

EXECUTIVE COMPENSATION AND BOARD GOVERNANCE IN US FIRMS*

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This paper investigates US executive compensation and governance. I find on average executive pay is positively correlated to firm performance and firm size. Executive pay contracts contain significant equity incentives. The use of restricted stock has become more important over time. Stock options remain an important part of executive pay. Compensation committees are generally independent and there is little evidence they result in 'too high' CEO pay. The Dodd-Frank Act changed the corporate governance landscape. Firms use compensation consultants that are generally engaged by the board and not management. 'Say-on-Pay' gave shareholders a non-binding mandatory vote on executive pay. Typically, stockholders endorse executive pay plans with very few resolutions failing.

Executive compensation is a very controversial subject (Conyon *et al.*, 1995; Conyon and Murphy, 2000; Bebchuk and Fried, 2003, 2006). It has attracted the attention of legislators, the media and has spawned an awful lot of academic studies. There are many reasons why executive compensation is so contentious. First, chief executive officer (CEO) pay has increased significantly in the last few decades and many are critical of this increase. Murphy (2012) shows that inflation-adjusted median CEO compensation at S&P 500 firms increased from \$2.9 million in 1992 to about \$9.0 million in 2011. That represents a real growth rate in US CEO pay of approximately 4% *per annum* every year for almost 30 years.

Second, there is a widely held perception that CEO compensation is insufficiently linked to the performance of CEOs or their firms (Bebchuk *et al.*, 2002; Bebchuk and Fried, 2003, 2006). Bebchuk and Fried (2006) provide a litany of alleged problems with the design of executive compensation in US firms. For example, firms frequently grant options that do not link pay tightly to CEO's own performance but instead allow managers to reap windfall gains from stock price increases that are due solely to the market and sector within which their firms operate. If true, then CEO pay is more related to luck than CEO effort.

Third, the growth in US CEO compensation far outpaces the growth of most Americans' incomes. Kaplan (2008) has documented that US CEO compensation increased from approximately one hundred times the median household income in 1993 to more than two hundred times the median household income in 2006. In

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general, widening income disparity has focused critical attention on those at the top of the pay distribution. Recent evidence shows that in the aftermath of the Great Recession the top 1% income shares rebounded in 2010 following a sharp decline in 2008 and 2009. In the US total income going to the top 10% is once again approaching 50% (Piketty and Saez, 2013).

Fourth, there is a suspicion that corporate governance has failed to rein in alleged corporate excess. CEO pay is, in actual practice, set by boards of directors and their compensation committees. In 2004 Warren Buffet, Chairman of Berkshire Hathaway, remarked:¹ ‘The typical large company has a compensation committee. They don’t look for Dobermans on that committee, they look for Chihuahuas – Chihuahuas that have been sedated’. The clear implication was that boards and compensation committees were at the behest of CEOs and were not sufficiently safeguarding shareholder interests. If CEOs have too much bargaining power relative to their boards then excess pay might result.

Recent policy changes and securities legislation of the US has re-focused attention on corporate governance as a way of making executive pay more transparent and accountable. The Dodd–Frank Act (2010), arising in the wake of the financial crisis, is a significant attempt to fix ‘too big to fail’ and other corporate governance problems. Among its many provisions, Dodd–Frank attempts to give owners more control over executive pay and to make boards of directors and their compensation committees more independent and accountable. Specifically, companies were required to provide investors with information about compensation consultants. Importantly, Dodd–Frank provided investors with the opportunity to vote on executive compensation – namely the so-called ‘say-on-pay’ provisions. In drafting the Act, Congress presumably believed that corporate governance arrangements prior to 2010 were weak or ineffective and more is needed to be done to curb excess executive compensation. Prior to Dodd–Frank, the Sarbanes Oxley Act (2002) addressed accounting and financial reforms in the wake of Enron and other corporate scandals.

In this study I re-visit the question of whether independent compensation committees and boards affect CEO compensation.² I document that US boards and compensation committees are near universally independent by 2011, according to agreed standards. I also document the growth in US executive compensation. I show that the level of executive compensation has increased significantly, as has the equity pay mix (i.e. the amount of compensation delivered in the form of stock options and restricted stock has also increased). I then investigate the correlation between executive compensation and affiliated (i.e. non-independent) compensation committees. Specifically, I test whether the level of executive compensation is higher in firms that have non-independent compensation committees and/or boards. In addition, I provide evidence on the market for executive compensation advice (i.e. the prevalence of compensation consultants) in the US after Dodd–Frank. In addition, I show how shareholder voting on CEO pay has changed after the implementation of Dodd–Frank.

¹ Quoted on CNN at http://money.cnn.com/2004/05/03/pf/buffett_qanda/.

² Conyon and Peck (1998) considered the relation between executive compensation, board control and compensation committees. See also Bonet and Conyon (2005) using UK data.

The broad conclusions of the study are as follows. First, US executive compensation has increased significantly between 1992 and 2012 for both CEOs and non-CEO executives alike. At the same time the composition of executive compensation has also changed. There has been a marked shift away from guaranteed forms of pay, such as base salaries, and towards more ‘pay at risk’ in the form of stock options and restricted stock. Since the mid-2000s public firms are placing more emphasis on grants of restricted stock as opposed to stock options. Second, the study finds that boards of directors and compensation committees are highly independent in the setting of executive pay. Directors are largely free from conflicts of interest arising from family ties, former affiliations with the firm, interlocking directorships and other material transactions that might compromise their independence. Third, the econometric evidence shows that on average executive compensation is statistically and positively correlated with measures of firm performance. This is the case for different measures of executive compensation (including total compensation, realised compensation and cash pay) as well as different performance measures (shareholder returns or return on assets). The study finds that executive compensation is positively correlated with firm size. On the other hand, the study finds that female executives are paid less than their male counterparts after controlling for firm-level variables and other determinants of executive pay. Finally, the study documents the governance of executive compensation since the Dodd–Frank Act (2010). Compensation committees almost universally use compensation consultants to advise them on executive pay. There are relatively few of these consultants in the market place, with five firms capturing approximately 50% of all engagements. In addition, Dodd–Frank mandated non-binding shareholder voting on executive pay. This study finds that shareholders overwhelmingly endorse management executive pay plans. Less than 2% of shareholder ‘say-on-pay’ proposals failed in the S&P 500 firms in 2011. The percentage votes for the pay resolutions are, on average, high and often exceed 80%.

1. Setting Executive Compensation

1.1. *Boards and Compensation Committees*

A considerable amount of research has been devoted in explaining executive compensation outcomes (Jensen and Murphy, 1990; Bebchuk and Fried, 2006; Frydman and Saks, 2010; Murphy, 2012). There are two broadly competing models of executive pay. One asserts that executive pay is too high and contracts are poorly designed. This is the ‘managerial power’ view of executive compensation (Bertrand and Mullainathan, 2001; Bebchuk and Fried, 2003, 2006). In the context of this study it means that CEOs and executives might exercise significant bargaining strength over their boards and compensation committees that leads to contracts that are not in the best interests of shareholders. CEO pay is too high and boards/committees do not tie executive pay sufficiently to performance.

An alternative approach to CEO pay is the ‘optimal contracting’ model (Core and Guay, 2010). This is essentially an economic or market-based view of the executive labour market. The optimal contracting model asserts that even though contracts

may not be perfect, they do minimise the myriad contracting costs that shareholders and managers face in the real world of imperfect and asymmetric information (Dow and Raposo, 2005; Edmans *et al.*, 2009). In addition, the market perspective predicts that CEO compensation is determined by competitive labour market forces. If CEO talent is correlated with firm size then as firm size increases so too does CEO compensation.³

This study focuses on the institutions of executive pay setting.⁴ Specifically, the connection between executive compensation and independent boards of directors. The growth in CEO pay (documented later in this article) has raised questions about the effectiveness of boards. A central issue is whether members of the board are truly independent and free from any conflicts of interest when setting executive pay. If the bargaining strength of CEOs is high relative to board members then executive pay contracts might be inefficient. Specifically, executive pay is ‘too high’ and there is insufficient ‘pay for performance’ (Bebchuk and Fried, 2006).

The standard theoretical approach to executive compensation is the principal–agent model (Holmström, 1979, 1999). Shareholders solve a latent moral hazard problem by designing an incentive compatible contract that motivates CEO effort. Theoretically, agency models predict that at least part of the executive compensation contract contains ‘risky’ pay as a signal of managerial effort (such as bonuses, stock options or restricted stock). However, in reality, shareholders do not set executive compensation directly. Instead, executive compensation is set by the board of directors acting on their behalf (Hermalin and Weisbach, 1998).⁵

Generally, the board of directors delegates pay setting to a specialised committee of the board – the compensation committee.⁶ The compensation committee contains independent outside directors who, in principle, are free from the influence of executives whose pay they recommend. Critics of executive compensation contend that this is where there is a weak link and theory and practice diverge (Bebchuk and Fried, 2003, 2006). For many reasons outside directors might not be fully ‘independent’. For example, directors may owe their current board position to the incumbent CEO; the directors might be fearful of not having their board positions renewed if they lowball the CEO’s pay package; the outside directors might be too busy as executives elsewhere; directors might rely too much on information supplied by the CEO and the firm; they may have family ties to the firm; directors may be former employees of the firm or they may have material financial relationships with the firm (Conyon and Peck, 1998; Core *et al.*, 1999; Bebchuk and Fried, 2006). For these – and

³ Gabaix and Landier (2008) provide empirical evidence of this claim using US data from 1992 to 2004. Recently, Gabaix *et al.* (2014) show that CEO pay decreased by 28% during the 2007–9 recession as firm size fell by 17%. Subsequently, in the recovery phase from 2009 to 2011, CEO pay increased by 22% as firm value increased by 19%.

⁴ Conyon and Gregg (1994) argue that institutions and corporate restructuring are important for CEO pay setting. They find that labour market institutions (trade unions) and product market institutions (corporate acquisitions and M&As) as well as corporate finance policies (debt structure) are important determinants of CEO pay.

⁵ Indeed, US corporation law imposes a fiduciary duty of care and loyalty on members of the board of directors. Their responsibility is to safeguard shareholder/owner interests.

⁶ Called the Remuneration Committee in the UK. The US terminology is used in this study. See Baker *et al.* (1988) who first note the importance of compensation committees.

other reasons – boards might fail to rein in excess compensation. This line of reasoning is consistent with the ‘managerial power’ view of executive compensation. Boards are either ‘too weak’ or ‘too compliant’ when setting executive pay. Such directors are classified as non-independent, affiliated or ‘grey’ (Core *et al.*, 1999; Bebchuk and Fried, 2006).

The compensation committee is particularly important as it is they who decide executive pay (Conyon, 1997; Conyon and Peck, 1998; Gregory-Smith, 2012). The compensation committee, composed of ‘independent’ directors, takes advice from various sources. Inside the firm information is supplied by employees from the HR department, which because they are employees might give advice partial to the incumbent CEO. Outside the firm, the committee takes advice from compensation consultants. These consultants, too, have incentives which might compromise the impartiality of their advice. For example, consultants who recommend low CEO compensation might not have their contract with their client renewed. Moreover, consultants might also have other lucrative other business with the client firm that might be put at risk if they recommend a low level of compensation for the CEO (Bebchuk and Fried, 2006; Conyon *et al.*, 2009).⁷

Not all economic models give rise to a negative correlation between boards and executive compensation. Adams *et al.* (2010) discuss a model where the opposite happens – more independent boards are positively correlated with CEO pay. The endogenous selection of independent boards leads to a greater propensity to monitor. More board monitoring imposes more risk and incentives on the CEO leading to higher effort. This results in higher levels of executive pay to compensate the CEO for this higher effort level. In addition, more board monitoring suggests that ‘low quality’ type CEOs are more likely to be discovered implying shorter average tenure as more CEOs are replaced. Again, higher executive compensation is required but this time to compensate for less job security.

In general, then, managerial power type models predict that boards or compensation committees that contain affiliated directors will result in higher levels of executive compensation and, in general, poorly structured compensation contracts as viewed from the perspective of shareholders (Bebchuk and Fried, 2006). For instance, the correlation between executive compensation and firm performance (the so-called ‘pay-for-performance’ link) is expected to be weaker in firms with compensation committees or boards containing affiliated (non-independent) directors. Also, the fraction of total pay delivered in the form of equity compensation such as restricted stock or options is expected to be lower (Conyon and Peck, 1998; Conyon *et al.*, 2009). However, research on endogenous board determination shows that the correlation between independent boards and executive pay does not have to be negative and, indeed, may be positive (Hermalin and Weisbach, 1998; Adams *et al.*, 2010).

⁷ Conyon *et al.* (2009) find that both CEO pay and the equity pay mix are higher in firms that use compensation consultants. They find little evidence that firms using consultants who have potential conflicts of interest, such as supplying other business to client firms, leads to higher CEO pay or the adverse design of pay contracts.

1.2. *Prior Studies*

There is a large prior literature investigating the determinants of executive compensation. See the comprehensive reviews by Murphy (1999, 2012). Several core hypotheses have been tested including the link between executive pay and firm performance, the connection between CEO pay and firm size as well as the role of CEO effort and performance. Indeed, Bertrand and Schoar (2003) showed that manager fixed effects and style matter for a range of corporate decisions. In addition, they found that managers with higher performance fixed effects receive higher compensation and are more likely to be located at firms with better corporate governance.

Research shows that executive compensation and firm size are positively correlated (Murphy, 2012). The estimated elasticity might be in the range 25% to 45%, indicating that firm size is an important economic predictor of executive pay. Gabaix and Landier (2008) developed an equilibrium model where CEOs with different talents are matched to firms in a competitive assignment model. They showed that the sixfold increase in US CEO pay between 1980 and 2003 can be fully explained by the change in firm size, namely the parallel sixfold increase in market capitalisation of large companies over the same time frame. Bloom and Van Reenen (2007) attested to the importance of firm size in CEO pay equations. They found that CEO pay is positively correlated with their measure of managerial talent but this clear link disappears once firm size is controlled for.

Various studies have, in addition, evaluated the effectiveness of boards and compensation committees as a restraint on excess executive pay. Early research by Main and Johnston (1993) analysed 220 British companies in 1990 finding only 30% even had a compensation committee. Fewer than half of these were independent, made up exclusively of outside directors. Main and Johnston (1993) found that CEO compensation was 21% higher in firms with compensation committees and concluded that such committees were, in general, ineffective at restraining excess CEO pay and aligning shareholders and managerial interests.

Conyon (1997) investigated the correlation between executive compensation and the presence of a remuneration committee for a set of 213 UK firms between 1988 and 1993. The study found that the growth in executive compensation was lower when firms introduced a compensation committee. However, there was no evidence that the pay-for-performance link was stronger in firms that adopted such institutions. Conyon and Peck (1998) investigated a panel of the 100 largest UK firms from 1991 to 1994. They found that CEO pay was higher in firms with compensation committees or those with a greater fraction of outsiders on the committee. In addition, the study found that the pay-for-performance link was stronger, the higher the proportion of outside directors on the compensation committee. This was in line with expectations that compensation committees align the incentive component of CEO pay with shareholder interests. Recently, Gregory-Smith (2012) evaluated the connection between CEO pay and independent compensation (remuneration) committees using UK data on constituents of the FTSE350 from 1996 to 2008. Compared with other UK studies, the author was able to construct nuanced measures of compensation committee independence using

data from a proxy voting agency. The study found no statistical correlation between CEO compensation and affiliated (i.e. non-independent) directors. This was interpreted as ‘challenging the theory of managerial power and the received wisdom of institutional guidance’.

Studies have also investigated the link between CEO pay and independent boards, including compensation committees, using US data. Core *et al.* (1999) found evidence that outside directors appointed by the CEO, grey outside directors, interlocked outside directors and busy outside directors are positively correlated with CEO compensation. Daily *et al.* (1998) investigated a random cross-section sample of 200 US companies from the Fortune 500 list in 1992. They focused on the link between affiliated directors (those who maintain a personal or professional relationship with the firm) and the level and structure of executive compensation. The study found no relationship between the level and structure of compensation and the proportion of affiliated directors on the compensation committee – implying that affiliated directors on compensation committees are not associated with higher levels of CEO pay or less pay for performance.

Newman and Mozes (1999) found no evidence that CEO compensation was higher in firms that contained insiders on the compensation committee. However, they found that the link between CEO compensation and firm performance was more favourable towards the CEO – at the expense of stockholders – when the compensation committee contained insiders. Vafeas (2003) documented that the presence of insiders on compensation committees declined in the 1990s. However, there was little evidence that the level and composition of CEO pay was affected by affiliated directors on the compensation committee. Anderson and Bizjak (2003) studied 110 US firms from 1985 to 1998. They, too, found no evidence that compensation committees containing insiders led to excess compensation or fewer incentives for CEOs. Conyon and He (2004) investigated the impact of compensation committees on CEO pay in 455 US initial public offerings from 1998 to 2001. They found no evidence that insiders or CEOs of other firms serving on the compensation committee raised the level of CEO pay or lowered CEO incentives. Sun *et al.* (2009) investigated the relation between firm performance and a composite measure of the quality of compensation committees. They found that committee composition mattered for firm performance. The positive correlation between future firm operating income and the firm’s granting of stock options to its executives was stronger in firms with higher quality compensation committees.

Overall, one can make the following conclusions. First, the evidence on the effect of independent compensation committees on the level executive pay is, at best, mixed with some studies showing higher and others showing lower levels of CEO pay. Second, the impact of independent compensation committees and boards on the pay-for-performance link is also mixed but perhaps errs on the side of showing no discernible effects. Third, most studies assert that independent compensation committees and boards are theoretically important for good corporate governance – even if the empirical data do not always strongly support this claim.⁸

⁸ This study differs from prior ones by using more recent US data spanning the global financial crisis from 2007 to 2012. In addition, UK studies have tended to focus on cash compensation rather than total compensation – typically because of the historical difficulty in assembling the UK pay data. These issues are reviewed in Gregory-Smith (2012).

1.3. *Regulation and Policy*

From a policy perspective, US legislators and regulators have acted to ensure that boards and compensation committees of public companies are independent and free from conflicts of interest. Most recently, this has been encapsulated in the Dodd–Frank Act of 2010.⁹ Dodd–Frank is wide ranging and was introduced following the 2008 financial crisis. The relevant corporate governance sections are contained in Title IX, subtitles E and G of the Act.

Section 952 of Dodd–Frank deals explicitly with boards and compensation committee independence. The Act delegates rule-making powers to the Securities and Exchange Commission (SEC). It mandates the SEC to make rules guaranteeing that publicly traded firms maintain independent compensation committees. In this context, legislators meant ‘independence’ to take into account any financial ties or other affiliations the director has with the firm. Section 952 also requires the compensation committee to assess the independence of compensation consultants and other advisors, taking into account factors such as other services the consultant supplies to the firm, fees received for other services to the firm, business or personal ties between the committee members and the consultant and the stock owned in the firm by the consultant. Clearly, the provisions in the act are motivated by the belief that affiliated directors on compensation committees, or compensation consultants with conflicts of interest, lead to inferior design of executive compensation contracts.

The various national securities exchanges, too, have listing standards with respect to corporate governance, board and compensation committee independence. For example, the New York Stock Exchange listing standards Section 303A deals explicitly with corporate governance standards.¹⁰ Section 303A.01 specifies that boards must have a majority of independent directors and Section 303A.02 addresses the relevant independence tests. Directors are not independent unless the board affirms that the director has no material relationship with the company. A director is deemed not to be independent if various conditions apply:

- (i) the director, or an immediate family member, has been an employee of the company in the last three years;
- (ii) the director has received fees above a threshold during the last three years;
- (iii) the director is a partner or employee of the company’s auditor;
- (iv) there has been an interlocking relationship between the director and the firm via membership of the compensation committee and
- (v) the director has a material financial relationship with the company.

Beyond legal rules and securities listing standards, compensation committee independence is frequently demanded by proxy voting institutions when evaluating executive compensation arrangements. Proxy voting agencies have received increased

⁹ The 1000+ page Dodd–Frank Act (H.R. 4173848) is available at <http://www.sec.gov/about/laws/wallstreetreform-cpa.pdf>.

¹⁰ The NYSE Listing manual is available at <http://nysemanual.nyse.com/lcm/>.

prominence because the Dodd–Frank Act mandated advisory shareholder voting¹¹ on executive compensation arrangements. Shareholder ‘say on pay’ has been a central feature of the US proxy season for two years now. RiskMetrics’ Institutional Shareholder Services (ISS) provides regular policy guidelines on corporate governance, including executive compensation. They state¹² that firms should: ‘Maintain an independent and effective compensation committee: This principle promotes oversight of executive pay programs by directors with appropriate skills, knowledge, experience, and a sound process for compensation decision-making (e.g. including access to independent expertise and advice when needed)’. RiskMetrics evaluates companies on this (and other dimensions) when making voting recommendations on executive compensation to its clients. The central point is that board and committee independence is important to owners, regulators and policy makers alike.

2. Methods

2.1. *Data*

To test the relation between executive compensation and affiliated boards and compensation committees I use data from two sources. The first is Standard & Poors Execucomp data set. This contains information on executive compensation from 1992 to 2012 for the constituent firms of the S&P 500, the S&P Mid-Cap and the S&P Small-Cap firms. The data are available for the CEO and other named executive officers of the company (typically five individuals per firm per year). This is the main compensation data used.

The second data source is the RiskMetrics (ISS) directors data set. For the purposes of this study the data set contains consistent time-series information about board directors from 2007 to 2011. There is one less year available (at the moment) relative to the executive pay data. Importantly, this data set contains information on whether a board director is considered to be affiliated to the company for reasons other than being a board member (i.e. non-independent). Using this information I can identify an affiliated non-independent director. In the statistical analysis below I combine these two data sets and estimate executive compensation equations over the time period 2008–12.¹³

2.2. *Estimating Model*

I test the relation between executive compensation and performance as well as the relation between executive compensation and board governance. I estimate variants of the following panel data regression model:

¹¹ Dodd–Frank (2010) Section 951 requires a non-binding advisory vote to approve executive compensation at least once every three years. This legislative change is consistent with policies currently operated in the UK, other European countries and in Australia.

¹² See RiskMetrics and ISS policy guidelines available at <http://www.issgovernance.com/files/2012USSummaryGuidelines1312012.pdf>.

¹³ In the executive compensation equation estimate below I use lag values of affiliated compensation committees and boards so the model is estimated over 2008–12.

$$y_{ijt} = \alpha_i + \gamma_j + \beta_1 D_{j,t-1} + \beta_2 P_{jt} + \beta_3 x_{jt} + \theta_t + \epsilon_{ijt}, \quad (1)$$

where y_{ijt} is the logarithm of executive compensation of person ' i ' in firm ' j ' at time ' t '. Executive compensation is compensation received in the current fiscal year and includes the expected value of option and equity grants (as defined later in this article). The term α_i is person-specific effects and the term γ_j firm fixed effects. In the absence of executive transitions into and out of the firm, model identification requires choosing either person effects or firm effects, but not both (Graham *et al.*, 2012). In Section 3, I present two sets of results. I show the results that contain the firm fixed effects and separately those that contain the person-specific fixed effects.¹⁴ The fixed effects control for unobserved time-invariant heterogeneity in the determinants of executive compensation (either individual or firm).¹⁵ The term θ_t is time dummies controlling for idiosyncratic economy-wide shocks to executive compensation.

The variable y_{ijt} is the logarithm of executive compensation of person ' i ' in firm ' j ' at time ' t '. The following compensation measures are used. First, total compensation is calculated as the sum of the annual salary, bonus, other annual pay, the value of restricted stock granted, the Black and Scholes (1973) value of stock options granted, long-term incentive payouts and all other compensation.¹⁶ Second, total realised compensation is defined as the sum of salary, bonus, other annual compensation, restricted stock grants, long-term incentive payouts, all other compensation and the value of options exercised.¹⁷ The difference between the two measures is that the former measures the expected value of option granted to the executive and the latter measures the realised value from exercising those stock options. Both are useful in understanding executive pay outcomes. The third measure is total cash compensation, the sum of salary and annual cash bonus.

The first measure of executive compensation includes the expected value of making an option grant to the employee. This is the opportunity cost forgone by the firm of not selling the option in the market.¹⁸ A reasonable approximation of this value is the Black and Scholes (1973) option price. The value of a European call option paying dividends is as follows: $c = Se^{-qt}N(d_1) - Xe^{-rt}N(d_2)$, where c is the option call value, $d_1 = \ln(S/X) + (r - q + \sigma^2 t)/2\sqrt{t}$ and $d_2 = d_1 - \sigma\sqrt{t}$, where S is the stock price; X the exercise price; t the maturity term; r the risk-free interest rate; q the dividend yield; σ is the volatility of returns and $N(\cdot)$ the cumulative probability distribution function for a standardised normal variable.

There has been an debate as to whether Black–Scholes is the appropriate way to measure the value of an option granted to an executive (Lambert *et al.*, 1991; Hall

¹⁴ Even though there are executive transitions in the data, this requires inverting a large matrix when including both person and firm fixed effects. The estimation of firm and person fixed effects in executive compensation models is discussed in Graham *et al.* (2012).

¹⁵ The fixed effects help ameliorate – but not completely eliminate – problems associated with omitted variable bias to the extent that such variables are relatively constant over the short period. These can include items such as unobserved executive or firm quality.

¹⁶ This is ExecuComp item TDC1.

¹⁷ This is ExecuComp item TDC2.

¹⁸ As such it represents the value the firm assigns to executive talent.

and Murphy, 2000, 2002; Henderson *et al.*, 2013). The Black–Scholes method provides a current estimate of the expected future value of the option assuming that the underlying assumptions of the model are valid. However, in practice the assumptions might not hold. First, executives are typically risk averse, undiversified and prevented from trading their stock options or, indeed, hedging their risk by short-selling activities. In consequence, they will place a lower value on the stock option compared with the Black–Scholes cost to the company¹⁹ (Hall and Murphy, 2002). Second, options granted to executives are like American call options in that they can be exercised any time between the vesting and maturity date, rather than at the maturity date as in the European call option. Each scenario creates a potential wedge between the executives personal valuation and the Black–Scholes value. Despite these limitations, most US firms reporting to the SEC use the Black–Scholes method to assign a fair value to grants of options to their executives (Equilar Inc, 2012) and it is a common valuation approach in the executive compensation literature.²⁰

The term $D_{j,t-1}$ represents two separate (inverse) measures of board independence:

- (i) the percentage of non-independent directors on the board and
- (ii) the presence of a non-independent compensation committee.²¹

The measure is lagged by one period to attenuate endogeneity concerns partially. The firm-level variable is calculated from the individual-level data. In the RiskMetrics data set, directors are assigned to one of the three types of board affiliations: insiders/employees (E), affiliated outsiders/linked (L) or independent outsiders (I). An insider (E) is an employee of the company or one of its affiliates or among the top five highest officer of the firm. A director is assigned an affiliated or linked director status, where the firm attests that the director is not independent; is a former CEO of the firm; is a non-CEO executive director; is a family member or has a transactional, professional, financial and/or charitable relationship with the firm or there is some other material relationship such as being party to a voting agreement. An independent director (I) has no material connection to the company other than board membership. In this study I define an affiliated compensation committee member as a director who has been assigned affiliated status in the afore sense. At the firm level, an affiliated (i.e. non-independent) compensation committee contains at least one non-independent/affiliated director. Again, measured at the firm level, an affiliated board is one that contains at least one affiliated director.

¹⁹ The higher Black–Scholes value compared with the lower valuation assigned by the executive is a wedge that might be thought of as a premium. The firm must pay the executive this premium to accept the risky option *versus* alternative riskless cash compensation. Firms will want to make sure that the resulting increase in executive and firm performance from using options covers the premium. In this sense, stock options are an expensive way to reward executives compared with simply providing them with cash.

²⁰ The important point is that employee valuations of stock options can differ from the Black–Scholes method for a host of reasons. Indeed, empirical research has shown that employees can value stock options both above as well as below the Black–Scholes expected value (Lambert and Larcker, 2001).

²¹ The terms ‘non-independent’ and ‘affiliated’ are used interchangeably.

The model also includes two firm performance terms, P_{jt} . The first is a market-based measure, included to measure the degree of alignment between owner and management interests (Murphy, 1999). This is the three-year total shareholder returns to investors including re-invested dividends. The second is an accounting-based measure. This is return on assets (ROA). The expectation is that $\beta_2 > 0$, implying greater alignment between owners and managers. It is one measure of the pay-for-performance link (Core *et al.*, 1999).

I also include a set of additional variables in the regression models that have found to be important in prior empirical research (the x_{jt} term in (1)). I include the log of firm sales revenues because larger firms require more talented individuals to run complex organisations (Murphy, 1999). Sales revenues are a proxy for the demand for executive talent. Previous research has consistently demonstrated the importance of size in CEO pay regressions (the executive compensation to firm size elasticity has been estimated to be approximately 25–45%). The equation also includes a CEO indicator variable. Prior theory (e.g. tournament models), as well as empirical research, shows that the CEO receives more compensation than other board executives. I also include an indicator variable for gender (= 1 if the executive is a woman). Theory (e.g. discrimination and glass-ceiling effects) and empirical evidence show that women frequently earn less than men. If this discount exists in the data I can quantify it via this variable. I also include executive age (measured in years) in the model as an approximation to the executive's skills, human capital and board experience. From the corporate governance side, I also include board size. Larger boards might be easier for powerful CEOs to control (because of free-riding effects in monitoring or through 'divide-and-rule' strategies). Generally, smaller boards are thought to be better correlated with corporate governance quality (Core *et al.*, 1999).

3. Results

3.1. *Trends in Executive Compensation*

Table 1 shows the level and structure of executive compensation in 2012. The upper half of the Table shows data for CEOs and the lower half of the Table for non-CEO executives. The data are also split by individuals who are members of the Standard & Poor's 500 (S&P 500) index and the non-S&P 500. Consider the level of total executive compensation, where total compensation includes salaries, bonuses, the grant date value of stock option grants, the value of restricted stock grants and other payments. First, average compensation is always higher than median executive compensation. This is because there are a sufficiently few high-paid CEOs who pull the average up. Second, executive compensation increases with firm size. CEOs and other executives of S&P 500 companies are paid more than CEOs and executives of non-S&P 500 firms. Median CEO compensation of an S&P 500 firm is approximately \$9 million which is approximately three times the median compensation of a non-S&P 500 CEO which is about \$3 million.

Table 1 also illustrates that the structure of executive compensation also differs by CEO and non-CEOs, as well as S&P 500 firms compared with non-S&P 500 firms.

Table 1
US Executive Compensation in 2012

Index	Average pay \$000s	Median pay \$000s	Salary %	Bonus %	Option %	Stock %	Other %
<i>CEOs</i>							
S&P 500	10,563.1	9,186.1	14.0	23.3	17.9	40.5	4.3
Non-S&P 500	3,830.1	3,215.4	27.8	23.3	11.8	32.2	4.8
Total	6,106.9	4,574.6	23.1	23.3	13.9	35.0	4.7
<i>Non-CEOs</i>							
S&P 500	4,180.4	2,957.4	20.5	23.3	14.6	35.6	6.1
Non-S&P 500	1,414.6	1,135.6	35.7	21.2	9.9	27.1	6.0
Total	2,387.7	1,560.1	30.3	22.0	11.6	30.1	6.0

Notes. Data are from Execucomp (2012). Total executive compensation (Execucomp TDC1) is the sum of salaries, bonus, grant date value of stock options and restricted stock and other pay, measured in \$000s; 'Salary %' is the base salary as a percentage of total executive compensation. 'Bonus %' is the value of the annual bonus and non-equity incentive compensation as a percentage of total executive compensation; 'Option %' is the Black and Scholes (1973) grant date value of stock options as a percentage of total compensation; 'Stock %' is the fair market value of restricted stock as a percentage of total executive pay; 'Other %' is the value of other pay and deferred compensation as a percentage of total executive compensation. CEOs are indicated as the current CEO of the company (Execucomp item CEOANN); non-CEOs are the (typically) four non-CEO executives per company who report executive compensation under SEC disclosure rules. Non-S&P 500 firms are Small-Cap and Mid-Cap firms in Execucomp.

Consider first the CEOs. Salary as a percentage of total compensation is approximately 14% for S&P 500 firms and 28% for non-S&P 500 firms. Implicitly,

- (i) the majority of CEO compensation is made up of performance-related pay in the form of an annual bonus, stock options and restricted stock and
- (ii) guaranteed compensation in the form of salary as a percentage of total pay is higher in smaller firms compared to S&P 500 firms.

The data show that annual incentives account for approximately 1/4 of total CEO compensation. This ratio is approximately constant across firms. The majority share of CEO compensation comes in the form of stock options and restricted stock. For CEOs of S&P 500 companies, stock options and restricted stock account for over 50% of total pay. For non-S&P 500 CEOs it is less than half (approximately 45% combined). Equity as a percentage of total pay is, therefore, higher in larger S&P 500 firms compared with smaller non-S&P 500 firms. Non-CEO executives also receive a high fraction of their compensation in the form of stock options and restricted stock. However, compared with CEOs they receive a lesser amount. Finally, the data show that restricted stock as a vehicle for equity compensation has become more important than stock options. During the 1990s stock options became a significant part of the CEO compensation pay package, as well as the most controversial. In 2012, stock options are less important relative to restricted stock for CEOs and non-CEOs alike in the S&P 500 firms as well as non-S&P 500 firms.

The time-series pattern shows that US executive pay has increased significantly from 1992 to 2012. Prior research shows that periods prior to this CEO pay growth was far less (Frydman and Saks, 2010; Murphy, 2012). Figure 1 plots total compensation for the CEOs at S&P 500, S&P Mid-Cap and S&P Small-Cap firms combined. Average CEO

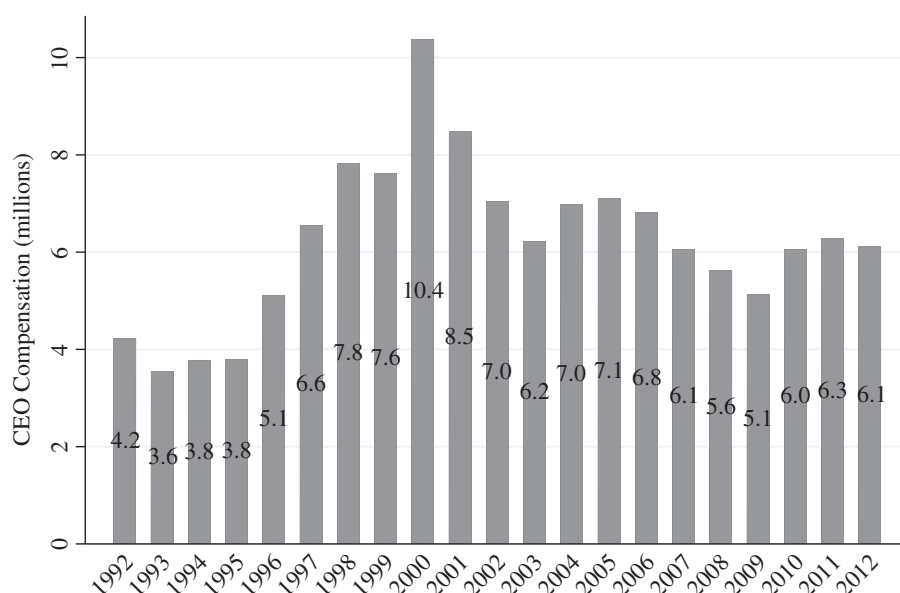


Fig. 1. *CEO Compensation in US Public Firms*

Notes. CEO Compensation is the sum of salary, bonus, the expected value of stock option grants using the Black and Scholes (1973) pricing method and the fair market value of restricted stock and other payments. I used the S&P Execucomp variable TDC1. It is expressed in constant 2012 US dollars deflating by the CPI. Calculations are for the CEOs of the S&P 500, Mid-Cap and Small-Cap firms CEOs of S&P firms in the Execucomp data base. *Source.* Execucomp data.

compensation was about \$4.2 million in 1992 and this rose steeply to about \$10.4 million in 2000. From year 2000 onwards average CEO compensation fell before picking up again in the mid-2000s. However, with the onset of the Great Recession average CEO compensation fell again in 2008 and 2009. However, since then CEO pay has been increasing again. In 2012, average CEO pay stood at approximately \$6 million. This pattern of executive compensation since the early 1990s accords with other studies (Murphy, 2012).²² Because CEO pay is increasing in firm size, average compensation of CEOs at large S&P 500 firms is higher than that in Figure 1. In addition, because executive compensation data are positively skewed, the time series of median CEO compensation is lower than that in Figure 1.²³

From 1992 to 2012 CEO compensation has shifted away from fixed types of compensation to variable (uncertain) compensation such as stock options and restricted stock. Figure 2 plots equity pay as a percentage of total compensation for the CEOs at S&P 500, S&P Mid-Cap and S&P Small-Cap firms. In 1992, stock options and

²² A similar time-series pattern for non-CEO executives was also found. Average non-CEO executive compensation was \$1.5 million in 1992 which increased to \$3.6 million in 2000. From year 2000 onwards average non-CEO executive compensation fell before rising again in the mid-2000s. Like CEOs, non-CEO executive pay fell during the years 2007–9. After that compensation began to increase once again. In 2011, average non-CEO executive compensation was approximately \$2.3 million.

²³ See Table 1.

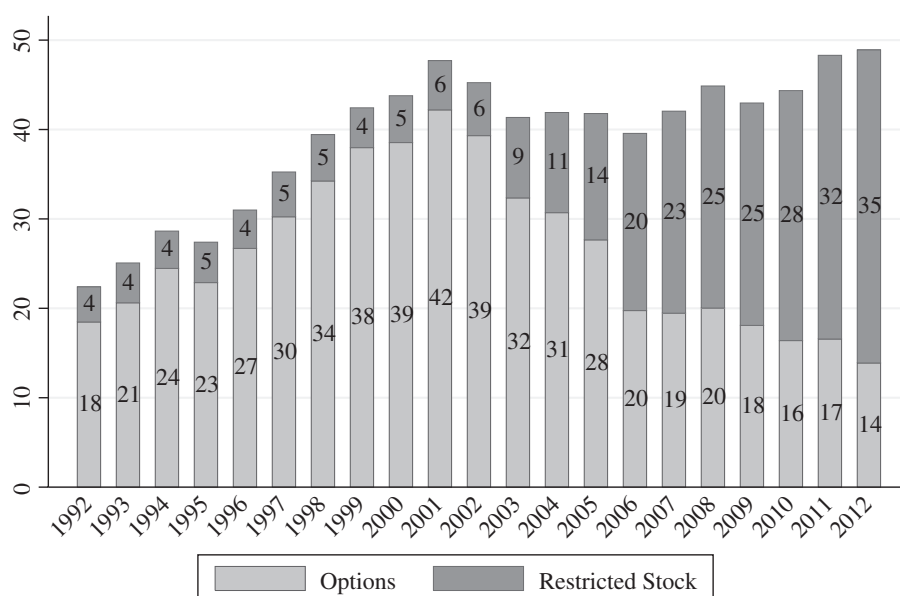


Fig. 2. *Options and Restricted Stock as Percentage of Total CEO Compensation*

Notes. Total Pay is the sum of salary, bonus, the expected value of stock option grants using the Black and Scholes (1973) pricing method, the fair market value of restricted stock and other payments. I used the S&P Execucomp variable TDC1. Options are the value of option awards in a given year. Restricted stock is the value of restricted stock. Calculations are for the CEOs of the S&P 500, Mid-Cap and Small-Cap firms CEOs of S&P firms in the Execucomp data base. The percentage of options and restricted stock pay for each is calculated and the average across all CEOs reported.

Source. Execucomp data.

restricted stock accounted for approximately 22% of CEO pay. This increased significantly during the 1990s and by 2001 options and restricted stock together accounted for approximately half of CEO compensation. This quantity fell slightly in the early 2000s. However, in 2012, grants of stock options and restricted stock still accounted for almost half of total CEO pay. Therefore, although there has been a marked increase in US executive compensation, this has been accompanied by a greater alignment between shareholders and managers in the form of more ‘pay-for-performance’.²⁴ A number of prior studies have remarked on the high level of compensation in the US compared with other countries (Canyon and Murphy, 2000; Canyon *et al.*, 2011; Murphy, 2012).

Another nuance is the marked shift from stock options to restricted stock from around 2004 onwards (Hayes *et al.*, 2012; Murphy, 2012).²⁵ In 1992, stock options

²⁴ I show the change in executive compensation from 1992 onwards for completeness. In the regression models, I can only use data from 2008 to 2012 because of the availability and consistency of the required corporate governance data.

²⁵ FAS 123 required firms to provide a fair market value estimate of the grants of options. This had the effect of making grants of stock options and restricted stock equally attractive from an accounting perspective (Hayes *et al.*, 2012; Murphy, 2012)

accounted for about 18% of total pay and restricted stock about 4%. By 2001 stock options accounted for 42% of total pay and restricted stock 6%. Indeed, before 2002 restricted stock never accounted for more than 10% of total pay of the typical CEO. From 2004 the importance of restricted stock, measured by the percentage of total pay, increased. In 2012, restricted stock accounts for approximately 35% of total pay and stock options of 14%. The substitution of restricted stock for stock options does not imply lower equity pay. The height of the bars illustrates that combined, both options and restricted stock form the largest share of executive compensation aligning the owner and manager interests.²⁶

3.2. Descriptive Statistics

Table 2 shows the classification of directors at publicly traded US firms from 2007 to 2011.²⁷ There is a high degree of independence on boards and compensation committees, as measured in the RiskMetrics data. Of the 68,465 director observations, there are 10,679 executive directors (about 15% of the total). The data show that 78% of the board members are considered to be 'independent'. Approximately 5% of the board are affiliated or non-independent. The degree of director independence is even higher on compensation committees. Approximately 98% of the directors on compensation committees are independent. Boards and committees have become more independent over time. In non-tabulated results, the data show that in 2007 approximately 77% of board members were independent and 6.4% were non-independent. In 2011, the fraction of independent board members had increased to 79.5% and the number of non-independent directors declined 5.3%.²⁸ At first sight, then, there would not seem to be a problem with the independence of boards or compensation committees at US firms. The results are in agreement with other studies showing that board independence has increased over time. However, do those firms

Table 2
Boards and Compensation Committees

	Board of directors		Compensation committee	
	Number	%	Number	%
Executive	10,679	15.6	46	0.17
Independent	53,628	78.33	27,023	98.5
Affiliated	4,158	6.07	365	1.33
Total	68,465	100	27,434	100

Source. RiskMetrics. Data are from 2007 to 2011 and are individual director-level data. 'Executive' are executive directors, 'Independent' are independent directors who have no material relationship with the firm and 'Affiliated' are non-independent directors who have some material link to the firm (such as a former employee, family member or financial relationship).

²⁶ See also the results by CEO, non-CEO and industry contained in Table 1.

²⁷ Data for 2012 was not available at the time of writing.

²⁸ A similar pattern was observed for members of the compensation committee.

Table 3
Descriptive Statistics

Variable	Mean	Median	SD
Total expected compensation	2,970.81	1,701.53	4,734.68
Total realised compensation	3,397.80	1,674.40	6,640.60
Salary and bonus	1,241.70	820.12	1,522.89
Log (expected compensation)	7.48	7.44	1.04
Log (realised compensation)	7.49	7.42	1.11
Log (salary and bonus)	6.75	6.71	0.95
Log sales	7.69	7.55	1.52
Shareholder returns	3.92	3.16	20.41
Return on assets	4.21	4.28	9.69
CEO	0.21	0.00	0.41
Female director	0.08	0.00	0.27
Age	53.33	53.00	7.21
Board size ($t - 1$)	9.54	9.00	2.43
Affiliated board percent ($t - 1$)	0.22	0.20	0.11
Affiliated compensation committee ($t - 1$)	0.05	0.00	0.22

Notes. Data are from Execucomp (2008–12) and RiskMetrics (2007–11). Total executive compensation (Execucomp TDC1) is the sum of salaries, bonus, grant date value of stock options and restricted stock and other pay; total realised compensation (Execucomp TDC2) is sum of salaries, bonus, other pay and realised value from the sale of stock options and restricted stock. Percentage equity is the sum of the grants date value of stock options and restricted stock divided by total expected compensation; sales are firm revenues, stockholder returns are three-year returns to stockholders (Execucomp TRS3YR); return on assets (Execucomp ROA); CEO is an indicator variable for the CEO (Execucomp = CEOANN); female director = 1 if woman director (Execucomp gender); age is the age of the executive in year (Execucomp); board governance variables are lagged one period ($t - 1$). Board size is the sum of board members by company and year (RiskMetrics director data set); percent affiliated board is the percentage of the board-made fraction of the board made up of non-independent board members (RiskMetrics); compensation committee affiliated is an indicator = 1 if there is at least 1 affiliated director on the compensation committee, by firm and year (Source: RiskMetrics). Number of observations is 28,259.

that have affiliated (i.e. non-independent) compensation committees or boards have different patterns of executive compensation?

Table 3 shows that total expected (or *ex ante*) compensation is approximately \$2.97 million. The median value is significantly lower at \$1.7 million. Average total realised (or *ex post*) compensation, which includes the value of stock options on exercise, is slightly higher than average total expected compensation. Again, the median of this quantity is similar to the median of total expected compensation. The data show that the average three-year stock returns is approximately 3.9%. The average ROA is about 4.2%. Approximately 21% of the executives in the data set are CEOs. Only 6% of the executives are females. The average age of an executive in the data is 53 years. Board size is approximately 9.5 members. The percentage of affiliated directors on the board (namely non-independent directors) is approximately 22%. The data show that only approximately 5% of the observations are from affiliated compensation committees.

3.3. *Econometric Results*

Table 4 contains the econometric results. Table 4 presents models that include both firm fixed effects and executive fixed effects in the panel data regressions. Recall that

the unit of observation in all the models is the individual executive director in the Compustat data set. Namely, there are approximately five directors per year per firm. The baseline ordinary least squares models are contained in column 1 (total expected compensation) and column 2 (realised compensation). The primary findings are that after controlling for individual-level and firm-level variables there is a negative correlation between total executive pay and the presence of an affiliated compensation committee (column 1) but not the realised pay measure (columns 2). In contrast to expectations, therefore, executive pay is not positively related to non-independent compensation committees but, instead, is negatively so. It is also found that the percentage of affiliated directors on the board of directors is also negatively correlated with executive compensation – again contrary to expectations.

Columns 3–5 give estimates from executive compensation that control for firm-level fixed effects (i.e. controlling for unobserved firm heterogeneity such as firm reputation etc.). Controlling for firm fixed effects, along with the other individual and firm-level variables, gives rise to an insignificant correlation between executive compensation and the presence of an affiliated compensation committee. It is similarly found that the percentage of affiliated directors on the board, after controlling for firm-level and individual variables, is still negatively correlated with total executive compensation. In column 4, an alternative total compensation measure is used. This variable contains the realised gains from the sale of options instead of the grant date expected value of options. The same qualitative result is observed between pay and affiliated boards and compensation committees. There is no correlation between executive compensation and the presence of an affiliated compensation committee but also no correlation with the presence of affiliated directors on the board, in the firm fixed-effects model. Similarly, there is no correlation between a narrower measure of compensation, namely cash compensation, measured as salary plus bonus, and the presence of an affiliated compensation committee. Investigation of the relation between executive cash compensation and board structure is presented in column 5. Again, there is no statistical correlation between cash compensation and affiliated compensation committees but a negative one between cash pay and the presence of affiliated board members.

Table 4 columns 6–8 re-estimates each of the models but now includes individual executive fixed effects rather than company level fixed effects. The results are qualitatively similar to those in columns 3–5. There is little evidence that affiliated compensation is connected to executive compensation. However, there is partial evidence that executive pay is negatively related to the presence of an affiliated director on the board. Again, this runs contrary to expectations. Overall, it appears that controlling for either unobserved firm or individual effects is important and different from controlling for firm-level fixed effects. The latter controls for unobserved and permanent company quality differences. Individual fixed effects, on the other hand, control for unobserved heterogeneity across individuals. This would include individual skills and abilities that are not observed and influence executive compensation outcomes.

Table 4 documents other important determinants of executive pay. In general, it is found that the elasticity of executive pay to firm sales is approximately 35%. This is consistent with other studies. It is also found that there is a positive correlation

Table 4
Executive Compensation Regressions

	(1) OLS log total pay	(2) OLS log realised pay	(3) Firm FE log total pay	(4) Firm FE log realised pay	(5) Firm FE log cash pay	(6) Exec. FE log total pay	(7) Exec. FE log realised pay	(8) Exec. FE log cash pay
Log sales	0.349** (0.005)	0.347** (0.005)	0.278** (0.041)	0.365** (0.048)	0.184** (0.050)	0.250** (0.026)	0.377** (0.030)	0.229** (0.027)
Shareholder returns	0.004** (0.000)	0.009** (0.000)	0.003** (0.000)	0.007** (0.000)	0.003** (0.000)	0.003** (0.000)	0.006** (0.000)	0.003** (0.000)
Return on assets	-0.000 (0.001)	0.001* (0.001)	0.001 (0.001)	0.001 (0.001)	0.005** (0.001)	0.001* (0.001)	0.002** (0.001)	0.006** (0.001)
CEO	0.960** (0.014)	0.955** (0.016)	0.946** (0.020)	0.936** (0.021)	0.767** (0.023)	0.429** (0.040)	0.287** (0.041)	0.444** (0.053)
Female director	-0.096** (0.014)	-0.100** (0.015)	-0.095** (0.020)	-0.093** (0.022)	-0.056* (0.023)			
Age	0.028** (0.010)	0.029** (0.010)	0.028 (0.019)	0.034 (0.019)	0.020 (0.016)	0.098* (0.041)	0.160** (0.045)	0.045 (0.029)
Age squared	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001** (0.000)	-0.001** (0.000)	-0.000 (0.000)
Board size ($t - 1$)	0.013** (0.002)	0.007** (0.002)	-0.004 (0.005)	-0.007 (0.007)	-0.005 (0.006)	-0.007* (0.004)	-0.006 (0.005)	-0.006 (0.004)
Affiliated board percent ($t - 1$)	-0.266** (0.044)	-0.131** (0.048)	-0.231* (0.095)	-0.198 (0.120)	-0.191* (0.097)	-0.184* (0.076)	-0.180 (0.094)	-0.047 (0.078)
Affiliated compensation committee ($t - 1$)	-0.041* (0.019)	-0.035 (0.021)	0.006 (0.029)	0.031 (0.038)	0.003 (0.030)	0.002 (0.019)	0.041 (0.024)	-0.016 (0.021)
Observations	28,259	28,259	28,259	28,259	28,259	28,259	28,259	28,259
R ²	0.446	0.416	0.321	0.299	0.228	0.130	0.184	0.098
Number of executives			1,409	1,409		9,506	9,506	9,506
Number of firms					1,409			

Notes. Data are from Execucomp (2008–12) and RiskMetrics (2007–11). Executive compensation is total expected compensation (Execucomp TDC1) and it is the sum of salaries, bonus, grant date value of stock options and restricted stock and other pay; total realised compensation (Execucomp TDC2) is sum of salaries, bonus, other pay and realised value from the sale of stock options and restricted stock. Executive pay variables are in natural logs. Sales are firm revenues, shareholder returns are three-year returns to stockholders (Execucomp TRS3YR); return on assets (Execucomp ROA); CEO is an indicator variable for the CEO (Execucomp = CEOANN); female director = 1 if woman director (Execucomp gender); age is the age of the executive in year (Execucomp); board size is the sum of board members by company and year (RiskMetrics director data set); percent affiliated board is the percentage of the board-made fraction of the board made up of non-independent board members (RiskMetrics); compensation committee affiliated is an indicator = 1 if there is at least one affiliated director on the compensation committee, by firm and year (Source: RiskMetrics). Firm fixed are by ticker; executive fixed effects are by executive-company combination. All regressions contain separate year dummies. Significance levels ***p < 0.01 and *p < 0.05, robust standard errors in parentheses (White, 1980). Regression constants not reported in the Table.

between executive pay and stockholder returns. In each of the compensation regressions it is positive and significant. For example, in column 2 there is a positive correlation between total expected executive compensation and shareholder returns, after controlling for other firm-level variables, individual characteristics and firm fixed effects.

It is also found that CEOs command a pay premium compared with non-CEOs. For example, in column 2 (measuring total executive compensation) it is approximately 160%.²⁹ The correlation, in all models, is highly significant. The CEO pay premium might reflect a combination of different person skills, differences in job function and a premium-associated tournaments in organisations.

Female executives, in general, receive significantly less compensation than their male counterparts. In terms of total compensation, the models predict that female total executive compensation is approximately 6% lower than male executives after controlling for firm performance, firm size, job position, board structure and firm-level fixed effects. In column 3 the effect is marginally significant for realised total compensation. The results in column 4 show that there is no statistical difference between male and female cash executive compensation controlling for firm and individual-level affects. Men and women executives receive approximately the same level of base salary and bonus. In terms of the structure of executive pay, it is found that women receive significantly fewer stock options and restricted stock compared with their male counterparts – again after controlling for other firm-level variables and firm fixed effects.³⁰

3.4. *Executive Compensation After Dodd–Frank*

The Dodd–Frank Act (2010) has a potentially profound effect on executive compensation arrangements in US publicly traded firms. One of the goals of legislators was to improve corporate governance arrangements at public firms in the wake of the 2008 financial crisis. Among its many provisions Dodd–Frank required compensation committees to be independent, it required that shareholders vote on CEO pay and it required boards of directors and compensation committees to disclose more information about compensation consultants and other pay advisors.

In terms of the results so far presented, causality cannot be inferred and so only statistical correlations have been established. Although these are important, it is also interesting to know what has happened to executive pay after the legislative changes brought about during Dodd–Frank. The full impact of the Act is yet to be seen and so our observations here are only preliminary. It is somewhat difficult to carry out a

²⁹ Calculated as $100 \times e(0.95) - 1$.

³⁰ In non-tabulated results I also included an interaction term between unaffiliated compensation committee and the two performance terms (Returns \times Comp. Comm and ROA \times Comp. Comm) as well as the interaction between an affiliated corporate board and the two interaction terms (Returns \times Aff. Board and ROA \times Aff. Board). The interaction terms define the pay-for-performance association in firms with affiliated boards or affiliated compensation committees. I found only weak evidence that the correlation between pay and performance was different in companies with affiliated boards compared with non-affiliated boards. This is consistent with prior research (Conyon and Peck, 1998; Gregory-Smith, 2012).

natural experiment as so many firms were in compliance, and the compliance decision too is endogenous. However, as an initial step I investigate changes in executive pay before and after Dodd–Frank as a shock where some firms have complied with aspects of the Act and others have not.³¹

I simply investigated the correlation between the growth in executive pay (i.e. the change in log pay = $\Delta y_{it} = y_{it} - y_{i,t-1}$) and a dummy variable, d , indicating whether or not the company had an affiliated compensation committee any time during the pre-Dodd–Frank. Compensation committees are the primary institution for setting executive pay. Table 5 presents the first-difference executive pay models and includes the level of affiliated compensation committee as an inverse proxy variable for good corporate governance. Columns 1 and 3 introduce a dummy variable equal to 1 for the years 2010 onwards (post-Dodd–Frank) and exclude the time dummies. These are replaced in columns 2 and 4 by the time-specific macro-effects. The empirical evidence shows that the growth in executive compensation increases in the post-Dodd–Frank era compared with earlier periods. This is perhaps not surprising as executive pay fell during the onset of the great recession – subsequently it increased. The data also show that the growth in executive compensation is unaffected by the level of affiliated compensation committee. Firms that never had an affiliated compensation committee in the sample period seem to experience no different growth rates in executive pay compared with other types of firms. Again, this might be attributable to the prevalence of many independent compensation committees during the sample. The results also show that the growth in executive compensation is positively and significantly related to the growth in firm sales, shareholder returns as well as ROA, illustrating that executive pay is linked to measures of firm performance. The results confirm those in Table 4.

3.5. *Compensation Consultants*

Executive compensation consultants provide advice to the board of directors of client firms about senior management pay. Generally, the consultants are hired by the board of directors but they may also be retained by the management. Compensation consultants advise on all aspects of executive pay issues, including the design of pay, the level of pay, trends in market or sector pay and associated tax and HR issues. Some academics and policy makers are concerned that the use of compensation consultants lead to poorly designed executive compensation contracts because their independence is compromised (Bebchuk and Fried, 2003, 2006; Waxman, 2007). One potential conflict of interest arises from the cross-selling of other services. Consultants might receive fees from providing services other than executive compensation advice (e.g. tax or HR). They, therefore, might be disinclined to recommend ‘low’ CEO pay to preserve such lucrative other business. In addition, compensation consultants might be concerned about repeat business. It has been hypothesised that compensation consultants who provide advice that leads to ‘low’ levels of CEO pay are less likely to be retained in the future by the

³¹ The problem is that firms had largely complied with much of the spirit contained in the legislation, for example, compensation committees were largely independent. However, some analysis is possible.

Table 5
Changes in Executive Compensation Regressions

	(1) Δ log total pay	(2) Δ log total pay	(3) Δ log realised pay	(4) Δ log realised pay
Δ log firm sales	0.298** (0.023)	0.296** (0.024)	0.444** (0.028)	0.467** (0.030)
Δ shareholder returns	0.001** (0.000)	0.002** (0.000)	0.004** (0.000)	0.004** (0.000)
Δ return on assets	0.003** (0.000)	0.002** (0.000)	0.003** (0.000)	0.002** (0.000)
Δ CEO	0.412** (0.035)	0.413** (0.035)	0.274** (0.038)	0.273** (0.038)
Δ executive age	0.144** (0.042)	0.150** (0.042)	0.163** (0.050)	0.171** (0.050)
Δ age squared	-0.001** (0.000)	-0.001** (0.000)	-0.002** (0.000)	-0.002** (0.000)
Ever affiliated compensation committee	0.018 (0.009)	0.018* (0.009)	0.012 (0.012)	0.013 (0.012)
Year 2009		0.002 (0.013)		0.045** (0.017)
Year 2010		0.157** (0.012)		0.280** (0.016)
Year 2011		0.013 (0.013)		0.050** (0.017)
Year 2012		0.046** (0.011)		0.170** (0.014)
Post-Dodd–Frank	0.071** (0.008)		0.149** (0.011)	
Observations	26,966	26,966	26,964	26,964
R ²	0.045	0.052	0.060	0.069

Notes. Data are from Execucomp (2008–12) and RiskMetrics (2007–11). Executive compensation: total expected compensation (Execucomp TDC1) is the sum of salaries, bonus, grant date value of stock options and restricted stock and other pay; total realised compensation (Execucomp TDC2) is sum of salaries, bonus, other pay and realised value from the sale of stock options and restricted stock. Executive pay variables are in natural logs. Sales are firm revenues, shareholder returns are three-year returns to stockholders (Execucomp TRS3YR); return on assets (Execucomp ROA); CEO is an indicator variable for the CEO (Execucomp = CEO-ANN); female director = 1 if woman director (Execucomp gender); executive age is the executive ages in years (Execucomp); significance levels **p < 0.01 and *p < 0.05, robust standard errors in parentheses (White, 1980). For variable, y_{it} then $\Delta y_{it} = y_{it} - y_{i,t-1}$. Ever affiliated comp. comm. is an indicator variable if the firm ever had an affiliated compensation committee (Source: RiskMetrics). Post-Dodd–Frank is a dummy variable equal to 1 for periods ≥ 2010 . Regression constants not reported in the Table.

client firm or perhaps other firms (Bebchuk and Fried, 2003, 2006).³² For these, and similar reasons, the use of compensation consultants was viewed as problematic.

The Dodd–Frank Act (2010) requires public firms – for the first time – to evaluate the independence of the compensation consultant (and other advisors). Firms are required to report this information to shareholders in the proxy statement.

³² Bebchuk and Fried (2003, p. 79) and Bebchuk and Fried (2006, pp. 37–9) argue that pay consultants have strong incentives to please management and not doing so jeopardises the firm–consultant relationship. Because the contracts signed between firms and their consultants are private information empirical evidence for this claim is hard to come by. Current empirical research (discussed later) evaluates the effect of the presence of a consultant on the level and structure of executive pay.

Specifically, independence is evaluated according to any other services that are provided by the consultant, the amount of fees that are paid to the advisor, business or personal relationships, company stock held by the committee adviser and conflicts of interest policies and procedures. In addition, the Act (section 952 paragraph C) gives the compensation committee sole discretion to retain or obtain the advice of a compensation consultant. The compensation committee is directly responsible for the appointment, compensation and oversight of the work of a compensation consultant. In summary, the Dodd–Frank Act significantly upgrades disclosure on executive compensation and compensation advisors. Future research on the efficacy of compensation consultants will undoubtedly take advantages of these new provisions.³³

Table 6 shows the market for compensation advice (consultants) among S&P 500 firms in 2011. The market is dominated by relatively few consulting firms. The five largest firms have a cumulative market share of approximately 50%. The largest 10 firms account for about 80% of the market (see panel (a)). After Dodd–Frank the market has consolidated, for example, the merger of Towers Perrin with Watson Wyatt in 2010 created Towers Watson (a leading supplier of executive pay advice). Overwhelmingly, compensation consultants advise the board of directors. Approximately 90% of consulting engagements are with the board rather than management (see panel (b)). Only a minority of firms do not use pay consultants (approximately 4%). About 13% of firms use two or more consultants (see panel (c)).

Do compensation consultants lead to inefficient executive pay outcomes? Studies have found some, but not overwhelming, evidence that compensation consultants give rise to agency costs. Using US and Canadian data, Murphy and Sandino (2010) found that CEO pay was higher in firms where consultants provided other services. However, Conyon *et al.* (2009) and Cadman *et al.* (2010) found little evidence that CEO pay was higher in firms when the executive compensation consultant also supplied cross-selling services. Murphy and Sandino (2010) also tested (and ultimately rejected) the ‘repeat business’ hypothesis, by investigating whether CEO pay was higher when the consultant worked for management rather than for the board of directors. They found, contrary to expectations, that US CEO pay was actually higher in the cases where the consultant works for the board rather than for management. Overall, compensation consultants are a major institutional mechanism in the determination of CEO pay. However, the available empirical evidence suggests that they are unlikely to be the main drivers of any alleged excess pay in the boardroom.

³³ Section 952 of the Dodd–Frank Act asserts:

- (A) the provision of other services to the issuer by the person that employs the compensation consultant, legal counsel or other adviser;
- (B) the amount of fees received from the issuer by the person that employs the compensation consultant, legal counsel or other adviser, as a percentage of the total revenue of the person that employs the compensation consultant, legal counsel or other adviser;
- (C) the policies and procedures of the person that employs the compensation consultant, legal counsel or other adviser that are designed to prevent conflicts of interest;
- (D) any business or personal relationship of the compensation consultant, legal counsel or other adviser with a member of the compensation committee and
- (E) any stock of the issuer owned by the compensation consultant, legal counsel or other adviser.

Table 6
S&P 500 Executive Compensation Consultants in 2011

	N	%	Cumulative %
<i>(a) Consultant</i>			
Frederic W. Cook & Co.	123	23.03	23.03
Pay governance	57	10.67	33.71
Meridian compensation	47	8.80	42.51
Towers Watson	46	8.61	51.12
Pearl Meyer & Partners	36	6.74	57.87
Mercer	30	5.62	63.48
Semler Brossy Consulting group	24	4.49	67.98
Hewitt associates	23	4.31	72.28
Exequity	21	3.93	76.22
Compensation advisory partners	17	3.18	79.40
31 Other consultants	110	20.60	100.00
Total engagements	534	100.00	
<i>(b) Consulting engagements</i>			
Board	467	87.45	87.45
Management	67	12.55	100.00
Total engagements	534	100	
<i>(c) Consultants per S&P 500 firm</i>			
No Consultants	20	4.14	4.14
1 consultant	398	82.40	86.54
2 consultants	60	12.42	98.96
3 or more consultants	5	1.04	100.00
Total S&P 500 firms	483	100.00	

Notes. Data are from Equilar Inc. Data refer to 483 of the S&P 500 firms in 2011.

3.6. Shareholder Voting on Executive Compensation

The Dodd–Frank Act (2010) also mandated non-binding shareholder voting on executive compensation. This was the first time this provision was introduced in the US. Similar director remuneration report (DRR) regulations were introduced in the UK much earlier in year 2002. Empowering shareholders, by mandating non-binding voting on executive compensation, has been seen as a potentially important mechanism to curb excess pay arrangements. Shareholders who are unhappy with executive pay arrangements can send a signal to management and vote ‘No’. The arrangements are colloquially known as ‘say on pay’.

What has been the effect of ‘say-on-pay’ regulation for US public firms? Using data supplied by Equilar Inc., Table 7 shows that shareholders overwhelmingly endorse executive compensation plans at S&P 500 firms. The data show the percentage of votes in favour of the mandated (but non-binding) executive compensation resolution.³⁴ About 98% of firms in the sample received greater than 50% votes in favour of the pay resolution. Equivalently, less than 2% of firms failed to pass the say-on-pay resolution. Greater than four fifths of companies receive say-on-pay votes greater than, or equal to, 80%. Remarkably, about 40% of firms received ‘yes’ votes greater than 95%. The *prima*

³⁴ Votes in favour of the pay resolution are expressed as a percentage of ‘votes for’ plus ‘votes against’ plus ‘votes abstained’.

Table 7
S&P 500 'Say-on-pay' Results in 2011

Percentage votes for resolution	Frequency	%	Cumulative %
<50	9	1.92	1.92
≥50 to <60	19	4.05	5.97
≥60 to <70	19	4.05	10.02
≥70 to <80	35	7.46	17.48
≥80 to <90	71	15.14	32.62
≥90 to <95	127	27.08	59.70
≥95	189	40.30	100.00
Total	469	100.00	

Notes. Data are from Equilar Inc. Data refer to 469 of the S&P 500 firms in 2011 for which executive compensation voting data were available. Votes in favour of the pay resolution (i.e. the 'Percentage votes for resolution' column) are expressed as a percentage of 'votes for' plus 'votes against' plus 'votes abstained'.

facia evidence is that shareholders (owners) are content with executive compensation arrangements at large publicly traded US firms. This does not mean that 'say on pay' has not changed the dynamics of shareholder and board relations or that pay arrangements cannot be improved upon. Indeed, one consequence of the new 'say-on-pay' regulations is that there may be more dialogue between shareholders, boards and compensation committees perhaps leading to better designed pay packages in advance of any shareholder vote on executive pay.

There is a growing body of research on the effects of 'say on pay' (Yermack, 2010). Cai and Walkling (2011) used an event study to test the effect of Congress's proposal to empower shareholders by introducing a vote on executive pay. They found that when the House passed the say-on-pay Bill (in April of 2007) the market reaction to the news was significantly positive for firms that had high abnormal CEO compensation. This is evidence that the Bill was likely to create value for stockholders in companies with 'excess' CEO pay. Recently, Ertimur *et al.* (2013) found that proxy voting agencies are more likely to recommend votes 'against' CEO pay at firms with poor performance and higher levels of CEO pay. Adverse voting leads firms to engage with shareholders and modify their pay plans but Ertimur *et al.* (2013) found no evidence of a market reaction to such changes. They suggested that the role of proxy voting agencies is to help investors process compensation information.

Because shareholder voting was introduced in the UK earlier, more research has been conducted there so far. Ferri and Maber (2013) examined the effect of 'say-on-pay' regulation in the UK. They found it increased shareholder value because the announcement of the new regulation triggered a positive stock price reaction at firms that were poorly governed (e.g. had in place weak penalties for poor performance). In addition, UK firms responded to negative say-on-pay voting outcomes by removing controversial CEO pay practices (such as large severance contracts). Carter and Zamora (2009) found that UK boards respond to poor voting results by reducing the grants of stock options, compensation but not by changing executive's salaries or altering the link between bonuses and performance. Conyon and Sadler (2010), on the other hand, found that few firms abstain or vote against the mandated DRR resolutions

in the UK. They found that higher levels of CEO pay, and the use of stock option pay, attracted more voting dissent. However, there was little evidence that average CEO pay subsequently fell following adverse voting or that there were large changes in CEO pay structure. Overall, the broad findings illustrate that owners (shareholders) welcome the opportunity for more involvement in influencing executive compensation (as evidenced by the positive market reaction that has been established). There is also some evidence that pay levels and structures adjust in response to adverse voting, especially in the context of prior weak governance arrangements. However, the full consequences of such ‘say-on-pay’ initiatives are yet to be established and remain an open question for future research.

4. Discussion and Conclusions

Executive compensation is important from an economic perspective because it is a potential solution to the latent moral hazard problem arising in agency models, especially the separation of firm ownership from control. Considerable energy has been expended by economists (and scholars from other disciplines such as management) to understand and explain the pattern of CEO pay (Frydman and Saks, 2010; Murphy, 2012). Shareholders design contracts to align owner and CEO interests and motivate agent effort. Principal–agent models typically predict the use of stock options, restricted stock and other forms of contingent pay in the optimal contract. In trying to understand executive compensation, many economic models have shown that the observed empirical pattern of CEO pay is consistent with various types of optimal contracting models.

However, another school of thought suggests that executive compensation is the problem and not the solution to corporate governance ills. Powerful CEOs do not engage in arm’s length bargaining and instead are faced with weak or compliant boards. The resulting CEO pay contracts are not in the interests of owners (Bertrand and Mullainathan, 2001; Bebchuk *et al.*, 2002; Bebchuk and Fried, 2003, 2006). Managerial power models, in contrast to optimal contracting models, claim that observed CEO pay is more consistent with this explanation.

Overall, it remains an open empirical question as to whether boards successfully restrain excess executive compensation, or whether executive compensation contracts are optimally determined. The challenge going forward is to design appropriate empirical tests to evaluate the causal link between governance and executive compensation. A major obstacle in this regard is that many of the variables of interest (e.g. board structure) are endogenous and identification of legitimate instruments is difficult. Thus, isolating a causal connection between governance institutions and CEO pay outcomes is, as yet, inconclusive (Adams *et al.*, 2010).

The results in this study indicate that, if anything, boards and compensation committees in the US have become increasingly independent over time. This has happened from a combination of self-regulation and government-imposed rules. Affiliated directors are those linked to the firm by mechanisms other than simply board membership, including recent former employees, family members, consultants or other material business relationships to the firm. The percentage of affiliated directors on boards and compensation committees has declined over time.

The empirical evidence also shows that executive compensation has grown significantly from 1992 to 2012. However, executive compensation is in flux. The level of pay has increased and decreased over this time period, often in line with general market movements. Indeed, there was a general run-up in executive compensation from 1992 until around year 2000 when it peaked. Following the 2001 recession, executive compensation also fell. It has since recovered and, in 2010 and 2012, executive pay saw significant gains following the Great Recession of 2008. The structure of executive compensation has also changed. In the early 1990s a significant amount of pay came in the form of guaranteed base salaries. This situation has now changed. Most CEO compensation is delivered in the form of variable, or 'at-risk', pay triggered by various performance criteria (bonuses, stock options and restricted stock). Equity compensation is very important in the US. In the 1990s, stock options were firms' vehicle of choice in delivering equity pay. Since the mid 2000s the situation has changed and restricted stock has become markedly important. Together, stock options and restricted stock form the major components of executive compensation in the US (Murphy, 2012).

It is less clear that this growth in pay is excessive or was caused by a failure of boards. The econometric results indicate little correlation between executive compensation and affiliated directors on boards. I found no robust evidence that the level of executive compensation was tied to the percentage of affiliated directors who are members of compensation committees or the board. I also found little evidence that the pay-for-performance link was weaker in firms with a higher percentage of affiliated directors on the compensation committee or board. This seems at odds with the conventional managerial power explanation of executive pay outcomes. Indeed, it is consistent with prior research on the endogenous structure of boards where more monitoring and higher executive pay might go hand in hand (Adams *et al.*, 2010).

The Dodd–Frank Act (2010) has changed the landscape of executive compensation and corporate governance yet further. The Act required firms to re-evaluate the independence of compensation committees and their advisors, such as compensation consultants. It also required mandatory, but non-binding, shareholder voting on executive compensation. I showed that the market for compensation consultants is active and dominated by several major consulting firms, each of whom have engagements primarily with the board rather than management. Very few firms do not use pay consultants, suggesting they provide valuable services to boards. Regarding 'say on pay', the basic data showed that shareholders overwhelmingly endorse management executive compensation plans. Very few 'say-on-pay' resolutions fail (in my sample, less than 2%) and approval rates in excess of 90% are not uncommon. The relative newness of the Dodd–Frank Act will, no doubt, spur yet further research in this domain.

From a practical standpoint investors are legitimately worried that boards or compensation committees are populated by non-independent directors. This is reflected in continued legislation and in the listing standards on the public exchanges that require independent boards – such as the provisions contained in the 2010 Dodd–Frank Act. However, for this time period, and for this set of firms, non-independent directors on boards do not seem to be the main driver of changes in executive compensation.

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Additional Supporting Information may be found in the online version of this article:

Data S1.

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