

**Are Top Executives Paid Enough?  
An Evidence-Based Review**

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**Abstract**

Our review of the evidence found that the notion that higher pay leads to the selection of better executives is undermined by the prevalence of poor recruiting methods. Moreover, higher pay fails to promote better performance. Instead, it undermines the intrinsic motivation of executives, inhibits their learning, leads them to ignore other stakeholders, and discourages them from considering the long-term effects of their decisions on stakeholders. Relating incentive payments to executives' actions in an effective manner is not possible. Incentives also encourage unethical behaviour. Organizations would benefit from using validated methods to hire top executives, reducing compensation, eliminating incentive plans, and strengthening stockholder governance related to the hiring and compensation of executives.

**Keywords:** bonus; cooperatives; corporate governance; democracy; employee selection; executive compensation; incentives; index methods; judgmental bootstrapping; Mondragon; motivation; pay; performance; stakeholders.

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In 2008, *Fortune 500* CEOs were paid 185 times more than the average worker (DeNavas-Walt et al. 2009). Academics and the general public have questioned the justification for such large payments to executives. A Gallup poll conducted in June 2009 found that 59 percent of a representative sample of 998 Americans favored government action to limit executive compensation (Jones 2009).

### **Problem**

Boards of directors set the compensation of their top executives to attract capable people and to encourage them to act in the firm's interests. In effect, the board must forecast which candidates will do the most effective job and how they will respond to the level and type of remuneration. This forecasting task is complex because potential executives vary on many dimensions, as do firms. The primary method used for this task is unaided expert judgment—i.e., unaided by any evidence-based forecasting methods (see Armstrong 2001).

Decades of research have led to a perplexing finding on unaided judgments: beyond a basic minimum, expertise has no value for forecasting outcomes in complex, uncertain situations. Nevertheless, people continue to believe experts' forecasts. This is known as the seer-sucker theory: "No matter how much evidence exists that seers do not exist, suckers will pay for the existence of seers" (Armstrong 1980, p. 2).

Research since 1980 has added support to the conclusion that unaided judgments are unsuitable for management forecasting for complex uncertain situations. In particular, see Tetlock's (2005) analysis of over 82,000 forecasts in a 20-year study of 284 experts, whose professions involve offering advice on political and economic trends. These experts barely outperformed laymen in the accuracy of their forecasts, and their forecasts were less accurate than those derived from simple decision rules.

Given the difficulty of learning from experience, recruiters may be unaware of the factors affecting their perceptions of job applicants' suitability. In one experiment, participants viewed videotaped job interviews. Unbeknownst to them, professional actors wore special prostheses to play overweight job candidates in the experimental condition and then played themselves—average-weight candidates—in the control condition. All the participants were presented with the same resumes and job descriptions. When participants viewed overweight job candidates, they made more negative inferences about them ( $r = -.45$ ) and reported they would be less willing to hire them ( $r = -.59$ ) (Pangitore et al. 1994). Studies on the beauty premium also show evidence of such bias. One study concluded that workers who ranked in the lowest 9 percent in terms of looks earned between 7 and 9 percent less than average, whereas workers who ranked in the top third earned 5 percent more than the average (Hamermesh and Biddle 1994). We are unaware of evidence that slim and attractive people are better managers.

## **Methodology**

We sought experimental and quasi-experimental studies (i.e., analyses of data for which key explanatory variables differed, while many but not all other variables were held constant) to assess how remuneration motivated managers and affected firm performance. Nonexperimental data are less useful for assessing causal effects, although we do draw on such analyses to some extent. With nonexperimental data, the relationship between executive pay and firm performance is confounded, because firms with high profits pay higher compensation to CEOs. Analyses of experimental data are preferable for identifying causality in such situations involving complexity and uncertainty (Armstrong 2012a).

To locate relevant studies, we searched the *ABI/Inform*, *PsychINFO*, and *SSCI* databases (search terms: “compensation OR pay AND performance”), examined the publication records of

researchers whose work is relevant to the questions at hand, scanned reference lists of all relevant papers that we obtained, and contacted key researchers to ask whether we might have missed relevant sources.

Academic papers frequently misstate findings in their reviews of prior research (Wright and Armstrong 2008). To address this, we contacted authors whose findings we summarized in substantive ways. If we received no reply, we followed up with another email. In all, we received replies from 80 percent of the authors whom we contacted. Information about the studies is provided in supplementary material to this paper at <http://dx.doi.org/10.1287/inte.2013.0705>.

### **Does Higher Pay Lead Firms to Hire More Effective Executives?**

One argument for high executive compensation is that firms must compete for the best managers by offering higher pay. This assumes firms use validated selection procedures. However, human resources (HR) practitioners hold fallacious views regarding personnel selection. For example, intelligence is the single best predictor of job performance (Schmidt and Hunter 1998), yet only 18 percent of the 959 HR professionals surveyed by Rynes et al. (2002) identified intelligence as a better predictor of job performance than conscientiousness. Similarly, when personnel experts in New Zealand and the United States were asked to rank the strength of job-performance predictors, the correlation between the experts' rankings and the evidence-based rankings was close to zero (Ahlburg 1992, Dakin and Armstrong 1989). Two surveys of 820 British recruitment consultants found that executives are generally selected using unstructured interviews and character references, procedures with little validity (Clark 1992).

Perhaps the most serious shortcoming of executive recruiting is the failure to apply Meehl's (1954) rule, summarized here as: *You should not meet job candidates until you decide to make them an offer*. Instead, Meehl advised the use of linear models (e.g., regression analysis).

In interviews, irrelevant factors (e.g., height, body build, gender, accent, and looks) often dominate relevant factors. Additional research has continued to support Meehl's findings (see Grove 2000 for a meta-analysis).

Few organizations follow Meehl's rule. However, its adoption by the Oakland Athletics baseball team had an enormous impact. Although the team had a modest payroll, it won a high percentage of its games. After initial resistance, other baseball teams also adopted these superior prediction methods, as did basketball and football teams (Armstrong 2012c). These teams believed they needed to adopt the method to stay competitive. Adoption by business firms has been slow; this is unfortunate, because we expect that using Meehl's rule would help all stakeholders.

Executives are often evaluated on the basis of the success or failure of the business units for which they are responsible. In practice, many internal and external factors influence outcomes for firms, and assessing the role played by a given executive is not possible. For example, should a manager get credit for a firm's success when the economy is booming or blame for the firm's losses during a recession? When answering such questions, evaluators are biased toward ignoring contextual factors and overly attributing outcomes to leaders. This bias was illustrated in a laboratory experiment in which groups of participants had to solve a coordination task. In the experiment, group size varied, and participants could perceive that the task was harder when the group was larger. Despite this, participants credited group leaders for the success of small groups and blamed them for the failure of large groups (Weber et al. 2001).

Nonexperimental studies also find that increases in CEO compensation occur following increases in firm performance that result from factors beyond the CEO's control—CEOs are paid for being lucky. For example, CEOs in the oil industry were compensated for increased profits

resulting from fluctuations in the price of crude oil—a factor beyond their control (Bertrand and Mullainathan 2001).

If the selection procedures do not use evidence-based procedures, then one would not expect executive search firms to add benefit over what a firm could do on its own. In addition, firms can do this at a lower cost given that leading executive search firms charge about one-third of the first year's compensation or roughly \$1 million for each CEO hired (Settimi 2008).

### **Does Higher Pay Lead to Better Performance?**

We present evidence on the relationship between pay and performance, and also examine the special case of large financial bonuses. We then discuss the specific structure and implications of executive incentive programs.

#### **Pay and Performance**

One study examined the performance of CEOs after receiving awards, such as CEO of the year or top manager, from the press (e.g., *Business Week*). In the year of the awards, the total compensation of superstar CEO winners increased by 44 percent; however, the compensation of all nonwinners showed little increase. This also applied to the nonwinners who were most similar to winners based on individual and firm characteristics; their compensation closely approximated what the superstar CEOs would have received had they not been given the awards. Three years following the awards, the difference in total compensation between the superstars and similar CEOs remained substantial. However, in the three-year period after the awards, the stocks of firms led by superstar CEOs underperformed those led by similar CEOs by 15 to 26 percent (Malmendier and Tate 2009).

The predominant view among economists is that monetary rewards motivate people to perform better.

Literature reviews (e.g., Prendergast 1999, Gerhart et al. 2009) and a number of meta-analyses (e.g., Cameron and Pierce 1994, Eisenberger and Cameron 1996) support the positive effect of pay on performance.

One meta-analysis examined the relationship between pay and performance across 39 laboratory and field experiments. Pay had no effect on performance in terms of quality, but did affect performance measures in terms of quantity ( $r = .34$ ), leading the authors to conclude that their results, along with similar results from previous meta-analyses, went “a long way towards dispelling the myth that financial incentives erode intrinsic motivation” (Jenkins et al. 1998, p. 784).

In contrast, psychologists tend to argue that the relationship between monetary rewards and performance depends on the situation. Especially important is the distinction between extrinsic motivation (rewards) and intrinsic motivation (satisfaction in doing the task).

A meta-analysis of 128 experiments concluded that extrinsic rewards undermine intrinsic motivation (Deci et al. 1999). Previous meta-analyses had reached similar conclusions (Rummel and Feinberg 1988, Tang and Hall 1995, Wiersma 1992). The Deci et al. meta-analysis corrected for a number of shortcomings in some of the meta-analyses we cited in support of the economists' view on incentives (i.e., Cameron and Pierce 1994, Eisenberger and Cameron 1996). For example, Cameron and Pierce (1994) omitted almost 20 percent of relevant studies, misclassified certain studies, and most importantly, did not consider relevant conditions (e.g., whether the tasks were inherently motivating).

Deci et al.'s meta-analysis of 128 laboratory experiments further examined the relationship between extrinsic rewards and intrinsic motivation by considering a number of moderating conditions. When rewards were tangible, expected, and contingent on performance—as they are for executives—the correlation between rewards and intrinsic motivation was -0.28 (based on 32 studies). The decrease in motivation was even greater when rewards were tangible, expected, and contingent on completion (i.e., when rewards were given only to those doing very well); the correlation, based on 19 studies, was -0.44 (Deci et al. 1999). Literature reviews (e.g., Frey and Jegen 2001) also support the detrimental effect of incentives on motivation and performance.

A meta-analysis involving 46 laboratory and field experiments that controlled for the nature of the tasks found a negative relationship between tangible rewards and performance for interesting tasks (i.e., tasks perceived as challenging, enjoyable, or purposeful), and a positive relationship between tangible rewards and performance for less interesting tasks (Weibel et al. 2010). For example, there was a positive relationship between tangible rewards and performance for a simple task like installing automobile windows (Lazear 2000); however, there was a negative relationship for difficult and (or) interesting tasks like resolving complex mathematical problems (Mowen et al. 1981). Specifically, the correlation between monetary rewards and work performance was positive ( $r = 0.42$ ) for simple or boring tasks, but negative ( $r = -0.13$ ) for interesting or difficult tasks. Five experiments examined how performance was affected by the use of incentives and by how severely nonoptimal answers were sanctioned. With incentives, participants were more concerned with evaluating how well they were doing than with understanding how the task should be done, leading to poorer performance for more complex tasks (Hogarth et al. 1991).

## **Incentive Systems**

The second author of this paper started his career as an engineer and was involved with designing incentive payments for repetitive tasks that require little thinking. This was used only when it was possible to tie individual efforts directly to outcomes in situations in which other factors have negligible effects. These systems also require extremely accurate performance measures. Once in place, it was common for workers to falsify their productivity accounts to increase their pay. In addition, conditions change over time, so that incentives frequently need updating. Workers point out changes that call for increased effort, but those that reduce effort (the more common situation). Engineers did not believe that incentive standards were possible for even the first level of supervision.

Consider the effects of particularly large financial incentives. In a field experiment, participants completed tasks requiring creativity, attention, concentration, and memory, and were randomly informed that exceptional performance would be rewarded by a small, medium, or large financial bonus (i.e., equivalent salary for a day, two weeks, or five months, respectively). Participants in the medium-bonus condition did not perform better than participants in the small-bonus condition; participants in the large-bonus condition performed the poorest (Ariely et al. 2009). When researchers replicated this experiment using functional magnetic resonance imaging to monitor participants' brain activity, they found that the prospect of obtaining larger-than-average rewards engaged a relatively large share of attention and working memory, leaving little available to effectively carry out tasks (Mobbs et al. 2009).

Incentive plans can be detrimental to the interests of shareholders when the plans focus on short-term performance at the expense of long-term profitability. See Bebchuk and Fried (2010) for a review. Additionally, incentive systems may affect executives in unintended ways.

Increased emphasis on profits or on any other single measure is likely to lead to reduced emphasis and even detrimental effects on other measures (Slovic and MacPhillamy 1974), such as the treatment of other stakeholders. For example, in a laboratory experiment, participants were asked if they would be willing to keep a profitable drug, Panalba, on the market in the face of overwhelming evidence that it was killing patients. They were told that drugs made by competitors provided the same benefits without causing fatalities. When playing the role of top executives and board members, no group removed the drug from the market. The participants were adhering to their task of increasing profits. However, groups that were asked to also consider the drug's effects on stakeholders and were given estimates of these effects were more likely to withdraw the drug (Armstrong 1977).

Financial incentives can lead to undesirable behaviors by executives. In a series of experiments on ethical behavior, financial incentives weakened or outweighed the participants' sense of moral self-identity. For example, participants were more likely to lie in an actual negotiation when personal financial incentives were involved (Aquino et al. 2009).

Incentive plans are likely to tempt executives to engage in fraudulent behavior. For example, school superintendents in Philadelphia were asked to improve their students' standardized test scores. Some superintendents were highly successful and were sought after by other schools. However, the key factor to their success was that they put a program in place to erase wrong answers on student exams and insert correct answers (Russ 2012).

Yermack (1997) noticed a pattern in which stock options grants for CEOs coincided with favorable movements in the stock price. The fraudulent nature of this became clear years later when Lie (2005) examined almost 6,000 CEO stock option awards granted between 1992 and

2002, and found that stock options were often granted on the day when the value of these options would be maximized.

### **Possible Solutions**

We discuss four improvements in executive compensation: (1) use evidence-based procedures for the selection and compensation of top executives; (2) reduce executive pay; (3) eliminate incentive payments for executives; and (4) improve corporate governance by giving stockholders more control over the hiring, retention, and compensation of top executives.

### **Use Evidence-Based Methods for Selection, Compensation, and Promotion**

A meta-analysis of 85 years of research on employee selection found that general mental ability (intelligence) is the single-best predictor of job performance, especially in jobs involving decision making in complex situations (Schmidt and Hunter 1998). These data are nonexperimental, and range restriction applies because people generally apply only for jobs for which they think they are capable. Schmidt and Hunter found that the number of years of education did not correlate to long-term job performance when the analysis controlled for the effect of cognitive abilities (e.g., IQ). A review of experimental studies, also reached this conclusion (Armstrong 2012b).

Biases can be avoided by making observers blind to irrelevant candidate characteristics. A study of symphonic orchestra auditions found that when applicants performed behind a screen, the probability that female candidates passed preliminary rounds of recruitment increased by 50 percent (Goldin and Rouse 2000).

Much evidence exists about factors that affect job performance. This information should be used in a structured fashion to improve reliability and to help control for biases. When many

important variables and good knowledge about the directional effects of the variables are present, index models allow the use of *all* prior information in a simple manner (see Armstrong and Graefe 2011 for evidence). Index models require only an assessment of the directional impact of each variable on the criterion, such as assigning a score of +1 (-1) if a variable has a positive (negative) effect on the criterion of interest. The sum of the scores serves as the predictive index—highest score wins.

Given the difficulty of developing objective performance measures for executives, judgmental bootstrapping offers a way to improve an expert's predictions. Used in the early 1900s to forecast agricultural crop yields, this method was applied successfully to personnel predictions and other management problems in the latter part of the 20<sup>th</sup> Century (Armstrong 2001). By using an experimental design with artificially created data (to avoid inter-correlation among the predictor variables), one can develop a model by regressing an expert's forecasts on the variables used. For example, the expert forecasts the success of 50 applicants, and his forecasts are regressed against the information provided to the expert. Validation studies have shown that the model's predictions are almost always more accurate than those the expert provided because the model applies the expert's rules more consistently. This approach can also identify when the expert is using irrelevant variables.

Sealed bids, a commonly used market-based procedure for hiring contractors of all types, might be considered for hiring top executives. Applicants using sealed bids would describe what they could do for the organization, what relevant skills they have (and support for their claims), how much they would require in remuneration, how long a contract they would need, and whether they would require any payments should they be asked to resign. The proposals would be cleaned to eliminate information that does not relate clearly to job performance (e.g., gender,

race, religion, weight, height, voice, or looks). The bids would then be sent to a screening committee who would make blind, independent ratings using a structured rating sheet.

Candidates who pass the initial screening would then go to an assessment center, where traits (e.g., cognitive abilities, values, and self-control) would be evaluated. In one study, 382 top executives (e.g., CEOs, presidents, board chairpersons, and controllers) completed an assessment of their values. They were then given an in-basket exercise for their decisions prior to leaving on a business trip. The tasks included descriptions of seven situations in which they could earn higher profits by using fraudulent accounting practices. Overall, they used fraudulent reports in 44 percent of their decisions. Interestingly, those who placed a high value on self-respect were less likely to make fraudulent decisions than those who placed a high value on extrinsic rewards (Brief et al. 1996).

Assessment centers would also include evaluations of skills, such as the ability to use evidence-based techniques for running effective meetings, analyzing data, listening to others, writing persuasive reports, and developing strategic plans. These results could be entered into an index model to identify the leading candidates.

Current procedures for selecting CEOs seem to rely heavily on the use of analogies. For example, “Ms. X was successful in running division A in company B, so she should do well in running our company because it is in a similar business.” Analogies can produce useful forecasts if used as inputs to forecasts (Green and Armstrong 2007). This suggests that organizations should look for suitable candidates among those currently working in the organization. An internal candidate’s performance would be more relevant given the similarities of domain knowledge, job function, product line, company culture, and managerial style. In addition, peers, subordinates, and superiors can rate internal candidates.

One study compared the performance of external hires against that of internal employees promoted to similar positions within a US investment banking division between 2003 and 2009. Although the external hires had more experience and education, and were paid 15 percent more in the two years following their recruitment, they performed worse on the job and were more likely to leave the company, as opposed to employees recruited internally (Bidwell 2011). Harris and Helfat (1997) also found that externally hired CEOs were paid more than CEOs promoted internally.

A policy of hiring from within might lead ambitious people to identify more closely with the firm and motivate them to prove their importance to the firm rather than trying to attract outside offers. Promotion from within has been used with apparent success by family-run firms, churches, the military, and many for-profit firms. We suspect that it is the dominant approach used by small firms. Many CEOs take pride in developing people to succeed them. We will not bother to mention examples, such as Apple, that lost their way when they hired outsiders as CEOs.

### **Reduce the Compensation of Top Executives**

Given the lack of evidence favoring high pay and the evidence on its detrimental effects, we conclude that compensation of top executives should gradually be reduced. Given the nature of the job (and the status associated with the position), many capable people would accept a modest salary for a top management position. Indeed, cooperatives and voluntary organizations often offer low salaries, yet they have no difficulty in finding top executives.

### **Eliminate Incentive Payments to Executives**

Jensen and Murphy (1990) supported a movement toward incentive payments for top management with an influential study (as of mid-2013, Google Scholar showed more than 5,000

citations for this paper). They argued that compensation should be designed to motivate those in top management to serve the firm, rather than their own interests. They suggested three guidelines: (1) require that CEOs hold a substantial amount of company stock, (2) make the levels and structure of compensation sensitive to firm performance, and (3) fire CEOs for poor performance. No experimental evidence was provided to support these guidelines.

### **Improve Corporate Governance**

Corporate governance plays an important role in keeping executive compensation in check. For example, in the aforementioned study of CEO compensation in the oil industry (Bertrand and Mullainathan 2001), pay for luck was 23 to 33 percent lower in firms where CEO power was weaker because of the presence of a large investor on the board.

A study of how CEO compensation changed in response to luck (i.e., events affecting firm performance beyond the CEO's control) between 1992 and 2011 showed that pay was about 25 percent higher when luck favored the CEO. However, this effect was evident only in poorly governed firms (Garvey and Milbourn 2006).

Similarly, in the superstar CEO study, the deleterious effects following awards to CEOs were most pronounced in firms in which management was more entrenched or shareholder protection was weaker (Malmendier and Tate 2009).

A study of CEO incentive payments in over 1,000 firms between 1992 and 2003 found that the extent to which CEOs had power over their boards explained between 10 and 30 percent of the variance in incentive pay and performance. Furthermore, greater CEO power was associated with decreased firm value and performance during that period (Morse et al. 2011).

One study found that opportunistic timing of option grants was more likely in firms with weaker corporate governance. This was measured by whether or not a firm's board had a

majority of independent directors, by whether or not the firm's compensation committee included an outside shareholder with a large number of shares, and by the length of CEO tenure (Bebchuk et al. 2010).

Studies of anti-takeover legislation show evidence that executive compensation increases with executive power. Following these anti-takeover legislations, which entrenched management, compensation levels increased, particularly among white-collar workers, and the firm's market value diminished (Bertrand and Mullainathan 1999, 2003). The effects of weakened corporate governance on executive compensation can spread to other firms because peer-group benchmarking is often used to set executive compensation. Consider the Delaware court rulings that strengthened firms' anti-takeover legislations. These court rulings led not only to a substantial increase in CEO compensation for firms incorporated in Delaware. It also affected firms outside Delaware because they used the CEO compensation of their competitors in Delaware as a benchmark to set the compensation of their CEOs (Bereskin and Cicero 2012).

Following corporate scandals in the early 2000s, US stock exchanges issued board requirements to limit the power of CEOs. A quasi-experimental study examined how this change in corporate governance affected CEO pay by observing changes in compensation between firms already following these requirements and firms that were not. These requirements reduced CEO pay between 2000 and 2005 in a sample of 865 firms listed in the S&P 1500 index. Furthermore, CEO compensation was 17 percent lower in firms that were more affected by these requirements compared to firms that were already generally complying with these requirements (Chhaochharia and Grinstein 2009).

In a study examining the relationship between management entrenchment and a firm's financial performance between 1990 and 2003, entrenchment was found to correlate negatively

with firm valuation, as measured both by stock returns and the firm's estimated worth.

Entrenchment was measured by an index based on the following provisions: “staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers, and charter amendments” (Bebchuk et al. 2009, p. 783).

A natural field experiment in corporate governance can be found in the Basque region of Spain where the democratically run Mondragon Cooperative Corporation (Mondragon) is based. The “Mondragon experiment” began with a single cooperative in 1956 and grew to 256 organizations employing over 100,000 people by 2012. From 1996 to 2008, its sales increased by more than 213 percent, while sales in conventional firms operating in the same sectors in Spain increased by only 140 percent.

The ownership of firms in the Mondragon cooperative is vested in the employees who elect their own managers. The governing council is effectively a board of directors that is responsible for electing the CEO and for approving the CEO’s choice of senior executives. Indeed, the top executives have no vote on the governing council. In effect, the owners control the process. The general idea is to promote from within, because the employee owners have excellent knowledge about the candidates. The top executive is a servant to those in the organization. If those in the organization believe they are being poorly served, they can replace the executive.

CEOs in Mondragon receive no incentive payments. The compensation of the highest-paid employee is set to a maximum of 8.9 times that of the lowest-paid employee (this ratio has increased after many years to retain top managers in response to market pressures). If all sources of compensation are included, this ratio is currently 11:1.

The Mondragon ratio is higher than the 5:1 maximum ratio used by most cooperatives (Arando et al. 2011). Because of these salary differential restrictions, if the CEO should receive a salary increase, then all employees would receive a commensurate salary increase.

Some US companies follow similar guidelines. For example, at Whole Foods, the maximum top salary is currently set at 18 times the average salary (Sutherland 2013). These companies seem to have no problem attracting people willing to become their CEOs. The case of Mondragon suggests that firms and their stockholders might benefit from introducing at least some degree of employee ownership.

An organization that does not find the evidence to date persuasive might consider what evidence would lead them to make changes. They could then search for such evidence, commission an experiment, or try alternative approaches.

## **Conclusions**

High pay levels do not lead to the selection of more effective managers. One reason is that executive recruiters often fail to use evidence-based selection procedures. This includes failure to use valid indicators of job performance and failure to use evidence-based methods, such as regression analysis, judgmental bootstrapping, and the index method. Particularly important to removing bias, the decisions should be made prior to meeting the potential candidates (Meehl's rule).

High levels of executive pay have not been shown to lead to better performance. Given this, owners should consider paying lower levels of remuneration to top executives. One way to implement this is to provide an open search with a preference for hiring from within the firm, and invite applicants to submit sealed bids on the positions.

Incentive payments are inappropriate for top executives. They lead executives to focus on invalid measures, reducing their ability to learn and encouraging unethical behavior.

Weak corporate governance allows CEOs to increase their compensation. Stockholders should have greater control over selection and remuneration procedures.

When it comes to executive selection and remuneration, a stark contrast exists between experimental findings and current practice.

### **Online Supplement**

An online supplement to this paper is available as part of the online version that can be found at <http://dx.doi.org/10.1287/inte.2013.0705>.

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## Supplementary materials

Listed below are the experiments, quasi-experiments, and meta-analyses we relied on in this paper.

Study	Design	Dependent variable	Variable of interest	Findings	Note
Aquino K, Freeman D, Reed II A, Lim VKG, Felps W (2009)	Experimental	Cooperation; Intentions to lie and actual lying; Intentions to enact a moral behavior	Centrality of moral identity; moral prime; feedback about the selfish behavior of others	The moral identity at a given point in time is positively related with intentions to act pro-socially and negatively related with intentions to behave selfishly. Moral primes increase the centrality of moral identity, while performance contingent financial incentives and feedback about the selfish behavior of others decrease it.	
Ariely D, Gneezy U, Loewenstein G, Mazar N (2009)	Experimental	Performance on tasks requiring creativity, attention, concentration, and memory	Size of the performance contingent financial incentive	Participants "choke under pressure"; when incentives are the largest, participants perform the least well.	Field experiment
Bebchuk LA, Cohen A, Ferrell A (2009)	Econometric model	Firm valuation (Tobin's Q), stockholder returns	24 corporate governance provisions followed by the Investor Responsibility Research Center (IRRC)	Six provisions capturing management entrenchment are negatively related with the dependent measures. These provisions are: "staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments."	Panel data with firm and year fixed effects
Bebchuk LA, Grinstein Y, Peyer U (2010)	Quasi-experimental and econometric models	Opportunistic timing of options awarded to CEOs and independent directors (i.e., grants awarded at the lowest price of the grant month)	CEO compensation; corporate governance	Opportunistic timing of options is associated with weak corporate governance—as measured by a board lacking a majority of independent directors, the absence of an independent compensation committee with an outside stockholder, and a long CEO tenure.	The actual number of lucky grants (i.e., grants awarded at the lowest price of the month) is compared with the expected number of grants that would be lucky if grants were randomly assigned during a month. Then models predicting lucky grants are estimated (with and without fixed effect controls)

Bereskin FL, Cicero DC (2012)	Quasi- experimental	CEO compensation	Variation in corporate governance resulting from the Delaware antitakeover legislation	Following the antitakeover legislation, CEO compensation increased the most in firms where managers were most shielded from outside shareholders. CEO compensation also increased in firms not directly impacted by the new legislation when this legislation impacted a substantial number of firms in their industry.	Differences-in-differences methodology
Bertrand M, Mullainathan S (1999)	Quasi- experimental	Wages	Variation in corporate governance resulting from antitakeover legislation	Annual wages rise as a result of the introduction of antitakeover legislation.	Differences-in-differences methodology
Bertrand M, Mullainathan S (2001)	Quasi- experimental	CEO compensation	Observable shocks to firm performance due to factors beyond CEO control	CEO compensation responds to these shocks, but less so in better governed firms.	Instrumental variables (IV) estimation
Bertrand M, Mullainathan S (2003)	Quasi- experimental	Wages; firm productivity and profitability; shutting down old plants; starting new plants	Variation in corporate governance resulting from antitakeover legislation	When managers are shielded from takeovers, worker wages increase—particularly for white- collar workers. Both the destruction of old plants and the creation of new plants fall. Overall profitability and productivity decline.	Differences-in-differences methodology
Bidwell M (2011)	Quasi- experimental	Ranked performance, competence, contribution, promotions, transfers, voluntary and involuntary exits; salary, bonuses, and total compensation	Internal mobility versus external hiring	External hires had more experience, more education, were paid 15% more, and were promoted faster. However, in the two years following their recruitment, external hires performed less well on the job and were more likely to leave the company than were employees recruited internally.	
Cameron J, Pierce WD (1994)	Meta-analysis	Intrinsic motivation	Extrinsic rewards	Rewards are not detrimental to intrinsic motivation.	Sample of 96 experimental studies
Chhaochharia V, Grinstein Y (2009)	Quasi- experimental	CEO compensation	Board structure	There is a greater decrease in CEO compensation in firms that were more affected by new board requirements. This effect is reduced by the existence of other monitoring mechanisms such as the presence of a large stockholder.	Differences-in-differences methodology
Deci EL, Koestner R, Ryan RM (1999)	Meta-analysis	Intrinsic motivation	Extrinsic rewards	All rewards were detrimental to intrinsic motivation—but to different degrees as a function of the type of rewards.	Sample of 128 experimental studies
Garvey GT, Milbourn TT (2006)	Econometric model	Executive compensation	Firm performance, industry or market benchmarks, corporate governance	Executive pay was less sensitive to “bad luck” than it is to “good luck”. This asymmetry was less pronounced in firm with strong corporate governance	Panel data with firm and year fixed effects

Goldin C, Rouse C (2000)	Quasi-experimental	Outcome of orchestra auditions	Candidate gender	There is evidence of sex bias in hiring. Indeed, when auditions are conducted behind screen such that the applications can be heard but not seen, the probability that women advance and are hired increases. For example, the probability that female candidates passed certain preliminary rounds of recruitment increased by 50% using screens.	Estimation follows an individual fixed-effects framework. Thus, difference in musical ability between candidates is controlled for
Hamermesh DS, Biddle JE (1994)	Econometric model	Earnings	Looks (i.e., beauty)	Looks affected earnings. For example, in one study, workers who ranked in the lowest 9% in terms of looks earned between 7% and 9% less than average. However, workers who ranked in the top tier (in terms of looks) earned 5% more than the average.	Data from household surveys
Harris D, Helfat C (1997)	Econometric model	CEO compensation	CEO succession (internal vs. external candidates)	Despite the fact that external successors should have less firm-specific, industry-specific, and generic skills, they receive greater compensation.	Sample consists of 305 CEO successors listed in the Forbes annual surveys of executive compensation in large U.S. companies over the 1978-1987 period
Hogarth RM, Gibbs BJ, McKenzie CRM, Marquis MA (1991)	Experimental	Task performance	The combined effects of financial incentives and of exactingness (i.e., the extent to which deviations from optimal decisions are punished)	Incentives improved performance only when exactingness was high. However, for incentives to affect performance they must be able to sharply discriminate between good and bad performance.	
Jenkins GD, Mitra A, Gupta N, Shaw JD (1998)	Meta-analysis	Performance quality and quantity	Financial incentives	Financial incentives were positively related to performance quantity but not quality.	A sample of 39 experimental and field experimental studies
Lazear EP (2000)	Experimental	Installing automobile windows	Compensation scheme (fixed vs. piece-rate)	The shift to piece-rate increased overall productivity both by attracting more able workers and by increasing the output by worker.	Field experiment
Lie E (2005)	Econometric model	Timing of CEO option grants	Abnormal stock returns	Abnormal stock returns are negative before the day on which options are granted and positive thereafter	

Malmendier U, Tate G (2009)	Quasi- experimental	Firm performance; CEO compensation; CEO activities unrelated with running their firm (e.g., writing books)	Shifts in CEO power (resulting from CEOs attaining superstar status after receiving awards from the business press); corporate governance	Following the awards, firm led by superstar CEOs underperformed, while CEO compensation increased. Furthermore, superstar CEOs spend more time on activities unrelated with running their firms. These effects were especially prevalent in poorly governed firms.	Propensity-score matching
Mobbs D, Hassabis D, Seymour B, Marchant JL, Weiskopf N, Dolan RJ, Frith CD (2009)	Experimental	Computer task	Small or large financial reward for successfully completing the task	Reduced performance with large incentives is due to excessive drive and arousal.	Participants underwent functional magnetic resonance imaging so as to test competing mechanisms that would explain why individuals perform least well in presence of large incentives
Morse A, Nanda V, Seru A (2011)	Econometric model	Performance measures underlying CEO incentive payment	CEO power to influence board decisions (above and beyond the influence resulting from ownership rights of control)	Powerful CEOs were able to influence their pay settings such that their incentive compensation was based on the better performing performance measure. CEO power explained between 10% to 30% of how sensitive incentive pay was to performance.	Panel data covering 1,119 firms in the U.S. over the 1993-2003 period. The data was obtained from the Execucomp database
Mowen JC, Middlemist RD, Luther D (1981)	Experimental	Performance in an arithmetic task	Difficulty level of the performance goal and incentive system (piece-rate vs. bonus)	In the bonus incentive condition, performance was lowest in the high goal condition (compared to the easy and moderately difficult conditions), whereas it was highest in the piece rate condition.	
Pingitore R, Dugoni BL, Tindale RS, Spring B (1994)	Experimental	Evaluation of job applicants	Physical appearance of the job candidates. Job applicants are played by actors, who in one condition appear overweight	Overweight job candidates were more negatively evaluated ( $r = -.45$ ) and were less likely to be hired ( $r = -.59$ ).	
Rummel A, Feinberg R (1988)	Meta-analysis	Intrinsic motivation	Extrinsic rewards	Extrinsic rewards were found to be detrimental to intrinsic motivation.	A sample of 45 experimental studies
Schmidt FL, Hunter JE (1998)	Meta-analysis	Validity of selection methods for making decisions about hiring, training, and developmental assignments	19 different methods are examined, along with the combination of certain of these methods	GMA (General Mental Ability) is the single best predictor. Combining GMA with a work sample test, an integrity test, and/or a structured interview can increase its validity.	
Tang SH, Hall VC (1995)	Meta-analysis	Intrinsic motivation	Extrinsic rewards	Rewards were found to be detrimental to intrinsic motivation with two exceptions. Rewards increased motivation when initial interest in experimental task was low and when rewards were non- contingent.	Sample of 50 experimental studies

Tetlock PE (2005)	Quasi-experimental	Accuracy of forecasts	Experts' predictions are evaluated against actual outcomes, and against predictions obtained from simple statistical models, and non-experts (uniformed and well-informed)	Experts' forecasts barely outperformed informed non-experts. Simple rules and models provide the best forecasts.	Evaluation of over 82,000 forecast made over a 20-year period by 284 experts
Weber R, Camerer C, Rottenstreich Y, Knez M (2001)	Experimental	Attributions of success/failure	Group size	In a group coordination game, group members blame/praise their group leaders for their performance even though they perceive that performance is the result of group size. In large groups, group leaders are voted out more frequently.	
Weibel A, Rost K, Osterloh M (2010)	Meta-analysis	Task performance	Pay for performance	Pay for performance negatively affects performance for interesting tasks, but has a positive effect on performance for less interesting tasks.	46 experiments and field experiments are analyzed
Wiersma UJ (1992)	Meta-analysis	Intrinsic motivation	Extrinsic rewards	The effect of rewards on intrinsic motivation was dependent on the operationalization of intrinsic motivation. When intrinsic motivation is measured as the amount of time participants continue engaging in a task during free time, rewards reduce intrinsic motivation. However, when intrinsic motivation is operationalized as task performance, reward increases intrinsic motivation.	Sample of 20 experimental studies
Yermack, D. (1997)	Econometric model (Event-study methodology)	Timing of CEO stock option awards	Stock prices (abnormal returns)	Stock returns are normal prior to the data stock options are granted. During the 50 days following the grant, stock returns exceed market returns by over 2%.	