), who analyze strike data for 2011–2014, find no improvement in
180 the pay–performance link after the first strike, but find that the pay–performance link becomes
181 worse after the second strike. They confirm, when examining responses to a strike, that firms
182 are likely to make changes to the growth and mix of CEO pay.

183 Faghani et al. (2015), using strike data for 2011–2013, examine the relation between
184 shareholder dissent votes and the level and composition of CEO remuneration. Their finding,
185 that first strike firms avoiding a second strike reduce CEO total pay, which is associated with
186 a lower level of shareholder dissenting votes on the following remuneration report. They also
187 report that first strike firms increase the proportion of CEO’s performance-based pay. Grosse
188 et al. (2017), using strike data for 2011 and 2012, report no association between CEO pay
189 (including various components and total, normal and excess pay) and the incidence of receiving
190 a strike. They conclude that shareholder dissenting votes are not used to target CEO excess
191 pay. However, they find strike firms have a 57.10% greater decrease in the CEO’s cash bonus
192 in the following year than non-strike firms have, suggesting that shareholder say on pay can
193 change CEO compensation structures.

194 To date, we are unaware of any study that examines the intended influence of the *Act* on
195 CEO pay (in total and in composition) in all the firms that are obliged under the *Act* to
196 implement the regulatory requirements. Murphy (2013) asserts that any compensation policy
197 ignoring the government regulatory requirements is likely to ignore an important aspect of
198 executive pay. The intended purposes of the *Act* are obviously to restrain CEO total pay and to
199 achieve an efficient pay structure (that is, the use of various components of CEO pay, such as
200 cash bonus and equity-based pay) that serves the best interests of shareholders. Therefore, it is
201 reasonable to expect that, after the *Act* became effective, all firms (both strike and non-strike
202 firms) would endeavor to review CEO compensation and adjust, if needed, to meet the *Act*’s
203 requirements and the shareholders’ expectations, to avoid receiving dissent votes.

204 We focus on the key CEO pay components (i.e., cash bonus, equity-based and total
205 compensation) that have theoretical significance in the literature (Walker, 2010; Ferri and
206 Maber, 2013; Grosse, et al., 2017). We expect firms would respond to the two-strikes rule by
207 amending these components in accordance with shareholders’ expectations. Firms use cash

208 bonus to reward managers for achieving specific performance targets, usually written in
209 accounting-based measures such as profitability. As such, cash bonuses have two main
210 features: (1) they reward management for past performance and are not related to future
211 performance of firms; (2) they are certain money paid to managers in the present and are not
212 affected by firm risk in the future. Because of these features, cash bonuses have been criticized
213 for inducing reckless short-term managerial decision-making (e.g., window dressing, earnings
214 manipulation), thereby sacrificing firms' long-term value (Walker, 2010), and have been
215 labelled 'rewards for failure' (Ferri et al., 2008). Therefore, cash bonuses would not be the
216 preferred way of pay for CEOs by shareholders.

217 Equity-based compensation (options and shares), on the other hand, is long-term oriented
218 and ties CEO pay to the firm's future performance and value. To maximize the value of equity
219 compensation, managers must maximize firm performance and value, consistent with the
220 interests of shareholders. Therefore, we expect that shareholders, empowered by the *Act*, will
221 want boards to remunerate CEOs with fewer cash bonuses and more equity compensation. The
222 say on pay legislations in the UK, US, and EU countries observe the decline of cash bonuses
223 in favor of equity-based compensation (Bushman and Smith, 2001; Dittmann et al., 2011; Ferri
224 and Maber, 2013). Australian firms are also following the trend by enhancing the equity
225 compensation in exchange for cash compensation (Matolcsy and Wright, 2007, 2011).

226 Total compensation, an all-inclusive measure, is expected to increase under the *Act*.
227 When firms pay managers with more equity compensation in exchange for fewer cash bonuses,
228 managers do not equate the market value (price) of equity compensation to the nominal value
229 of cash bonuses. This is because cash is certain money and risk free whereas equity
230 compensation (options and shares) is tied to the firm's future performance and value, which is
231 risky. Meulbroek (2001) argues that managers are exposed to the firm's total risk, but are
232 rewarded (through expected returns) for only the systematic portion of that risk; hence

233 managers value stock or option-based compensation at less than its market value. Meulbroek
234 (2001) finds that managers who, at the average NYSE firm have their entire wealth invested in
235 the firm, value their options at 70% of their market value. Therefore, firms must compensate
236 managers with a higher market value of equity compensation in exchange for a lower amount
237 of cash bonuses, leading to an increase in total compensation. This discussion leads to H1:

238 *H1: The Remuneration Amendment Act impacts CEO equity and total compensations*
239 *positively, and cash bonus negatively.*

240 **2.3 Remuneration Amendment Act, CEO compensation and corporate cash holdings**

241 Corporations worldwide have increased their cash holdings (in amount and in cash-to-
242 asset ratio) considerably over the past two decades (Amess et al., 2015; La Cava and Windsor,
243 2016). Bates et al. (2009) document that the average cash-to-asset ratio for the US firms more
244 than doubles over their sample period, from 10.5% in 1980 to 23.2% in 2006. Large cash
245 holdings are also observed in the UK, Continental Europe, Japan, South Korea, and China
246 (Iskandar-Datta and Jia, 2012; Amess et al., 2015; La Cava and Windsor, 2016). In Australia,
247 La Cava and Windsor (2016) report that the average cash-to-asset ratio of listed companies
248 between 1990 and 2014 is ranked among the top five in the OECD countries and exceeds that
249 of their US counterparts.

250 Excess cash holdings are considered detrimental to firm value and shareholder wealth
251 for two main reasons. First, cash holdings are a negative net present value (NPV) project, from
252 the investment perspective, because interest incomes from cash deposit earn a return less than
253 the firm's cost of capital (Tong, 2010) and are subject to double taxation (Opler et al., 1999).
254 Second, cash holdings are easily accessible by managers, with little outside scrutiny, and are
255 subject to managerial discretion in deployment (Dittmar and Mahrt-Smith, 2007; Bates et al.,
256 2009). Self-interested managers keep excess cash for their private gains (e.g., perquisite
257 consumptions) at the expense of shareholders.

258 Management motive for holding excess cash is said to be an agency problem (Jensen and
259 Meckling, 1976; Amess et al., 2015). Since managers have undiversified interest in the firm,
260 risk-eschewing managers would reduce firm risk to reduce their own risk (Jensen and
261 Meckling, 1976; Tong, 2010; Liu and Mauer, 2011) and cash holdings are risk-free assets.
262 Consequently, the agency theory asserts that managers keep high cash holdings to lower the
263 firm (thus their own) risk, sacrificing firm (thus shareholder) value (Jensen and Meckling,
264 1976; Tong, 2010).

265 The agency motive for holding excess cash (due to managers' lower risk preference or
266 perquisite consumptions) is constrained by a system of good corporate governance (Jensen,
267 1986; Amess et al., 2015), which includes internal mechanisms (e.g., board independence and
268 CEO compensation incentives) and external mechanisms (e.g., debt and regulations). A good
269 internal governance mechanism can alleviate agency conflict through monitoring managers and
270 designing CEO pay packages that lead to alignment of managers' interests with those of
271 shareholders (Jensen and Meckling, 1976; Dittmar and Mahrt-Smith, 2007; Clarkson et al.,
272 2011). With the alignment of interests, the agency theory predicts that managers would act in
273 the best interests of shareholders by reducing cash holdings and engaging in positive
274 investment projects (Jensen, 1986; Coles et al., 2006; Amess et al., 2015).

275 The relationship between CEO compensation incentives and cash holdings is an important
276 issue from both theoretical and practical perspectives, as it helps to design a more efficient
277 CEO pay structure that aligns the interests of managers with those of shareholders. Prior
278 research, which investigates the question of how CEO compensation incentives influence
279 corporate cash holdings (e.g., Tong, 2010; Liu and Mauer, 2011), documents that an efficient
280 pay structure inducing interest alignment can limit firms' investment in cash needed only to
281 support operations (Rajgopal and Shevlin, 2002; Coles et al., 2006). Prior research further
282 argues that the equity component of compensation ties the managers' wealth with that of the

283 firm (that is, risk-taking, or vega, incentives) and motivates managers to pursue riskier and
284 more profitable investment projects to maximize shareholder value. Therefore, the relationship
285 between CEO equity compensation and cash holdings is predicted to be negative (Jensen and
286 Meckling, 1976; Coles et al., 2006; Tong, 2010; Amess et al., 2015).⁵

287 The *Act*, a significant piece of legislation, provides a strong external governance
288 mechanism to oversee corporates in Australia (Monem and Ng, 2013). It has the capacity to
289 change CEO pay composition through empowering shareholder say on pay. More specifically,
290 prior research finds that strike firms amend their remuneration policies by using fewer cash
291 bonuses and more equity-based pay for CEOs (Faghani et al., 2015; Bugeja et al., 2016; Grosse
292 et al., 2017). The change in the CEO compensation structure (in particular, the increase in
293 equity-based pay, also resulting in the increase in total pay) alters CEO compensation
294 incentives, which leads to changes in related firm policies. Furthermore, the exercise of the
295 two-strikes rule by shareholders is unlikely to be limited to CEO remuneration plans.
296 Shareholders may also take the opportunity provided by the *Act* to express their concerns over
297 other firm policies such as dividend and leverage (Grosse et al., 2017), as well as cash holdings.
298 Prior research also concurs that shareholders target those firm policies indirectly associated
299 with remuneration when expressing their dissent (Gillan and Starks, 2000; Ertimur et al., 2010;
300 Grosse et al., 2017). Given the anticipated impact of the *Act* on CEO compensation and the
301 likelihood of shareholders targeting other policies, it is expected that the *Act* (as an external
302 governance mechanism) has a spill-over effect on corporate cash holdings. This spill-over
303 effect, in turn, transfers some of the risk on the part of shareholders (related to high cash
304 holdings) to risk-averse managers, thus aligning the interests between shareholders and

⁵ Tong (2010) finds that firms with higher CEO risk incentives have lower cash holdings. Similarly, Coles et al. (2006), Core and Guay (1999), Rajgopal and Shevlin (2002), and Williams and Rao (2006) find that higher CEO risk incentives are associated with riskier investment and financing policy choices.

305 managers (Tosi et al., 2000). We investigate the spill-over effect of the *Act* on corporate cash
306 holdings through CEO compensation incentives, forming the second hypothesis:⁶
307 *H2: CEO equity and total compensations are negatively related to corporate cash holdings*
308 *after the Remuneration Amendment Act.*

309 **3 Research design**

310 **3.1 Sample**

311 Our sample, obtained from Connect4, consists of the top 300 capitalized firms listed in the
312 ASX from 2004 to 2015. The year 2004, the first year that Connect4 reports executive
313 compensation information, includes items such as base salary, cash bonuses, share and option
314 grants, and total compensation. The database divides the compensation into two sets:
315 executives and directors. We collect compensation data for the “CEO/MD” position. We
316 collect financial data of the sample firms from Morningstar DatAnalysis Premium.

317 We match the ASX codes reported in the Morningstar DatAnalysis Premium database with
318 the compensation data before combining the data from the two sources. The initial sample
319 consists of 3,600 firm-year observations. We exclude the firm-years with missing observations
320 for accounting and compensation variables. We also drop financial and utility firms due to their
321 industry-specific liquidity requirements following prior studies (e.g., Ozkan and Ozkan, 2004;
322 Liu and Mauer, 2011). Finally, to be unbiased, we only allow firms to be part of the final sample
323 if they are present in both the pre- and post-*Act* periods. The final sample consists of 3,064
324 firm-year observations. We classify firms on the basis of two-digit codes of the Global Industry
325 Classification System (GICS). All the variables (dollar amounts) are inflation adjusted to 2015
326 dollars using the consumer price index.

⁶ The relation between cash bonus and cash holdings is not modelled as we see little theoretical significance in it.

327 3.2 Variables description

328 Table 1 provides the name, measurement, and data sources of the independent,
329 dependent, and control variables. The independent variables are the *Remuneration Amendment*
330 *Act* and CEO compensation incentives (as dependent variables in H1) including options, equity
331 compensation, total compensation and cash bonus. We model the *Act* as a dummy variable,
332 equaling 0 before and 1 after the *Act*. Cash holdings (*Cash*), the dependent variable (in H2), is
333 measured as a ratio of cash and marketable securities to total assets, where total assets are
334 defined as the book value of total assets, following prior studies (Bates et al., 2009; Nikolov
335 and Whited, 2014; Liu et al., 2015).

336 CEO compensation incentives are measured using the four variables. First, options
337 compensation (*Ln options*) is a natural log of the sum of the total value of options granted to
338 CEOs in a year. Second, equity compensation (*Ln equity comp*) is a natural log of the sum of
339 the total value of shares and stock options granted to CEOs each year. Equity compensation
340 measures the overall risk arising out of executives' holdings in firms. Third, following prior
341 literature, total compensation (*Ln total comp*) is all-inclusive pay including salary, bonus,
342 superannuation, LTIP and allowance, and equity incentives offered to CEOs in accordance with
343 certain performance indicators during the year (see, Graham et al., 2012; Grosse et al., 2017).
344 Fourth, cash bonus (*Ln bonus*) is the performance bonus granted to CEOs each year.

345 [Insert Table 1 about here]

346 Following prior studies (e.g., Bates et al., 2009), we control the firm characteristics for
347 their effects: market-to-book ratio (*MTB*), capital expenditure (*Capex*), leverage ratio (*Lev*),
348 dividend payout (*Div*), firm size (*Size*), cash flow (*CF*), CEO tenure (*CEO tenure*),
349 remuneration committee size (*Rem com size*) and remuneration committee independence (*Rem*
350 *com ind*) (see, Table 1 for definitions and measurements).

351 **3.3 Descriptive statistics**

352 Table 2 reports the summary statistics of the variables for the full sample and for before
353 and after the *Act* sub-samples. Panel A shows the statistics of the dependent variable cash
354 holdings (*cash*) with mean, 1st quartile, median and 3rd quartile values, while Panels B and C
355 show the statistics of the independent and control variables respectively.⁷ Panel A reports that
356 cash holdings have a mean (median) of 18.333% (9.380%) to total assets, based on the full
357 sample; however, after the *Act*, cash holdings decrease to 15.080% from 19.960%. Panel B
358 reports the *Act* as a dummy variable. In log values, in the full sample, the means (medians) for
359 options, equity compensation, total compensation and cash bonus are 12.575% (12.712%),
360 12.714% (12.822%), 14.107% (14.044%) and 12.867% (12.916%), respectively. Moreover,
361 mean values for options, equity, and total compensation (cash bonus) increase (decreases) after
362 the *Act*.

363 [Insert Table 2 about here]

364 Panel C presents the control variables with mean values including average market to
365 book value (*MTB*, 3.674), capital expenditure (*Capex*, -0.079), leverage (*Lev*, 0.173), dividend
366 payment (*Div*, 0.714), firm size (*Size*, 20.327), and cash flow (*CF*, -0.012). Corporate
367 governance characteristics include *CEO tenure*, which is 7.940 years on average. The
368 remuneration committee, an important feature in the current unique setting, consists of 3
369 members on average, with a 69.300% independence level compared with board size.

⁷ We perform the univariate test using the non-parametric *t*-test for cash holdings with respect to CEO compensation incentives before and after the *Remuneration Amendment Act 2011*. The two-tailed test of mean differences shows significant differences between compensation incentives before and after the *Act* at the 1% level. We run correlation among dependent and independent variables. We also perform the VIF test; it turns out to be 3.360, which is below 5, meaning that our results are not biased. However, we use compensation variables separately in our models to avoid spurious results. For brevity, we do not report the results in the paper, but they are available if required.

370 **3.4 Econometric specification**

371 First, we model the effect of the *Remuneration Amendment Act* on CEO compensation
372 incentives. As the *Act* is expected to affect CEO compensation structure, our model examines
373 the *Act*, as an independent variable, on the key components of CEO pay: stock options (*Ln*
374 *options*), equity (options and shares) compensation (*Ln equity comp*), total compensation (*Ln*
375 *total comp*) and cash bonuses (*Ln bonus*). The model investigating *H1* is shown in equation
376 (1):

$$377 \text{ Compensation incentives}_{it} = \alpha + \beta_1(\text{Act})_{it} + \delta_2(\text{Controls})_{it-1} + \delta_3\sum(\text{Industry effect})_i + \\ 378 \delta_4\sum(\text{Year effect})_t + \varepsilon_{it} \quad (1)$$

379 Second, we model the spill-over effect of the *Act* on corporate cash holdings by
380 interacting the *Act* and CEO compensation incentives. The model investigating *H2* is:

$$381 \text{ Cash}_{it} = \alpha + \beta_1(\text{Compensation incentives})_{it} + \beta_2(\text{Act} * \text{Compensation incentives})_{it} + \\ 382 \delta_3(\text{Controls})_{it-1} + \delta_4\sum(\text{Industry effect})_i + \delta_5\sum(\text{Year effect})_t + \varepsilon_{it} \quad (2)$$

383 All the variables in equations 1 and 2 are defined in Table 1 and are measured for firm *i*. Control
384 variables in both equations are measured at year *t-1*, α , β and δ represent model parameters,
385 and ε represents error term.

386 We use ordinary least square (OLS) regression to analyze the relationship of the *Act*, the
387 CEO compensation incentives and the cash holdings in time-series and cross-sectional
388 differences, while controlling for industry (GICS) and year effects.⁸ To choose between the
389 fixed effect and the random effect, we perform a Hausman test and the un-tabulated results
390 confirm the suitability of fixed effect (FE)⁹ to explore the time-series variation and to avoid
391 misspecification of the model due to omitted variable bias. We use one-year lagged variables

⁸ For instance, CEOs in the financial services industry earn higher pay while CEOs in electric utility companies receive lower pay, compared to their counterparts in other industries (Murphy, 1999). Controlling for industry complexity, CEOs can demand higher compensation due to talent and industry (Aggarwal, 1981).

⁹ The technique is commonly suggested for panel data estimation (see, Wooldridge, 2002 for details).

392 (controls) to avoid the simultaneity bias, following Harford et al. (2008). The standard errors
393 are corrected for clustering of residuals at the firm level to control for heteroscedasticity
394 (Petersen, 2009).

395 **3.5 Robustness check**

396 Our results may suffer from trending effect of the long sample period due to confounding
397 factors and also CEO compensation incentives may be jointly determined by unknown factors
398 after the *Act* (Grosse et al., 2017). In addition, our independent variables may not be
399 systematically associated with the dependent variable (cash holdings) due to a causality issue.
400 To mitigate potential endogeneity concerns in our findings, we use several sensitivity tests: for
401 instance, stacking data in narrow samples, the two-step system generalized method of moments
402 (GMM) (e.g., Harford et al., 2008), and the propensity score matching (PSM) estimators, as
403 explained in Section 4.

404 **4 Empirical results**

405 **4.1 Remuneration Amendment Act and CEO compensation**

406 Table 3 presents the results of equation (1), which analyzes the effect of the *Act* on CEO
407 options, equity, total compensation and cash bonus using 12 years of data. The regression
408 models are statistically well fitted, as depicted by the R-squares ranging from 0.286 to 0.484.
409 For each dependent variable proxy, we run regressions using OLS and FE. Columns 1–6 report
410 the effects of the *Act* on CEO options incentives (*Ln options*), equity incentives (*Ln equity*
411 *comp*) and total compensation (*Ln total comp*), respectively, and all the coefficients are positive
412 and significant ($p < 1\%$). Columns 7–8 show the effect of the *Act* on the CEO cash bonus (*Ln*
413 *bonus*): the results are insignificant, although both OLS and FE show a negative sign. We find
414 that the control variables of market-to-book ratio, capital expenditure, leverage and firm size
415 have varying levels of significance. The economic significance of the findings: the effect of
416 the *Act* on CEO compensation incentives, is also important. For example, one standard

417 deviation in the *Act* (Table 2) increases (decreases) *Ln options*, *Ln equity comp*, *Ln total comp*
418 (*Ln bonus*) by approximately 0.87%, 0.95%, 0.84% (-0.36%), respectively in the OLS (e.g.,
419 $Act\ 0.471 \times 0.234 / Ln\ options\ 12.575 = 0.0087$).

420 [Insert Table 3 here]

421 To examine the impact of the *Act* on CEO compensation more closely and to minimize the
422 trending effect of data, we re-run our equation (1) using a narrow sample with six years of data,
423 three years (2008–2010) before and three years (2012–2014) after the *Act* (2011). We choose
424 a narrow sample of six years, following Ferri and Maber (2013), who examine the impact of
425 the UK say on pay legislation on CEO pay using three years of pre- and post-legislation data.
426 Ferri and Maber (2013) also argue that a long-period sample may have a trending effect where
427 many confounding factors that are not investigated may come into play.

428 Table 4 presents the results of the impact of the *Act* on CEO compensation using the 6-
429 year window. Overall, we find that the *Act*'s effects on CEO options, equity and total
430 compensation are positive and significant at varying levels of significance, consistent with the
431 Table 3 results. Importantly, the narrow sample shows that the *Act* impacts the performance-
432 based cash bonus (*Ln bonus*) negatively, significant at 10% level (using OLS). This outcome
433 is interesting as it indicates the use of cash bonus by firms to remunerate CEOs is decreased
434 after the *Act*.¹⁰ The economic significance estimations of the narrow sample findings show that
435 one standard deviation in the *Act* (Table 2) increases (decreases) *Ln options*, *Ln equity comp*,
436 *Ln total comp* (*Ln bonus*) by approximately 0.90%, 0.62%, 0.34% (-0.40%), respectively in the
437 OLS (e.g., $Act\ 0.471 \times 0.241 / Ln\ options\ 12.575 = 0.0090$).

438 [Insert Table 4 about here]

¹⁰ We also use a 4-year window, two years before and two years after the *Act* and the results are statistically similar.

439 Results in Tables 3 and 4 show that the *Act* impacts equity (options and shares) and total
440 compensation positively and cash bonus negatively, supporting *H1*. The findings suggest that,
441 after the *Act*, firms have changed their CEO compensation structure by using more equity-
442 based compensation, which is preferred by shareholders and which enables alignment of
443 interests between managers and shareholders, and fewer performance-based bonuses, which
444 reward past performance.

445 **4.2 Robustness**

446 In this section, we conduct a set of sensitivity tests to check the robustness of our results.
447 Our sensitivity tests employ a narrow sample analysis, the two-step system GMM, and
448 propensity score matching estimators. We report the results of two-step system GMM and
449 propensity score matching estimators (PSM) only, for the purpose of brevity. The result of the
450 remaining test is available in the online appendix A.

451 We re-estimate equation (1) using the two-step system GMM (Arellano and Bover, 1995;
452 Blundell and Bond, 1998) to test the robustness of the results. This system GMM uses first-
453 differenced variables as instruments for the equations in levels and the estimates are robust to
454 undetected heterogeneity, causality problems and dynamic endogeneity (if present) in model.¹¹
455 The stability of the system GMM depends on two major conditions. First, the serial
456 independence of the residuals is that the first difference residuals (*AR1*) should be serially
457 correlated by the means of structure, and the second difference residuals (*AR2*) should not be
458 serially correlated. Second, the validity of instruments should be used in the dynamic
459 estimation. The *Hansen J-statistics* of over-identifying restrictions tests the null hypothesis of
460 the instrument validity. In Table 5, the insignificance of the *Hansen J-statistics* confirms the
461 validity of the instruments in their respective estimations. Moreover, the number of instruments

¹¹ The system GMM estimations are based on Roodman (2006) using Stata module '*xtabond2*'. Refer to Roodman (2006) for details on dynamic panel data estimations.

462 (i.e., 28) used in the model is less than the panel (i.e., 917), which adds to the reliability of the
463 *Hansen J-statistics*.

464 [Insert Table 5 about here]

465 The diagnostic test in Table 5 shows that the model is statistically well-fitted for the first
466 order autocorrelation (*AR1*), but is insignificant for the second order autocorrelation (*AR2*), and
467 for the *Hansen J-statistics* of over-identifying restrictions. The interpretations of the parameters
468 on the *Act* and the CEO compensation incentives quantitatively remain the same as in Table 3.
469 For instance, the *Act* positively affects *Ln options*, *Ln equity comp*, and *Ln total comp*. Hence,
470 the system GMM estimate supports our results, even after controlling for undetected
471 heterogeneity, simultaneity bias and dynamic endogeneity.

472 Moreover, we use PSM (Lennox et al., 2011) to examine whether our prior analyses
473 concerning the effect of compensation incentives after the *Act* (an exogenous shock) on cash
474 holdings are robust. PSM exploits the assumption of ‘parallel trends’, that is, two similar firms
475 are expected to follow the same trend without any treatment. In case the treatment occurs, the
476 impact should be reflected in the difference between the changes of outcome treatment and
477 control firms (Roberts and Whited, 2011). We compare the changes in cash holdings for the
478 two groups of firms, which are similar in characteristics but which experienced different
479 changes in compensation incentives around the time of the *Act*. Following prior studies (e.g.,
480 Brogaard et al., 2017), we focus on a narrow sample because it reduces the concerns of reverse
481 causality and offers better control over the impact of unobserved factors. We use three years
482 before and three years after the *Act* to form our treatment and control groups.

483 We follow Fang et al. (2014) and Brogaard et al. (2017) to construct our treatment and
484 control groups. The sample firms are ranked on the basis of changes in their compensation
485 incentives (*Ln options*, *Ln equity comp*, and *Ln total comp*) around the *Act* (3 years before and

486 after), and we retain and assign firms into the first and third terciles. We create three dummy
487 variables (*options_dummy*, *equity_dummy*, and *total_dummy*), equaling 1 for firms in the top
488 tercile (the treatment group) and 0 for the firms in the bottom tercile (the control group). The
489 treatment (control) group consists of firms with the highest (lowest) increase in compensation
490 incentives. The rationale is that the *Act* encourages firms to use equity incentives that lead to
491 shareholders' wealth maximization.

492 First, we run the logistic regression for these dummy variables with other explanatory
493 variables. The firms in the treatment group are matched to the firms in the control group with
494 the closest propensity score matching within 0.01.¹² In case of multiple matching, we retain the
495 pairs for which the propensity score is the smallest. This criterion yields a treatment and a
496 control group with similar firm characteristics and compensation incentives prior to the *Act* but
497 with different degrees of change in compensation incentives (*Ln options*, *Ln equity comp* and
498 *Ln total comp*) after the *Act*. The results of the pre-match logistic regression are reported in
499 Panel A of Table 6 (Columns 1–3). The pseudo R-square is high for the regressions (0.148,
500 0.141, and 0.251, respectively).

501 To further verify that the firms in the treatment and control groups are indistinguishable
502 in terms of observable characteristics, we conduct two diagnostic tests following Chen et al.
503 (2017). The first test re-estimates the logit model for the post-match sample. The results in
504 Panel A of Table 6 (Columns 4–6) suggest that all the variables are insignificant, indicating
505 that there are no distinguishable trends in the treatment and control groups. The magnitude of
506 coefficients in the post-match regression are smaller and insignificant, suggesting a decline in
507 the degree of freedom in the restricted sample. Moreover, the pseudo R-squares decline for
508 post-match regressions. This suggests that propensity score matching removes all observable

¹² Our results (un-tabulated) hold if we increase the permissible difference in propensity scores (1.0% and 0.5% in value).

509 differences in the two groups. The second diagnostic test examines the differences in the mean
510 of each observable characteristic between the treatment and the control firms. Panel B of Table
511 6 shows that between the treatment and control groups there are no statistically significant
512 differences in the pre-*Act* period.¹³ Moreover, the two groups have identical levels of
513 compensation prior to the *Act*, even if the *Act* affects them differently. Overall, the diagnostic
514 tests suggest that propensity score matching removes all of the observable differences known
515 to affect the dependent variable (cash holdings).

516 [Insert Table 6 about here]

517 Panel C of Table 6 shows a significant difference (post-*Act*) in the treatment and control
518 firms' compensation incentives, suggesting the effect of the *Act*.¹⁴ Panel D shows the
519 regression results based on the matched sample. We report coefficients of variables of interest
520 (for the sake of brevity) that show the treatment firms experience a positive change in
521 compensation incentives after the *Act*.¹⁵ These findings are consistent with our main results.

522 **4.3 Remuneration Amendment Act, CEO compensation and cash holdings**

523 Table 7 presents the results based on equation (2), which examines the spill-over effect
524 of the *Act* on cash holdings using interaction between the *Act* and CEO compensation
525 incentives.¹⁶ Columns 1–6 show the interaction effect of $\ln options \times Act$, $\ln equity comp \times$
526 Act and $\ln total comp \times Act$ on cash holdings. Interestingly, the three pairs of relationships –
527 CEO options and cash holdings, equity compensation and cash holdings, total compensation
528 and cash holdings – are negative after the introduction of the *Act*.¹⁷ Columns 1 and 2 show the
529 interaction effect of $\ln options \times Act$: the coefficients are negative for OLS (-0.011) and FE (-

¹³ Mean difference between the treatment and the control group is based on the average treatment effect on the treated (ATT).

¹⁴ We report differences for main independent variables for the purpose of brevity.

¹⁵ We also perform propensity score matching analysis that shows a significant difference in cash holdings between the treatment and control firms after the *Act*. These findings suggest that the decrease in cash holdings is attributable to compensation incentives after the *Act*.

¹⁶ We also test the relationship between CEO compensation incentives and cash holdings in Australian firms. Detailed results are available in the online appendix A.

¹⁷ As shown in the online appendix A, the relationships between CEO compensation incentives and cash holdings are positive without the *Act* in the model. The results, without the *Act* mean that higher compensation incentives lead to higher cash holdings, indicating an agency problem.

530 0.013), both at $p < 1\%$. Columns 3 and 4 show the interaction effect of $\text{Ln equity comp} \times \text{Act}$:
531 the coefficients are negative for OLS (-0.012) and FE (-0.011), significant at $p < 1\%$ and $p <$
532 5% , respectively. Columns 5 and 6 show the interaction effect of $\text{Ln total comp} \times \text{Act}$: the
533 coefficients are negative for OLS (-0.001) and FE (-0.001), significant at $p < 1\%$ and $p < 5\%$,
534 respectively.¹⁸

535 [Insert Table 7 about here]

536 The economic significance estimations also show an important aspect: one standard
537 deviation increase in CEO options award and equity compensation after the implementation of
538 the *Act* would result in decreasing the cash level by 9.30% ($\text{Ln}1.549 \times -0.011 / \text{Ln}0.183 = -0.093$)
539 and 10.50% ($\text{Ln}1.579 \times -0.0122 / \text{Ln}0.183 = -0.105$), respectively. Total compensation, an
540 important aspect which also significantly decreases cash holdings, in addition to equity-based
541 incentives, is often overlooked in the literature (e.g., Tong, 2010; Liu and Mauer, 2011).

542 The negative effect of the interaction of the *Act* and CEO compensation incentives on
543 cash holdings indicates that, after the *Act*, higher CEO compensation incentives lead to lower
544 corporate cash holdings. These negative relations are mainly driven by equity-based incentives
545 (i.e., options and shares) as hypothesized, whereas the total compensation follows the direction
546 of equity compensation. The findings suggest that CEOs who are rewarded with more equity-
547 based incentives are more inclined to invest in positive net present value projects rather than to
548 hold cash. This move of executives enhances firm value and is consistent with shareholders'
549 interests. This result that the *Act* through its influence on CEO compensation incentives leads
550 to lower cash holdings, supports *H2*. Three reasons explain the CEOs' adoption of the
551 alignment motive: (1) Equity-based incentives tie CEO's wealth with that of shareholders and
552 the *Act* also prohibits managers from hedging their equity; (2) CEOs are likely to avoid

¹⁸ To check for any trending effect, we re-run our models using a 6-year narrow window, 3 years before and 3 years after the *Act*, to examine the interaction of the *Act* and CEO compensation incentives. The results are statistically similar to those reported in the Table 7.

553 shareholder dissent votes on remuneration resolutions; (3) CEOs are likely to avoid shareholder
554 dissent votes targeting firm cash holding policy (see, Grosse et al., 2017).

555 Further, we examine the effect of CEO compensation incentives after the *Act* on the value
556 of cash holdings in line with the argument that CEO incentives help reduce the agency cost and
557 align the interests of managers and shareholders by lowering cash holdings. We follow the
558 Faulkender and Wang’s (2006) approach to investigate the value of cash holdings (further
559 detail on methodology is available in the online appendix A). This approach is widely used in
560 literature to examine the value of cash holdings (e.g., Tong, 2010). We report results in Table
561 8. We find that the coefficients of interaction between CEO compensation incentives, the *Act*,
562 and change in cash holdings (across the three Columns 1–3) are positively associated with the
563 dependent variable (excess return). These findings are consistent and further support our *H2*
564 that after the *Act* CEO compensation incentives are positively associated with the value of cash
565 holdings.

566 [Insert Table 8 about here]

567 **5 Conclusion**

568 This study contributes to the compensation literature by investigating the effect of the
569 *Remuneration Amendment Act* on CEO compensation incentives and a spill-over effect on cash
570 holdings in Australian firms. We find that the *Act* has affected the CEO compensation practices
571 of Australian firms, indicating that firms now use more equity-based incentives (i.e. options
572 and shares) and fewer cash bonuses to remunerate CEOs; this also results in increases in total
573 compensation due to inequality in values between cash and equity remunerations. This change
574 in the compensation structure and the increased use of equity incentives after the *Act* links
575 CEO’s pay more closely to the firm’s future operations, and is in line with international (e.g.,
576 US and UK) trends and with the recommendations of the ASX Corporate Governance Council

577 (ASX Corporate Governance Principles and Recommendations 2014) that encourage the use
578 of equity incentives. Our results are robust to different estimation techniques.

579 Moreover, after the introduction of the *Act*, CEO compensation incentives are negatively
580 related to cash holdings, indicating that higher CEO equity (thus risk) incentives lead to lower
581 cash holdings. Rewarded with more equity-based incentives after the *Act*, CEOs are inclined
582 to take risks by investing cash holdings in profitable investment projects to maximize firm
583 value, which aligns the interests of managers with those of shareholders. CEO compensation
584 incentives after the *Act* are positively associated with the value of cash holdings. We conclude
585 that the *Act* has the effects of making positive changes to CEO compensation structure and
586 having a spill-over effect on cash holdings. For these achievements, we praise the *Act*. Our
587 findings provide important insights for the discussion on compensation regulations.

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Table 1 Variable definition

Variables	Name	Measurement	Data Source
Cash	Cash holdings	Ratio of cash and marketable securities to book value of total assets	DatAnalysis
<i>Act</i>	<i>Remuneration Amendment Act</i>	Dummy variable post <i>Act</i> equals 1 and 0 otherwise	
Ln options	Executive equity incentives-Proxy 1	Natural log of sum of total value of options granted to CEO in each year	Connect 4
Ln equity comp	Executive equity incentives-Proxy 2	Natural log of sum of total value of options and shares granted to CEO in each year	Connect 4
Ln total comp	Executive incentives-Proxy 3	Natural log of total value of salary, bonus, super, options, shares, LTIP and allowance granted to CEO in each year	Connect 4
Ln bonus	Executive cash incentives-Proxy 4	Natural log of performance bonus granted to CEO in each year	Connect 4
Control Variables			
MTB	Market to book asset ratio	Calculated as market value equity plus book value of assets minus book value of equity divided by book value of assets	DatAnalysis
Capex	Capital expenditure	Capex is figured as capital expenditure divided by book value of assets	DatAnalysis
Lev	Leverage	Sum of long and short term debt divided by book value of assets	DatAnalysis
Div	Dividend	Dummy variable equal to one if dividend paid otherwise zero	DatAnalysis
Size	Firm size	Size is measured by log of total assets	DatAnalysis
CF	Cash flow	Free cash flow divided as book value of assets	DatAnalysis
CEO tenure	CEO tenure	Numbers of years being in position	Connect 4
Rem com size	Remuneration committee size	Percentage of member directors to board size	Connect 4
Rem com ind	Remuneration committee Independence	Dummy variable $0 \leq 50\%$ Independent directors otherwise $1 \geq 50\%$	Connect 4

Table 2 Descriptive statistics

Variables	Full sample					Before <i>Act</i>	After <i>Act</i>
	Mean	1 st Quartile	Median	3rd Quartile	Std. Dev.	Mean	Mean
Panel A: Dependent variable							
Cash	0.1833	0.0385	0.0938	0.2514	0.2132	0.1996	0.1508
Panel B: independent variables							
<i>Act</i>	0.3333	0.0000	0.0000	1.0000	0.4715	0.0000	1.0000
Ln options	12.5756	11.5923	12.7129	13.7134	1.5494	12.4093	12.8439
Ln equity comp	12.7142	11.7194	12.8225	13.8854	1.5793	12.5764	13.9398
Ln total comp	14.1078	13.4024	14.0446	14.8786	1.0993	13.9879	14.3474
Ln bonus	12.8675	12.0173	12.9167	13.8316	1.2505	13.8675	11.8675
Panel C: control variables							
MTB	3.6747	1.3005	2.2295	4.1288	5.8743	4.0796	2.8648
Capex	-0.0791	-0.1016	-0.0405	-0.0117	0.1072	-0.0847	-0.0679
Lev	0.1730	0.0028	0.1503	0.283	0.1676	0.1667	0.1856
Div	0.7147	0.0000	1.0000	1.0000	0.4516	0.6754	0.7933
Size	20.3277	18.8944	20.1511	21.6979	2.1409	20.0768	20.8295
CF	-0.0120	-0.0666	0.0257	0.0757	0.2037	-0.0229	0.0098
CEO tenure	7.9403	4.0000	6.0000	11.0000	5.9191	8.6771	6.4758
Rem com size	3.0161	2.0000	3.0000	4.0000	1.6399	2.9035	3.2408
Rem com ind	0.6930	0.5000	0.7500	1.0000	0.3205	0.6629	0.7488

Table 2 presents the summary statistics in different panels with mean, first quartile (1st quartile), median, third quartile (3rd quartile) and standard deviation (Std. Dev.). Panel A presents cash holdings and Panel B describes the *Act* and CEO compensation incentives based on full, before and after the *Act* samples. Panel C presents the firm characteristics and corporate governance variables. All the variables in dollar amounts are adjusted to inflation to 2015 dollars using the consumer price index. The sample period is 2004–2015. For variable definitions see Table 1.

Table 3 The effect of the *Act* on CEO compensation incentives

Variables	Ln options		Ln equity comp		Ln total comp		Ln bonus	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
<i>Act</i>	0.2340*** (3.21)	0.1309*** (3.16)	0.2591*** (3.17)	0.1095*** (2.50)	0.2528*** (3.77)	0.1967*** (2.93)	-0.1019 (-1.69)	-0.0145 (-1.19)
MTB _{<i>t-1</i>}	-0.0534*** (-4.95)	-0.0044* (-1.89)	-0.0230** (-2.15)	-0.0018*** (-2.60)	-0.0004*** (-2.24)	-0.0061*** (-3.05)	0.0027* (1.90)	0.0012 (1.06)
Capex _{<i>t-1</i>}	-3.7109*** (-2.76)	-1.3911* (-1.81)	-3.1611** (-2.16)	-1.2712** (-2.40)	-1.5020 (-1.07)	-1.2552 (-1.05)	-1.6189 (-0.53)	-1.0302 (-0.87)
Lev _{<i>t-1</i>}	-0.1736 (-0.87)	-0.1140 (-0.65)	-0.1111 (-0.63)	-0.804* (-1.84)	-0.0447 (-1.15)	-0.0146 (-1.24)	0.3548*** (2.86)	0.2783*** (2.68)
Div _{<i>t-1</i>}	-0.3582*** (-3.53)	-0.4517** (-4.23)	-0.5174*** (-2.52)	-0.2065** (-2.19)	0.0473 (1.22)	0.0396 (1.04)	0.2568*** (2.71)	0.1621*** (2.64)
Size _{<i>t-1</i>}	0.4111*** (9.17)	0.3434*** (6.79)	0.4023*** (9.54)	0.3074*** (4.23)	0.3962*** (3.65)	0.3117*** (4.52)	0.4173*** (3.18)	0.3790*** (3.08)
CF _{<i>t-1</i>}	-1.2911* (-1.89)	-1.3512 (-0.47)	1.013 (0.79)	2.5912* (1.79)	-1.2750 (-0.77)	-1.2501 (-0.60)	-1.6132* (-1.89)	-1.7125 (-0.48)
CEO tenure _{<i>t-1</i>}	0.0034 (0.47)	0.0153* (1.99)	0.0013 (0.23)	0.0107* (1.82)	-0.0023 (-1.04)	0.0057* (1.98)	0.0146*** (3.90)	0.0265** (2.71)
Rem com size _{<i>t-1</i>}	0.0133 (0.44)	0.0091 (0.52)	0.0265 (1.03)	0.0175 (0.83)	0.0204 (1.73)	0.0093 (1.06)	0.0310 (1.71)	0.0205 (1.39)
Rem com ind _{<i>t-1</i>}	0.2644*** (2.49)	0.2575** (2.81)	0.1611* (1.85)	0.1535** (1.99)	0.0412* (1.89)	0.0262 (0.84)	0.1397** (2.09)	0.1000* (1.86)
Industry effect	Yes		Yes		Yes		Yes	
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.2703*** (5.91)	5.5107*** (3.78)	3.91488*** (6.18)	6.2999*** (9.82)	5.4601*** (4.81)	7.6540*** (3.87)	3.4147*** (6.78)	4.4494*** (2.90)
N	1541	1541	1999	1999	3064	3064	2105	2105
adjusted R ²	0.324	0.314	0.331	0.286	0.361	0.309	0.484	0.476

Table 3 shows the regression of the *Act* on CEO compensation incentives with other control variables (at year *t-1*) based on equation 1. The dependent variables are CEO compensation incentives in a given year. Columns 1–8 show the impact of the *Act* on *Ln options*, *Ln equity comp*, *Ln total comp* and *Ln bonus* in year *t*, respectively. Industry effects are based on Global Industry Classification Standards (GICS) codes. The *t*-statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table 4 The effect of the *Act* on CEO compensation incentives: narrow sample

Variables	Ln options		Ln equity comp		Ln total comp		Ln bonus	
	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
<i>Act</i>	0.2414*** (2.65)	0.2703** (2.09)	0.1697** (2.44)	0.2413** (2.06)	0.1045*** (3.02)	0.1102*** (2.74)	-0.1119* (-1.93)	-0.0870 (-1.75)
MTB _{<i>t-1</i>}	-0.0703*** (-2.75)	-0.0051* (-1.96)	-0.0879** (-2.02)	0.0220 (1.71)	-0.0124** (-2.17)	-0.0131* (-1.94)	0.0201* (1.96)	0.0149 (1.15)
Capex _{<i>t-1</i>}	-0.7901* (-1.94)	-2.0471** (-2.17)	-0.3948* (-1.93)	-1.4319* (-1.90)	-0.1281* (-1.93)	-0.1933 (-1.70)	-0.2301 (-1.77)	-0.6232 (-1.65)
Lev _{<i>t-1</i>}	-0.4753* (-1.89)	-0.2101 (-1.55)	0.2213 (1.27)	-0.7763* (-1.92)	0.0640 (1.45)	-0.2107 (-1.69)	-0.0342 (-1.19)	-0.1135* (-1.92)
Div _{<i>t-1</i>}	-0.1230* (-1.93)	-0.1947 (-1.70)	-0.0475 (-1.35)	-0.2324* (-1.97)	-0.1349* (-1.92)	0.0158 (1.61)	0.2012*** (2.14)	-0.0372 (-1.41)
Size _{<i>t-1</i>}	0.3833*** (5.16)	0.2304** (2.23)	0.3112*** (2.91)	0.2344** (2.24)	0.3019** (2.26)	0.3401*** (2.47)	0.2204*** (3.04)	0.3923*** (2.63)
CF _{<i>t-1</i>}	0.1920 (1.03)	0.2230 (1.57)	0.1027 (1.53)	0.3901 (1.76)	0.0234 (1.63)	0.1219 (1.01)	0.2405* (1.89)	0.0219 (1.09)
CEO tenure _{<i>t-1</i>}	0.0116 (1.22)	0.0032 (0.97)	0.1235 (1.49)	0.076 (1.06)	0.0204 (1.41)	0.0111 (1.20)	0.0273*** (2.74)	0.0324** (2.11)
Rem com size _{<i>t-1</i>}	0.0382 (1.76)	0.0159* (1.92)	0.3037 (1.74)	0.0372 (1.57)	0.0104** (2.11)	0.0230 (1.74)	-0.3244 (-1.68)	-0.0123 (-1.60)
Rem com ind _{<i>t-1</i>}	0.0331* (1.98)	0.0112* (1.89)	0.0329 (1.18)	0.1201* (1.90)	0.1143** (2.24)	0.0301* (1.95)	0.1234 (1.69)	-0.1625* (-1.88)
Industry effect	Yes		Yes		Yes		Yes	
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.1042*** (3.19)	5.0657*** (2.98)	2.4498*** (3.87)	3.0392** (2.19)	3.0672*** (4.83)	5.5023*** (4.33)	3.2123*** (3.18)	3.2125** (2.77)
N	849	849	1112	1112	1597	1597	1110	1110
adjusted R ²	0.362	0.351	0.337	0.341	0.453	0.371	0.446	0.353

Table 4 shows the regression of the *Act* on CEO compensation incentives along with other control variables (year *t-1*) based on a narrow window of 6 years (3 years before and after the *Act*). The dependent variables are the CEO compensation incentives in a given year. Columns 1–8 show the impact of the *Act* on *Ln options*, *Ln equity comp*, *Ln total comp* and *Ln bonus* in year *t*, respectively. Industry effects are based on Global Industry Classification Standards (GICS) codes. The *t*-statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table 5 Two-step system GMM regression

Variables	Ln options	Ln equity comp	Ln total comp
<i>Act</i>	0.0896** (2.07)	0.0264** (2.24)	0.0290*** (2.66)
MTB	0.0412 (1.00)	-0.0072 (-0.24)	0.0075 (0.53)
Capex	-2.3424** (-2.23)	-1.1931 (-1.41)	-1.0965*** (-2.59)
Lev	-0.0774 (-0.07)	0.5878 (0.59)	0.1333 (0.40)
Div	-1.0977 (-1.01)	-1.1522 (-1.08)	-0.1355 (-0.37)
Size	1.0533*** (5.29)	0.9424*** (3.70)	0.5315*** (6.03)
CF	-0.0000 (-0.54)	0.0000 (0.57)	0.0000 (0.70)
CEO tenure	0.0062 (0.09)	0.0018 (0.03)	0.0155 (0.61)
Rem com size	0.2731 (0.67)	0.6543** (2.44)	0.1699** (2.00)
Rem com ind	0.0172 (0.02)	-0.6838 (-0.91)	0.0546 (0.15)
Year effect	Yes	Yes	Yes
Constant	-9.7127** (-2.54)	-8.1887* (-1.76)	2.4590 (1.54)
Model fits			
Wald χ^2 -statistics	57.070***	36.150***	108.230***
Arellano-Bond AR (1)	-2.420*** [0.015]	-3.860*** [0.000]	-5.100*** [0.000]
Arellano-Bond AR (2)	-0.910 [0.363]	-1.360 [0.174]	-0.960 [0.335]
Hansen J-statistics	17.220 [0.440]	14.090 [0.660]	13.6700 [0.690]
No. of instruments	28	28	28

Table 5 shows the results of the two-step system Generalized Method of Moments (GMM). The dependent variables are CEO compensation incentives. The model fits include the system GMM reliability conditions: first order autocorrelation *AR* (1), second order autocorrelation *AR* (2), and Hansen *J*-statistics test for over-identifying restrictions. We used collapsed instruments to reduce the propagation and preserve the depth of sample. Figures in parentheses are *t*-statistics while brackets show the *p*-values. Coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table 6 Propensity score matching estimators

Panel A Variables	Pre-match			Post-match		
	(1)	(2)	(3)	(4)	(5)	(6)
	options_dummy	equity_dummy	total_dummy	options_dummy	equity_dummy	total_dummy
MTB	-0.0049 (-0.54)	0.1004 (1.10)	-0.0375 (-1.21)	0.0000 (0.01)	0.0000 (0.02)	0.0057 (0.76)
Capex	-4.9922*** (-2.76)	-3.7746*** (-2.96)	1.5382* (1.92)	0.9893 (0.50)	0.4924 (0.31)	0.1946 (0.19)
Lev	-1.2481 (-1.46)	0.1791 (0.27)	-0.4119 (-0.95)	-0.1099 (-0.12)	0.4230 (0.57)	0.2176 (0.40)
Div	1.1146*** (2.63)	1.1769*** (3.42)	-0.0775 (-0.42)	0.2276 (0.50)	-0.3594 (-0.91)	0.0202 (0.09)
Size	0.0265 (0.20)	0.2425 (1.13)	0.1624*** (2.65)	0.0185 (0.15)	-0.0010 (-0.01)	-0.0662 (-0.85)
CF	-0.0908 (-0.67)	-0.0495 (-0.46)	0.0366 (0.63)	-0.0345 (-0.24)	-0.2087 (-0.83)	0.0588 (0.81)
CEO tenure	0.0120 (0.39)	0.0150 (0.61)	-0.0060 (-0.47)	-0.0057 (-0.17)	0.0278 (1.02)	0.0136 (0.83)
Rem com size	0.0547 (0.41)	-0.0504 (-0.48)	-0.0247 (-0.42)	0.0157 (0.10)	0.0906 (0.78)	0.0271 (0.38)
Rem com ind	0.4503 (0.97)	0.1408 (0.37)	-0.1786 (-0.81)	-0.2180 (-0.43)	0.0107 (0.03)	0.0413 (0.16)
Constant	-0.3121 (-0.20)	-0.3867 (-0.30)	-4.7735*** (-6.35)	0.1373 (0.08)	-1.7897 (-1.33)	0.2385 (0.25)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	756	990	1,510	264	384	674
Pseudo R ²	0.148	0.141	0.251	0.015	0.028	0.011

Panel B: Differences in firm characteristics pre-Act

Variable	options_dummy				equity_dummy				total_dummy			
	Treatment	Control	Difference	t-stat	Treatment	Control	Difference	t-stat	Treatment	Control	Difference	t-stat
Ln options	13.8849	13.8541	0.0307	0.1600								
Ln equity comp					13.8708	13.9423	-0.0715	-0.4100				
Ln total comp									14.4245	14.4768	-0.0522	-0.6000
MTB	3.6294	3.2219	0.4075	0.6903	3.5145	3.1217	0.3928	0.2812	2.9494	2.2386	0.7107	0.8300
Capex	-0.0846	-0.0783	-0.0062	-0.4200	-0.0852	-0.0835	-0.0016	-0.1200	-0.0629	-0.0614	-0.0015	-0.2100
Lev	0.1995	0.2391	-0.0396	-1.3500	0.2165	0.1980	0.0184	0.7800	0.1915	0.1905	0.0010	0.0700
Div	0.8505	0.8661	-0.1550	-0.2400	0.8696	0.8695	0.0001	0.0000	0.7967	0.8387	-0.0419	-1.2100
Size	21.5802	21.5375	0.0426	0.1200	21.6824	21.4085	0.2739	0.9000	21.3857	21.4275	-0.0417	-0.2400
CF	18.9631	18.7202	0.2428	0.8400	18.9716	18.7365	0.2351	0.8500	18.5007	18.4809	0.0198	0.1200
CEO tenure	6.6525	7.7322	-1.0797	-1.4200	6.7221	6.2010	0.5210	0.9600	6.1370	6.4010	-0.2640	-1.1200
Rem com size	3.7480	3.4960	0.2519	1.4400	3.6847	3.6956	-0.0108	-0.0600	3.6870	3.6967	-0.0096	-0.0900
Rem com ind	0.7572	0.7912	-0.0339	-0.7000	0.7681	0.7559	0.0121	0.2700	0.7230	0.7343	-0.0112	-0.4100

Panel C: Differences in CEO compensation incentives post-Act

Variable	Treatment	Control	Difference	t-stat
Ln options	14.3719	12.0180	2.3539***	4.6200
Ln equity comp	14.1838	12.0575	2.1263***	5.7100
Ln total comp	15.3271	13.4245	1.9026***	3.0700

Panel D: Regression

Variable	options_dummy	equity_dummy	total_dummy
Act	0.0071*** (2.72)	0.0161** (2.19)	0.0121*** (3.12)
Other controls	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Firm year fixed effect	Yes	Yes	Yes

Table 6 shows the results of propensity score matching estimators. Panel A shows the pre-match and post-match regression results. Panel B shows the differences in firm characteristics in the pre-Act period. Panel C shows the differences in CEO incentives only (for the purpose of brevity) in the post-Act period. Panel D shows the regression results based on the matched sample. Figures in parentheses are *t*-statistics. Coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table 7 The effect of the *Act* and CEO compensation incentives on cash holdings

Variables	Cash					
	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE
Ln options	0.0106*** (2.69)	0.0121*** (2.49)				
Ln options \times <i>Act</i>	-0.0119*** (-2.99)	-0.0132*** (-2.84)				
Ln equity comp			0.0126*** (3.40)	0.0141** (2.04)		
Ln equity comp \times <i>Act</i>			-0.0122*** (-2.41)	-0.0113** (-2.19)		
Ln total comp					0.0165* (1.89)	0.0145 (1.76)
Ln total comp \times <i>Act</i>					-0.0012*** (-2.74)	-0.0019** (-2.13)
MTB $t-1$	-0.0119 (-1.36)	-0.0011 (-1.61)	0.0016 (1.62)	-0.0146 (-1.73)	0.0021* (1.99)	0.0012* (1.91)
Capex $t-1$	1.4013*** (4.23)	0.2019** (2.15)	0.2101*** (3.16)	0.2192*** (2.90)	0.2173*** (3.12)	0.1982*** (2.70)
Lev $t-1$	-0.3201** (-2.11)	-0.2606*** (-3.12)	-0.2109*** (-2.80)	-0.2328*** (-4.00)	-0.2736*** (-6.02)	-0.2192*** (-3.99)
Div $t-1$	-0.1115*** (-2.89)	-0.0201 (-1.75)	-0.0837*** (-4.58)	-0.0133 (-1.32)	-0.0672*** (-2.98)	-0.0112 (-1.83)
Size $t-1$	0.0125*** (2.82)	0.1240*** (2.69)	-0.0190*** (-3.18)	-0.0270*** (-3.09)	-0.0201*** (-2.85)	-0.0173*** (-2.68)
CF $t-1$	-1.1323** (-2.19)	-0.0219 (-1.95)	-0.1122*** (-3.10)	-0.0431 (-1.41)	-0.1302*** (-2.01)	-1.0132 (-1.56)
CEO tenure $t-1$	0.0019 (1.61)	-0.0181 (-1.13)	-0.0011 (-1.03)	-0.0140 (-1.19)	0.0011 (1.71)	-0.0014 (-1.52)
Rem com size $t-1$	-0.0015 (-1.13)	-0.0112 (-1.09)	-0.0019 (-1.80)	-0.0141 (-1.42)	-0.0023 (-1.19)	-0.0043 (-1.61)
Rem com ind $t-1$	0.0124 (1.19)	0.0141 (1.45)	-0.0110 (-1.09)	-0.0018 (-1.15)	0.0123 (1.76)	0.0043 (1.25)
Industry effect	Yes		Yes		Yes	
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.5075*** (4.58)	1.9906*** (3.07)	0.5124*** (4.03)	1.2012*** (3.66)	1.4053*** (6.11)	1.2637*** (3.65)
N	1498	1498	1945	1945	2992	2992
adjusted R ²	0.318	0.213	0.289	0.199	0.279	0.211

Table 7 shows the regression of CEO compensation incentives and the *Act* on cash holdings along with other control variables (year $t-1$). The dependent variable is cash holdings in a given year. Columns 1–6 show the impact of the interactions between *Ln options* \times *Act*, *Ln equity comp* \times *Act*, and *Ln total comp* \times *Act* impact on cash holdings in year t . Industry effects are based on Global Industry Classification Standards (GICS) codes. The t -statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table 8 The effect of the *Act* and CEO compensation incentives on the value of cash holdings

Variables	(1)	(2)	(3)
Ln options \times <i>Act</i>	0.0132*** (2.84)		
Ln options \times <i>Act</i> \times Δ cash	0.199** (2.19)		
Ln equity comp \times <i>Act</i>		0.0122*** (2.41)	
Ln equity comp \times <i>Act</i> \times Δ cash		0.212*** (2.65)	
Ln total comp \times <i>Act</i>			0.0012*** (2.54)
Ln total comp \times <i>Act</i> \times Δ cash			0.114** (2.21)
Δ cash	0.0141* (1.79)	0.0113 (1.64)	0.0113** (2.29)
Cash	0.0112 (1.01)	0.0142 (1.04)	0.0126* (1.99)
MTB $t-1$	-0.0213 (-1.10)	-0.0016 (-1.23)	-0.0741* (-1.89)
Capex $t-1$	1.0204*** (2.23)	0.1130*** (3.16)	0.1212*** (2.91)
Lev $t-1$	-0.2021** (-2.21)	-0.2150*** (-2.80)	-0.2121*** (-2.46)
Div $t-1$	-0.1325** (-2.19)	-0.0837*** (-2.58)	-0.0210* (-1.82)
Size $t-1$	0.0121*** (2.69)	0.0141*** (2.28)	0.0190** (2.19)
CF $t-1$	-1.0019** (-2.26)	-0.1051*** (-2.60)	-0.0125 (-2.11)
CEO tenure $t-1$	0.0142* (1.96)	0.0314* (1.89)	0.0121* (1.79)
Rem com size $t-1$	0.0125 (1.74)	0.0129* (1.81)	0.0123 (1.59)
Rem com ind $t-1$	0.0112 (1.20)	0.0312 (1.21)	0.0127 (1.13)
Lev \times Δ cash $t-1$	-0.0231 (01.43)	-0.1313 (1.43)	0.0318 (1.48)
Cash \times Δ cash $t-1$	-0.0421 (1.60)	0.0511 (1.71)	0.1107 (1.63)
Constant	1.1035*** (3.58)	0.1320*** (4.25)	1.1932*** (3.12)
N	1498	1945	2992
adjusted R ²	0.291	0.201	0.255

Table 8 shows the regression of CEO compensation incentives and the *Act* on the value of cash holdings along with other control variables (year $t-1$). The dependent variable is excess return in a given year. Δ cash is the one year change in cash holdings. Columns 1–3 show the impact of the interactions between *Ln options* \times *Act* \times Δ cash, *Ln equity comp* \times *Act* \times Δ cash, and *Ln total comp* \times *Act* \times Δ cash impact on the value of cash holdings in year t . The t -statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Online Appendix A

Remuneration Amendment Act, CEO compensation and cash holdings

We re-run equation (2) using a 3-year narrow sample to minimize the trending effect and influence of other confounding factors from a long sample period following Ferri and Maber (2013). The narrow sample enables us to examine the spill-over impact of the legislation on cash holdings. Thus, to capture the post regulation changes, we use three years pre- (2008–2010) and post-*Act* (2012–2014) to stack the necessary data for regressions. Table A2 reports the results that are the same as those reported in Table 5, lending support to *H2*.

[Insert Table A1 about here]

We conclude that regulatory change reduces the agency problem between principals and agents. Our results are consistent with the recommendations of the ASX Corporate Governance Council (ASX Corporate Governance Principles and Recommendations 2014), which encourage the equity incentives to align the interests of shareholders and managers.

CEO Compensation and cash holdings analysis

We model the relationship between CEO compensation incentives and corporate cash holdings to determine the prevailing management motive for holding cash. This model enables us to investigate the contemporaneous relationship between compensation incentives and cash holdings. The dependent variable is corporate cash holdings (*Cash*), measured in a cash-to-asset ratio, and the independent variables are stock options, equity and total compensation. We exclude cash bonus from the analysis as we find little theoretical significance in the relationship between cash bonus and cash holdings. The model is shown in the following equation:

$$Cash_{it} = \alpha + \beta_1(Compensation\ incentives)_{it} + \delta_2(Controls)_{it} + \delta_3 \sum (Industry\ effect)_i + \delta_4 \sum (Year\ effect)_t + \varepsilon_{it} \quad (i)$$

Table A2 presents the regression results that investigate the effect of CEO options, equity and total compensation on cash holdings using OLS and FE estimations. The regression models are well fitted, as depicted by R-squares ranging from 0.160 to 0.459 and statistically significant. Columns 1–2 show the relationship between stock options (*Ln options*) and cash holdings using pooled OLS and FE. Both Columns show positive and significant ($p < 1\%$) relationships between CEO options and cash holdings.

[Insert Table A2 about here]

Columns 3–4 show the relationship between equity compensation (*Ln equity comp*) and cash holdings. Columns 3 and 4, using pooled OLS and FE estimation, show positive and significant results ($p < 1\%$, and $p < 10\%$, respectively). Similarly, Columns 5–6 test the relationship between total compensation (*Ln total comp*) and cash holdings and show positive and significant results (all at $p < 5\%$).

The results, which show that CEO options, equity and total compensations are all significantly and positively related to corporate cash holdings¹⁹ indicate that equity-based (options and shares) compensation (and the related total compensation) increases cash levels of Australian firms. These findings suggest, over the entire sample period 2004–2015, that the agency motive of management for holding excess cash prevails.

The coefficients reported in Table A2 may be biased, as compensation incentives are not in fact exogenously structured. For instance, compensation incentives may depend on the size of firm, the cash flows available for distribution, and the form of the incentives. To address causality concerns, we include the one-year lagged variables following

¹⁹ We test the linearity of relationship between compensation incentives (*Ln options*, *Ln equity comp*, and *Ln total comp*) and find positive and significant results ($p < 1\%$).

Harford et al. (2008). We replace the contemporaneous explanatory variables (compensation incentives) with their lagged values (i.e., year $t-1$) using the following equation:

$$Cash_{i,t} = \alpha + \beta_1(Ln\ compensation\ incentives)_{i,t-1} + \delta_2(Controls)_{i,t} + \delta_3\Sigma(Industry\ effect)_i + \delta_4\Sigma(Year\ effect)_t + \varepsilon_{it} \quad (ii)$$

Table A3 reports the results, which can be interpreted statistically to be the same as those reported in Table A2.

[Insert Table A3 about here]

Alternate variables specification

We employ alternate variables for compensation measures to test the sensitivity of results, as by Monem and Ng (2013). We replace the *Ln options* with an options award divided by total compensation (*Options/total comp*), and replace the *Ln equity comp* with *equity incentives/total comp*, consistent with previous studies (Mehran, 1995; Chen et al., 2006; Li et al., 2011).

[Insert Table A4 about here]

Table A4 shows the results of the alternate variable specifications using pooled OLS and panel fixed effects. Columns 1 and 2 report the statistically significant and positive effect of *Options/total comp* on cash holdings. *Equity incentives/total comp* is also significantly positively related to cash holdings. Our results are consistent with the previous findings reported in Table A2. We also test (un-tabulated) the sensitivity of the analysis by splitting our sample into pre- and post-legislation and find statistically similar results.

Value of cash holdings

We use the Faulkender and Wang's (2006) approach to examine the value of the cash holdings. This approach represents a long-run event study where the particular event

is the expected change in cash holdings. We measure the value of cash by examining how the unexpected change in the cash holdings affects excess stock return using the following model.

$$\begin{aligned}
R - RB_{it} = & \alpha + \beta_1(Cash)_{it} + \beta_2(Act)_{it} + \beta_3(\Delta Cash)_{it-1} \\
& + \beta_4(\Delta cash * Act * Compenastion incentives)_{it} + \beta_5(MTB)_{it-1} + \beta_6(Capex)_{it-1} \\
& + \beta_7(Lev)_{it-1} + \beta_8(DIV)_{it-1} + \beta_9(Size)_{it-1} + \beta_{10}(CF)_{it-1} + \beta_{11}(CEO tenure)_{it-1} \\
& + \beta_{12}(Rem com size)_{it-1} + \beta_{13}(Rem com ind)_{it-1} + \beta_{14}(Lev * \Delta Cash)_{it-1} \\
& + \beta_{15}(Cash * \Delta Cash)_{it-1} + \varepsilon_{it}
\end{aligned}$$

where Δ represents change in X variables of i firm in year $t-1$ to t . $R - RB_{it}$ indicates excess stock return for firm i during fiscal year t from firm i 's benchmark return. The excess return is considered to be the cumulative abnormal return during a fiscal year as it includes the impact of the unexpected change in cash holdings on the change in shareholder value. We use the realized change in cash holdings as the unexpected change in cash. All the variables are scaled by a one-year lagged market value of equity (year $t-1$) to ensure that larger firms do not bias our results. We construct the interaction between CEO compensation incentives, the Act , and $\Delta cash$ to examine the impact on the value of cash. We also include other control variables that may have an effect on cash holdings, following Faulkender and Wang (2006). All other variables are explained in Table 1.

Table A1 The effect of the *Act* and CEO compensation on cash holdings: a narrow sample

Variables	(1)	(2)	(3)
	Cash		
<i>Ln options</i> × <i>Act</i>	-0.0017** (-2.00)		
<i>Ln equity comp</i> × <i>Act</i>		-0.0013** (-2.03)	
<i>Ln total comp</i> × <i>Act</i>			-0.0016*** (-2.78)
MTB	0.0129*** (3.91)	0.0125*** (4.75)	0.0127*** (5.65)
Capex	0.2460*** (3.30)	0.2416*** (3.64)	0.2884*** (4.67)
Lev	-0.3648*** (-9.59)	-0.3418*** (-10.50)	-0.3752*** (-11.49)
Div	-0.0913*** (-4.64)	-0.0822*** (-4.86)	-0.0671*** (-4.67)
Size	-0.0128*** (-2.73)	-0.0081** (-1.97)	-0.0142*** (-3.91)
CF	-0.0866 (-1.47)	-0.1309** (-2.18)	-0.1336** (-2.52)
CEO tenure	-0.0003 (-0.32)	-0.0007 (-0.81)	0.0007 (0.78)
Rem com size	0.0020 (0.40)	-0.0005 (-0.13)	-0.0009 (-0.27)
Rem com ind	-0.0152 (-0.77)	-0.0123 (-0.71)	-0.0056 (-0.41)
Industry effect	Yes	Yes	Yes
Year effect	Yes	Yes	Yes
Constant	0.6148*** (6.37)	0.5069*** (6.15)	0.6283*** (8.51)
N	825	1083	1559
adjusted R ²	0.347	0.325	0.338

Table A1 shows the regression of CEO compensation incentives and the *Act* on cash holdings along with other control variables in a narrow window of 6 years (3 years before and after the *Act*) using OLS. Columns 1–3 show the impact of the interactions between *Ln options* × *Act*, *Ln equity comp* × *Act*, and *Ln total comp* × *Act* impact on cash holdings in year *t*. Industry effects are based on Global Industry Classification Standards (GICS) codes. The *t*-statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table A2. CEO compensation incentives and cash holdings

Independent variables	Cash					
	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE
Ln options	0.0107*** (3.16)					
Ln options		0.0087*** (3.31)				
Ln equity comp			0.0149*** (5.13)			
Ln equity comp				0.0045* (1.78)		
Ln total comp					0.0099** (2.14)	
Ln total comp						0.0077** (2.55)
MTB	0.0020 (1.19)	0.0005 (1.53)	0.0022 (1.29)	0.0005 (1.37)	0.0031*** (6.78)	-0.0001 (-0.48)
Capex	0.2275*** (3.82)	0.2505*** (2.63)	0.2095*** (3.96)	0.2533*** (3.23)	0.2149*** (5.71)	0.3446*** (13.98)
Lev	-0.3924*** (-12.12)	-0.3091*** (-4.94)	-0.3300*** (-11.55)	-0.2614*** (-5.17)	-0.3693*** (-17.35)	-0.1198*** (-6.87)
Div	-0.1076*** (-7.29)	-0.0133 (-0.95)	-0.1026*** (-7.92)	0.0012 (0.10)	-0.0954*** (-10.22)	0.0157** (2.45)
Size	-0.0170*** (-3.67)	-0.0372*** (-2.78)	-0.0173*** (-4.39)	-0.0396*** (-3.62)	-0.0186*** (-6.35)	-0.0087** (-2.43)
CF	-0.1126*** (-2.81)	-0.0472 (-1.01)	-0.1260*** (-3.36)	-0.0554 (-1.27)	-0.1063*** (-5.34)	-0.1980*** (-15.38)
CEO tenure	-0.0001 (-0.13)	-0.0007 (-0.62)	-0.0009 (-1.31)	-0.0006 (-0.64)	0.0005 (0.83)	-0.0001 (-0.14)
Rem com size	0.0028 (0.71)	-0.0021 (-0.55)	0.0013 (0.42)	-0.0047 (-1.30)	0.0019 (0.69)	-0.0018 (-1.14)
Rem com ind	0.0027 (0.18)	0.0030 (0.25)	-0.0009 (-0.07)	-0.0026 (-0.24)	0.0121 (1.22)	0.0020 (0.36)
Industry effect	Yes		Yes		Yes	
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.5536*** (6.26)	0.9085*** (3.43)	0.5201*** (7.57)	1.0075*** (4.50)	0.5605*** (10.11)	0.2084*** (2.75)
N	1498	1498	1945	1945	2992	2992
adjusted R ²	0.360	0.160	0.338	0.127	0.324	0.459

Table A2 shows the regression of CEO compensation incentives on cash holdings along with other control variables based on equation i. The dependent variable cash holdings is the ratio of cash and marketable securities to total assets in a given year. Columns 1–6 show the impact of *Ln options*, *Ln equity comp* and *Ln total comp* on cash holdings in year *t*, respectively. The *t*-statistics are heteroskedastic consistent standard errors clustered at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table A3 Regression of cash holdings on lagged CEO compensation incentives

Variables	Cash		
	(1)	(2)	(3)
Ln options _{t-1}	0.0003** (1.99)		
Ln equity comp _{t-1}		0.0130*** (4.93)	
Ln total comp _{t-1}			0.0059** (2.12)
MTB	0.0021 (1.28)	0.0023 (1.38)	0.0031* (1.91)
Capex	0.2603*** (4.52)	0.2184*** (4.08)	0.2139*** (4.59)
Lev	-0.4308*** (-13.76)	-0.3630*** (-12.91)	-0.3698*** (-14.94)
Div	-0.1144*** (-7.66)	-0.1061*** (-8.18)	-0.0951*** (-9.06)
Size	-0.0116*** (-2.74)	-0.0150*** (-4.10)	-0.0165*** (-4.55)
CF	-0.1124*** (-2.76)	-0.1268*** (-3.43)	-0.1067*** (-3.21)
CEO tenure	-0.0002 (-0.29)	-0.0004 (-0.56)	0.0005 (0.78)
Rem com size	0.0050 (1.28)	0.0028 (0.86)	0.0021 (0.80)
Rem con ind	0.0000 (0.00)	-0.0002 (-0.02)	0.0125 (1.24)
Industry effect	Yes	Yes	Yes
Year effect	Yes	Yes	Yes
Constant	0.5978*** (7.26)	0.5086*** (7.21)	0.5847*** (9.06)
N	1512	1945	2991
adjusted R ²	0.363	0.349	0.323

Table A3 shows the regression of cash holdings and one-year lagged CEO compensation incentives along with other control variables based on the following equation (ii)

$$Cash_{i,t} = \alpha + \beta_1(Ln\ compenation\ incentives)_{i,t-1} + \delta_2(Controls)_{i,t} + \delta_3(Industry\ effect)_i + \delta_4(Year\ effect)_i + \varepsilon_{it}$$

Columns 1–3 regress the cash holdings on *Ln options*, *Ln equity comp*, and *Ln total comp* at time *t-1*. The industry effects are based on Global Industry Classification Standards (GICS) codes. The *t*-statistics are heteroskedastic consistent standard errors cluster at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.

Table A4 Regression of alternate CEO compensation incentives

Variables	Cash			
	(1) OLS	(2) FE	(3) OLS	(4) FE
Options/total comp	0.0522* (1.91)	0.0610*** (2.59)		
Equity incentive/total comp			0.0789*** (3.32)	0.0436** (2.25)
MTB	0.0021 (1.20)	0.0005 (1.19)	0.0023 (1.30)	0.0005 (1.27)
Capex	0.2247*** (3.78)	0.2514*** (5.06)	0.2095*** (3.94)	0.2572*** (5.93)
Lev	-0.3967*** (-12.20)	-0.3120*** (-8.35)	-0.3341*** (-11.61)	-0.2624*** (-8.48)
Div	-0.1071*** (-7.26)	-0.0128 (-0.88)	-0.1007*** (-7.73)	0.0015 (0.12)
Size	-0.0125*** (-2.98)	-0.0343*** (-4.50)	-0.0114*** (-3.22)	-0.0383*** (-5.88)
CF	-0.1133*** (-2.83)	-0.0484* (-1.78)	-0.1265*** (-3.38)	-0.0564** (-2.44)
CEO tenure	-0.0001 (-0.13)	-0.0006 (-0.49)	-0.0009 (-1.22)	-0.0006 (-0.62)
Rem com size	0.0030 (0.76)	-0.0021 (-0.61)	0.0016 (0.50)	-0.0048* (-1.66)
Rem com ind	0.0030 (0.20)	0.0035 (0.29)	-0.0006 (-0.05)	-0.0025 (-0.24)
Industry effect	Yes		Yes	
Year effect	Yes	Yes	Yes	Yes
Constant	0.5804*** (6.44)	0.9463*** (6.08)	0.5587*** (7.89)	1.0266*** (7.63)
N	1498	1498	1945	1945
adjusted R ²	0.358	0.140	0.333	0.126

Table A4 shows the regression of cash holdings and alternate proxies of CEO compensation incentives along with other control variables. Columns 1–2 regress cash holdings in year t on the alternate proxy *Options/total comp* of (\ln options). Columns 3–4 regress the dependent variable on the alternate proxy *Equity incentive/total comp* of (\ln equity comp), respectively. Industry effects are based on Global Industry Classification Standards (GICS) codes. The t -statistics are heteroskedastic consistent standard errors cluster at firm level and reported below the parameters in parentheses. Standardized beta coefficients are reported at 1%, 5% and 10% significance levels with ***, **, * respectively.