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BUYING BAD BEHAVIOR: TOURNAMENT INCENTIVES AND SECURITIES CLASS ACTION LAWSUITS

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Research summary: *Tournament theory suggests that a large gap in pay between CEOs and top managers can provide incentives to perform, but we argue that it can also elicit negative effort and even motivate the kind of behavior that leads to lawsuits. We posit that this negative effort is greater when firms have high levels of unrelated diversification because there is less operational interdependency, so tournament effects are stronger. We also contend that the influence of tournament incentives on behavior leading to lawsuits is weaker when environmental uncertainty is high. We discuss the consequences of these findings for research on fraud and tournament theory as well as the practical repercussions for firms, investors, and policymakers.*

Managerial summary*: Each year, the press has a field day when companies announce the outsized compensation packages laid out for CEOs. Economists use "tournament theory" to describe how high CEO pay motivates everyone else to work hard to get into the top job. The problem with this approach is that, yes, top managers work harder when the gap between their and the CEO's pay increases, but as that gap widens, it also incentivizes top managers to cheat or cut corners. As a result, we find that the gap between CEO and top manager compensation predicts the likelihood that shareholders will file a securities class action lawsuit against the company. This gap in pay is an especially good predictor of lawsuits for highly unrelated diversified companies and companies facing a low level of external uncertainty.*

May you have lawsuits … and win them. (Spanish Gypsy Curse)

INTRODUCTION

Securities class action lawsuits have drawn considerable attention in recent years from managers, shareholders, and the media alike (Davidoff, 2013). Such lawsuits are brought by a class of allegedly harmed investors against firms and their managers to recover losses due to fraud and violation of securities laws (Dyck, Morse, and Zingales, 2010). In 2013 alone, plaintiffs filed 234 securities class action lawsuits, and federal courts approved \$6.5 billion in settlements (Gershman, 2014). This is an important phenomenon for strategy researchers because having such a lawsuit filed against a firm can have dire consequences. Research shows that securities class action lawsuits can result in executive turnover (Arthaud-Day *et al.,* 2006), increased cost of capital (Sudheer *et al.,* 2010),

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reputational penalties (Helland, 2006), reduced payouts to shareholders (McTier and Wald, 2011), and an average 18-percent drop in stock price (Francis, Philbrick, and Schipper, 1994).

Prior work on predicting and preventing securities fraud[1] has focused on governance, shareholders, and institutions (McTier and Wald, 2011), and some have also found evidence for the role of executive compensation (Johnson, Ryan, and Tian, 2009; Peng and Roell, 2008). Though these latter studies have generated important insights, they have been limited to examining the absolute level of top manager pay (Denis, Hanouna, and Sarin, 2006), the type of top manager pay (Bauer, Braun, and Moers, 2009), and the use of stock options for top managers (Peng and Roell, 2008). Less research examines the influence of *relative* executive compensation on the likelihood of a firm becoming subject to a securities class action lawsuit.

This is an important omission because scholars have shown that relative levels of pay can actually be more consequential to behavior than absolute levels of pay (Pfeffer and Langton, 1993). Furthermore, in recent decades, CEOs have taken increasingly large slices of the executive compensation pie (Siegel and Hambrick, 2005). Data from Execucomp show that in 1995, CEOs captured about 25 percent of the compensation doled out to executives within a firm, but 15 years later, that number had risen to 35 percent and it is now approaching 40 percent. Research demonstrates, however, that wide pay gaps can have unintended consequences (Pfeffer and Langton, 1993). As gaps grow, feelings of injustice can result in undesirable behavior (Cowherd and Levine, 1992). Studies have found a relationship between large pay gaps and shirking (Bloom and Milkovich, 1998), uncooperativeness (Bloom, 1999), and turnover (Bloom and Michel, 2002; Messersmith *et al.,* 2011).

We extend this line of study by examining the effects of managerial pay gaps on the likelihood of engaging in more egregious behavior that is both unethical and illegal. Specifically, in this study we consider how executive pay gaps influence the extent to which managers take actions that deceive, con, or cheat investors or other key stakeholders (Daboub *et al.,* 1995; Zahra, Priem, and Rasheed, 2005). Such behavior is not just about diminished productive efficiency, but could have disastrous consequences for the firm (Gande and Lewis, 2009).

Tournament theory (Lazear and Rosen, 1981) has long served as the cornerstone of research on pay gaps (Connelly *et al.,* 2014). In tournament theory, the gap in pay between the CEO and other top executives induces effort and competition because the salary of the CEO motivates those who might become the next CEO (Lazear, 1998; Main, O'Reilly, and Wade, 1993). We contribute to the empirical body of tournament theory work by examining the extent to which relative executive compensation (i.e., the vertical pay gap between the CEO's pay and the average pay of non-CEO top executives) might also result in extreme "negative effort," thereby resulting in a securities class action lawsuit (Dye, 1984). "Negative effort," here, refers to any volitional acts of employees that potentially violate the legitimate interests of, or do harm to, a firm's owners (i.e., shareholders) (Marcus *et al.,* forthcoming). For top managers, this may include, for example, falsely reporting or misreporting financial data, withholding detrimental information about the firm's products or services, or engaging in inter-organizational relationships that are not in the firm's best interest.

In addition, we advance arguments about two key boundary conditions. We contend that the influence of relative executive compensation on top executives' negative effort is contingent upon one important internal factor: a firm's level of unrelated diversification. Firms with a high level of unrelated diversification are more likely to engender internal competition among managers, thus exacerbating the effects of relative compensation on negative effort (Hill, Hitt, and Hoskisson, 1992; Hoskisson, Hill, and Kim, 1993a). Moreover, tournament theory models typically include a stochastic component of worker output that some have called luck or chance (Lazear and Rosen, 1981). When this random element is substantial, it diminishes the effectiveness of the tournament (DeVaro, 2006b). Therefore, in the presence of high environmental uncertainty, managers may perceive that promotion opportunities are beyond their control and vertical pay gaps are likely to play less of a role in

[1] Scholars often use securities class action lawsuits as a proxy to empirically examine securities fraud, and we do the same (e.g., Amoah and Tang, 2010; Gande and Lewis, 2009; McTier and Wald, 2011). However, as is common in studies of corporate misconduct in general, one cannot truly distinguish between wrongdoing (i.e., fraud) and targeting (i.e., the lawsuit). Fraud that is committed but undetected could potentially confound our investigation if it were to occur in relatively large quantities. We address this problem methodologically by using bivariate probit models with partial observability and a matched-pairs sample research design in supplementary analyses.

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motivating managerial behavior, thereby diminishing the positive relationship between vertical pay gaps and securities lawsuits.

Our study may be of interest and value to multiple disciplinary audiences. For scholars working in the area of organizational misconduct, we add an important new antecedent that can help predict and prevent securities class action lawsuits (Greve, Palmer, and Pozner, 2010). For executive compensation researchers, our study moves the field beyond counterproductive behavior associated with pay gaps (Bloom, 1999) by revealing potentially far more damaging consequences. For work on tournament theory, our study expands what we know about the potentially negative consequences of vertical pay gaps (Connelly *et al.,* 2014). As suggested by the Spanish Gypsy curse from long ago, lawsuits—win or lose—can have devastating consequences for the defendant. Therefore, predicting and preventing their occurrence is of great interest to strategy researchers. We discuss the potentially far-reaching implications of our findings for managers, directors (who design executive pay packages), and policymakers (who are concerned with minimizing securities class action lawsuits).

CONCEPTUAL DEVELOPMENT

Corporate misconduct refers to "organizational pursuit of any action considered illegitimate from an ethical, regulatory, or legal standpoint" (Harris and Bromiley, 2007: 351). Strategy scholars have examined violations of environmental regulations (McKendall and Wagner, 1997), earnings mismanagement (Marcel and Cowen, 2013), and white-collar crime (Coleman, 1987; Green, 2006). A growing form of misconduct that is of increasing concern to shareholders and regulators is securities fraud (Davidoff, 2013). Researchers in finance (Gande and Lewis, 2009; McTier and Wald, 2011), accounting (Amoah and Tang, 2010), and law (Choi, 2004; Choi and Thompson, 2006) have begun to examine this emerging trend, but management researchers have devoted less attention to the subject.

Securities class action lawsuits

Under Rule 10b-5 of the Securities Exchange Act of 1934, securities class action lawsuits are filed by shareholders against a defendant firm in response to allegedly fraudulent and deceptive behavior (Peng and Roell, 2008). Examples typically involve corruption, lying about facts, falsifying information, or covering up systemic problems (Baucus and Near, 1991). These lawsuits include but are more far-reaching than earnings restatements (Gangloff, Connelly, and Shook, 2014) because they engender intentionally deceitful, and by definition, illegal behavior and encompass behaviors beyond financial misrepresentation. Securities class action lawsuits are generally attributable to top executives because they are directly responsible for disclosing information to shareholders (Larcker and Tayan, 2011). For this reason, researchers often use securities class action lawsuits as a proxy for corporate misconduct (Amoah and Tang, 2010; Gande and Lewis, 2009; Peng and Roell, 2008).

There may be personal benefits to engaging in behavior that could lead to a lawsuit, such as the temporary appearance of improved performance or increases in contingent compensation (Efendi, Srivastava, and Swanson, 2007). Accounting scandals are the most common source of securities class action lawsuits, wherein top managers deliberately provide false information about the firm's financial performance (Gande and Lewis, 2009). Another common example includes scenarios wherein a firm experiences a major setback of some kind (e.g., poor product quality), but top managers are reluctant to share related information because it would reflect negatively on them.

Consider, for instance, the largest securities class action lawsuit in history: the Enron scandal. When CFO Andrew Fastow invented off-balance-sheet entities to conceal the firm's losses, he benefitted personally as he was viewed as the rising star of the organization (Saporito, 2002), and he was ultimately held accountable for his criminal actions. Similarly, Nortel Networks incurred a billion-dollar lawsuit settlement because, according to the Securities Exchange Commission (SEC), CFO Frank Dunn fudged revenue numbers in 1999 and 2000; Dunn was promoted to the position of CEO in 2001. Withholding negative information about products is another common source of securities class action lawsuits. Janssen Pharmaceuticals deceptively promoted the drug Risperdal despite knowing it was associated with early death, resulting in a $2.2 billion settlement for parent company Johnson & Johnson. The U.S. Department of Justice said that Janssen President Alex Gorsky "was actively

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involved" in the fraud, but he was promoted to be Johnson & Johnson's new CEO.

Much of the research on securities class action lawsuits is concerned with finding governance structures that prevent its occurrence (Baker and Griffith, 2007), including the implementation of appropriate executive compensation structures. Some have found that the level and use of contingent pay for CEOs is positively associated with the probability of a lawsuit (Bauer *et al.,* 2009; Denis *et al.,* 2006), though others found no significance (McTier and Wald, 2011). We suggest that a more meaningful way to examine the influence of executive compensation on the likelihood that a firm will be the subject of a lawsuit is to compare the relative pay of the CEO and non-CEO top executives. To do so, we rely on tournament theory (Lazear and Rosen, 1981), which describes how pay gaps affect motivation and behavior.

Tournament theory

Lazear and Rosen's (1981) formulation of tournament theory was originally put forth to explain promotion tournaments in organizations. They viewed promotions at firms, and more specifically, the wage increases associated with promotion, as prizes that motivate effort among participants without need to monitor their activity. A key underlying assumption of the theory is that there is a reasonably well-defined set of candidates for promotion, and there are clear winners and losers (Rosen, 1986). Tournaments arise because firms commit to future levels of compensation (Ehrenberg and Bognanno, 1990; Knoeber, 1989). Lazear and Rosen (1981) show that there is an optimum prize spread (difference between wages of the promoted person and those of the candidates for promotion) that will maximize productive output of the tournament.

Myriad studies present the details of Lazear and Rosen's model (Eriksson, 1999; Knoeber and Thurman, 1994), but we highlight some of the fundamental principles that are most salient to our theorizing. One principle of tournament theory is that each worker's level of effort increases with the spread between the winning and losing prize, not the absolute size of their winnings (DeVaro, 2006a; Knoeber and Thurman, 1994). There is some evidence in the management literature to support this idea that individual effort increases more with compensation spread than with compensation levels (Brown, Sturman, and Simmering, 2003; Cappelli and Cascio, 1991; Shaw, Gupta, and Delery, 2002).

Rosen (1986) extends this basic principle to show that, in sequential tournaments, the prize spread increases by level because the value functions include not only the higher prizes, but also the value of the possibility to compete for more prizes at higher levels. At the highest level of a sequential tournament, such as the tournament to be CEO, the prize spread must be extraordinarily large to compensate for the "no tomorrow" aspect of the final stage (Shen, Gentry, and Tosi, 2010). Studies show that positions at the highest levels of the organization command disproportionate premiums, and top managers who compete in the final tournament for the highest position in the organization must be incentivized as if the tournament actually had higher levels (Conyon, Peck, and Sadler, 2001; Fredrickson, Davis-Blake, and Sanders, 2010).

Relatedly, scholars have extended tournament theory models to incorporate negative effort (Garvey and Swan, 1992; Harbring and Irlenbusch, 2008). In the tournament theory literature, *negative effort* (Milgrom and Roberts, 1988) describes the practice of increasing one's probability of winning, or decreasing others' probability of winning, via behavior that is ultimately bad for the firm. For instance, Lazear (1989) shows that greater wage spreads can result in higher levels of sabotage. Drago and Garvey (1998) add that high wage spreads result in increased levels of uncooperative behavior, and DeVaro and Gürtler (2012) show that strategic shirking (i.e., underperforming on tasks that are unimportant to promotion) can be another result.

A simple but important early extension of tournament theory involved expanding the number of workers to a number, n, larger than 2 (Green and Stokey, 1983; O'Keeffe, Viscusi, and Zeckhauser, 1984). In equilibrium, and holding the wage spread fixed, the probability of any given worker winning the tournament drops from 1/2 to 1/n (Prendergast, 1999). This leads to the conclusion that wage spread must increase with n (McLaughlin, 1988). As a result, a line of study has arisen examining actor effort in tournaments that require collaboration among the n participants (Bloom, 1999; Siegel and Hambrick, 2005). When tournament participants act independently, monitoring difficulty increases and tournament theory suggests that individuals will be strongly motivated by high pay gaps in such scenarios (Henderson and Fredrickson, 2001).

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Lastly, the optimum wage spread, and optimum worker effort, is determined in part by a random component. Some have called this "luck" or "noise" (Eriksson, 1999). This random element diminishes the likelihood that the tournament winner will be the worker with the greater output because—even if they produce more effort—their effort may yield less than that of another participant after the random components are added. Thus, workers would be less likely to undertake the costs of high levels of effort as the variance of this random component increases. Stated simply, if luck matters a lot in determining promotion outcomes, then workers do not have as much incentive to try as hard for a given level of wage spread (DeVaro, 2006b).

HYPOTHESES

Tournament incentives[2]

Although scholars have employed various nomenclature, we define *tournament incentives* as the vertical pay gap between the CEO's compensation and the average compensation of the firm's top managers not including the CEO (Gupta, Conroy, and Delery, 2012; Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012; Siegel and Hambrick, 2005). According to tournament theory, maximizing the productive output of a promotion tournament requires selecting a vertical pay gap that optimizes worker effort (Knoeber and Thurman, 1994). This is particularly important in the case of executives due to the inherent problems of implementing incentive contracts based on absolute levels of individual performance (e.g., defining and monitoring performance measures). To optimize efficiency of sequential tournaments within an organization, vertical pay gaps must widen at increasingly high levels of the organization (Lambert, Larcker, and Weigelt, 1993; Rosen, 1986), with the widest gap at the highest level (Shen *et al.,* 2010). Thus, tournament theory has undergirded research seeking to explain the phenomenon of outsized CEO pay (Conyon *et al.,* 2001).

For the final stage of organizational promotion tournaments, contestants competing for the CEO's position consist of the firm's top management team. The "levels" of tournament theory describe individuals that are candidates for promotion to a given position. In practice, candidates may not all reside in positions that are precisely at the same level (i.e., one level below the desired position). For instance, candidates for promotion to Director of Marketing might include application engineers, marketing managers, and project managers, whose relative hierarchical status is not entirely determinate. Candidates for promotion to CEO are the firm's top managers, which may include the CFO, other C-level officers, or Executive Vice Presidents, depending on the firm's choice of titles. Following prior top management team (TMT) research, we define *top managers* to be the four highest-paid executives in the firm other than the CEO, whose salaries are established by the Board of Directors and must be publicly reported in accordance with SEC regulations (Carpenter and Sanders, 2002; Fredrickson *et al.,* 2010; Henderson and Fredrickson, 2001). Data from Execucomp show that, for inside CEO promotions at large public companies over the past 15 years, more than 80 percent came from this group of top managers, so it is likely a reasonable approximation of tournament participants.

Top executives compete with one another for promotion to CEO (Lazear, 1989). On one hand, they can participate in tournament contests in a fair manner by exerting positive effort (Cappelli and Cascio, 1991; Conyon *et al.,* 2001; Kale *et al.,* 2009). On the other hand, a large vertical pay gap can also give rise to undesirable influence activities ranging from "attempts at self-promotion through office politics to the out-and-out sabotage of the endeavors of rival fellow workers" (Main *et al.,* 1993: 607). Negative effort could potentially benefit those that engage in such behavior by improving their own performance relative to others (Garvey and Swan, 1992; Harbring and Irlenbusch, 2008; Lazear, 1989).

In a similar manner, top managers who engage in behavior that could result in a lawsuit may do so in order to improve their chances of being promoted (Ridge, 2012). The primary mechanism by which top managers are evaluated is by their performance, and the pressure for consistent, positive performance reports is intense (Arthaud-Day *et al.,* 2006). They may be tempted, therefore, to cover up problems or exaggerate performance potential in order to present their work in the best possible

[2] Management researchers appear to interchange the terms *pay gap*, *pay differential*, *pay disparity*, *pay spread*, *pay inequality*, *pay variation*, and *pay dispersion* when referring to tournament incentives though they do not always refer to the same thing (Gupta *et al.,* 2012). To avoid confusion, we use only the term *vertical pay gap* when referring to tournament incentives.

light and position themselves for promotion (Zahra *et al.,* 2005). Top executives might fail to disclose problems in product development, not acknowledge that a firm's product line is becoming obsolete, or provide overly optimistic statements about project initiatives (Gilpatric, 2011). Unfortunately, such actions can result in securities class action lawsuits (Niehaus and Roth, 1999).

Conversely, an argument could be made that large vertical pay gaps might result in increased monitoring among members of the TMT because each is unwilling to let another get away with unfair behavior. However, Hambrick (1994) found that top executives are generally responsible for their own business units (a concept we unpack further in the next hypothesis), so top managers may not be able to monitor one another's activities. Further, if an executive discovers that one of the other tournament participants is providing inordinately rosy information about performance, it may be easier to respond in kind as opposed to undertaking the difficult task of trying to prove the dishonest behavior. This could lead to an even greater likelihood of securities fraud as top managers one-up each other and dishonest behavior escalates.

As the vertical pay gap between the CEO and the TMT widens, top executives are increasingly tempted to resort to unethical behavior in order to attain the hefty reward (Bainbridge, 2004). Given that top managers are a group of "highly motivated, achievement-oriented, and status-driven" individuals (Fredrickson *et al.,* 2010: 1033), increased competition arising from tournament incentives (large vertical pay gaps) could turn competition into the seeds of managerial wrongdoing regardless top managers' actual level of compensation. Faced with the potential for a large payout, top managers may be less attuned to the early signs of project failure and potentially more reckless about mitigating risk (Sanders and Hambrick, 2007). Consequently, a focus on the prize could set the stage for TMT cover-ups of mistakes in the design, production, or distribution of products and services (Wowak, Mannor, and Wowak, 2015). For some top managers, a large vertical pay gap could cause them to rationalize that the heightened risk of unethical behavior is worth the potential payoff of winning the tournament for the top job. That is, the reasonably certain benefit of being evaluated favorably may overshadow the smaller chance that the firm will incur the wrath of shareholders for dishonest behavior (O'Connor *et al.,* 2006). In sum, we expect that strong tournament incentives are likely to exacerbate the potential for the kind of negative behavior that results in a securities class action lawsuit. Therefore, we hypothesize the following:

Hypothesis 1: The vertical pay gap between the CEO's compensation and the average top manager's compensation is positively associated with the likelihood of a securities class action lawsuit, holding constant the average level of compensation of the top managers.

Unrelated diversification

Tournament theory is based on a game-theoretic view of principal-agent relations, and is most explanatory of behavioral outcomes when there is information asymmetry between (1) principals and agents or (2) the agents themselves.[3] The first speaks to the extent to which principals can effectively monitor worker output (Frick, 2003). The second addresses the extent to which workers operate independent of one another (Morgan and Wang, 2010). When either type of information asymmetry is low, tournament incentives become less effective (Connelly *et al.,* 2014).

Tournament theory explains how to elicit worker effort in scenarios where it is difficult or expensive for principals to monitor agent behavior (Becker and Huselid, 1992). In tournament theory, when the monitoring of worker effort is reliable and inexpensive, one can pay workers based on marginal productive output, and promotion choices are straightforward because principals can simply compare marginal contributions. As oversight becomes more costly and unreliable, however, identifying the best candidate becomes increasingly difficult (Ehrenberg and Bognanno, 1990). This problem is exacerbated when it is difficult to evaluate the agents' processes or assess their performance in absolute terms. Under such conditions, large vertical pay gaps with a clear winner are effective because ranking candidates is easier than precisely measuring and comparing marginal product (Henderson and Fredrickson, 2001).

[3] In the case of CEO promotion tournaments, agents are the top managers competing for the job of CEO; principals are a firm's owners, the shareholders. One might also discuss the Board of Directors as principals since the board is the tournament designer that establishes the reward structures and is supposed to represent the shareholders.

Information asymmetry between principals and agents increases the extent to which vertical pay gap is a useful tool for predicting agent behavior.

Moreover, a fundamental assumption of tournament theory is that workers compete relatively independent of one another (Nalebuff and Stiglitz, 1983; O'Reilly, Main, and Crystal, 1988). If this were not the case, the competition would be sub-optimal because it could be marred by collusion and workers could adjust their effort levels up or down based on information about their competitors. Although scholars often use tournament theory to describe promotion tournaments within organizations, such tournaments can involve varying levels of corroboration, information sharing, and interdependence (Main *et al.,* 1993). As a result, tournament theory predictions about the behavioral outcomes of vertical pay gaps should be more accurate when workers truly operate in an independent manner (Bloom and Michel, 2002).

A key organizational factor that affects both kinds of information asymmetry described above is the firm's level of diversification (Hoskisson and Hitt, 1990). At the corporate level, top managers make decisions about which businesses in which they will compete and which they will avoid (Hoskisson and Johnson, 1992). The main tools for implementing these decisions are acquisitions, internal development, and restructuring (Gaughan, 1999). The resultant levels of diversification have been a central component of management research for decades, and a distinguishing feature of this line of study is the specialization, or relatedness, of a firm's portfolio of businesses (Rumelt, 1986). In short, relatedness describes the diversity of businesses in which a firm is engaged (Hoskisson *et al.,* 1993c).

When unrelated diversification is high (i.e., firms participate in many diverse businesses), it becomes more difficult for principals to monitor the behavior of top managers (Baysinger and Hoskisson, 1989). This is because boards, and investors, are boundedly rational and have limited ability to fully gather, process, and understand the strategic complexities associated with dissimilar businesses (Bower, 1970). As unrelated diversification increases, there is a separation of corporate decision making from operational decision making, so the board becomes increasingly divorced from the undertakings of individual business units (Hoskisson, Hitt, and Hill, 1993b). Monitoring the performance of diverse businesses typically devolves into comparing and ranking financial indicators across divisions (Johnson, Hoskisson, and Hitt, 1993; Sundaramurthy and Lewis, 2003).

Similarly, high levels of unrelated diversification also reduce interdependence among members of the top management team (Hill *et al.,* 1992). When firms have business units that are unrelated to one another, there is little need for collaboration among the units (Michel and Hambrick, 1992). Top managers do not share information with one another because lessons learned in, for instance, nuclear power generation have little bearing on how to compete and grow market share in luxury watches. There is little coordination among managers in such firms because they are not likely to work together toward common goals (Sanders and Carpenter, 1998). In fact, firms with high levels of unrelated diversification often instill internal competition between business units as a means to engage top managers and determine resource allocations (Hill *et al.,* 1992; Hoskisson *et al.,* 1993a).

Because high levels of unrelated diversification reduce the ability to monitor top managers and increase the extent to which they work independently, we expect tournament incentives to be particularly meaningful in such scenarios (Henderson and Fredrickson, 2001). As monitoring difficulties increase due to high levels of unrelated diversification, large vertical pay gaps should provide strong incentives for workers to put forth effort without the need for costly supervision. This may include positive effort, but it also encompasses negative effort that could lead to a securities class action lawsuit. Similarly, as interdependencies among tournament participants decrease, also owing to high levels of unrelated diversification, the vertical pay gap becomes more predictive of behavioral outcomes. Again here, we expect this to include both positive and negative effort on the part of top managers, with a view toward winning the tournament. In fact, the independence that arises in firms with high levels of unrelated diversification also means that managers are less able to monitor each other in order to protect against potentially nefarious behavior. Taken together, these arguments lead us to the following:

Hypothesis 2: Unrelated diversification positively moderates the relationship between vertical pay gaps and the likelihood of a securities class action lawsuit (holding constant the average level of compensation of the top managers).

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Environmental uncertainty

One of the economic building blocks of tournament theory is that formal models represent a worker's level of effort by including a stochastic term drawn from the zero-mean density function, which introduces an element of randomness to tournament outcomes (Ehrenberg and Bognanno, 1990). As randomness increases, the optimum level of effort for a given wage spread decreases (Eriksson, 1999). Therefore, in scenarios where contributions of luck, noise, or other random factors to managerial output are especially important, firms may use a larger vertical pay gap to offset the effort-reducing effect of randomness (Lazear, 1995). Strategy research examining the influence of executive compensation structures on positive effort have yet to investigate the extent to which this random component constrains their theory (Conyon *et al.,* 2001; Fredrickson *et al.,* 2010; Henderson and Fredrickson, 2001; Siegel and Hambrick, 2005). We, therefore, extend this body of research on executive compensation by examining how randomness could change the nature of our proposed relationships.

We suggest that environmental uncertainty is an appropriate indicator of external influences that introduce randomness into managerial promotion tournaments. The role of the external environment is rooted in information uncertainty, wherein "under most ordinary conditions, even with simple purposes, not many men can see what each is doing or the whole situation" (Barnard, 1938: 106). Due to bounded rationality (Cyert and March, 1963), executives are limited in their capacities to collect and process information, and thus, are often unable to accurately predict the consequences of their effort. Management scholars have applied these principles to describe how imperfect knowledge about the external environment yields uncertainty about causal relationships between managerial effort and expected outcomes (Lawrence and Lorsch, 1967). Researchers have identified various dimensions of an organization's task environment (Aldrich, 1979), and two key components that characterize its uncertainty: dynamism and complexity (Dess and Beard, 1984).[4]

Dynamism refers to the rate and unpredictability of change in a firm's external environment (Dess and Beard, 1984). Firms operating in a dynamic environment face uncertain demand, changing technologies, variation in customer preferences, and raw material supply fluctuations. When dynamism is high, firm performance is subject to the influence of a wide range of factors beyond the control of top managers. Li and Simerly (1998) note that managers working in highly dynamic environments lack well-developed alternatives or clear evaluation criteria by which to select among them. Thus, performance outcomes may be a function not only of managerial ability, but also of unpredictable external forces acting upon the firm.

Complexity refers to the heterogeneity of external factors facing an organization (Bourgeois, 1980) and captures the extent to which external environments are characterized by intense competition (Jansen, Bosch, and Volberda, 2006). Top managers facing a complex environment encounter greater information-processing requirements than those facing simpler environments (Wiersema and Bantel, 1993). Firms operating in environments with high levels of complexity transact with a wide array of inputs and outputs, which decreases the certainty associated with resource acquisition and disposal (Dollinger and Golden, 1992). As complexity increases, executives must interact with more stakeholders, thus making goals and reward structures less clear (Dess and Beard, 1984). These arguments suggest that managerial effort in complex environments is loosely connected with outcomes because the success of one's effort is a function of a wide range of external dependencies (Hillman, Withers, and Collins, 2009).

As environmental uncertainty in the forms of dynamism and complexity increases, the optimum level of effort that we should expect top managers to expend for a given vertical pay gap decreases (Lazear and Rosen, 1981). This is because high levels of environmental uncertainty obscure the relationship between effort and performance, which infuses an element of noise into promotion outcomes. In standard tournament models, this has a chilling effect on positive effort (DeVaro, 2006b).

[4] A third component, munificence, is another consequential aspect of the external environment that researchers commonly measure. Munificence captures the scarceness or abundance of resources needed by firms (Dess and Beard, 1984). It is most often operationalized as growth in demand in a market over a period of several years. This obviously takes time to change, so munificence is fairly stable and relatively predictable. It is not, therefore, a good fit with what we are trying to capture as randomness in tournament outcomes. Therefore, we control for this dimension of the environment, but do not include it as a component of environmental uncertainty.

The same logic holds for negative effort. If there is a lot of noise in the process of determining promotion outcomes because the environment is characterized by high levels of dynamism and complexity, then top managers are not incentivized to put forth negative effort for a given vertical pay gap. In other words, why take the risk of cheating if the likelihood that it will help win the tournament is diminished? These arguments lead us to conclude the following:

Hypothesis 3: Environmental uncertainty negatively moderates the relationship between vertical pay gaps and the likelihood of a securities class action lawsuit (holding constant the average level of compensation of the top managers).

METHODS

Sample and data

Our sample includes all firms listed in the S&P 1,500 between 1996 and 2012. We chose to begin our sampling window in 1996 because passage of the Private Securities Litigation Reform Act (PSLRA) in 1995 significantly reduced the number of frivolous lawsuits (Choi, 2004). Focusing on the years after the passage of the PSLRA helps to partially address the potential problem of examining firms that have been falsely targeted for a lawsuit despite having done nothing wrong. In addition, we excluded firms in the financial, insurance, bank, and utilities industries for several reasons (McTier and Wald, 2011). First, a number of firms in these industries are named as defendants not because they engaged in fraud, but due to their role as investment bankers or due to other fiduciary responsibilities. Second, these industries are heavily regulated. Therefore, firms in these industries may face a different external environment from firms in unregulated industries, imposing an undue weighting of the sample for our examination of environmental uncertainty.

We complemented securities class action lawsuit information from the Institutional Shareholder Services (ISS) Securities Class Action Services (SCAS) with information from the Securities Class Action Clearinghouse (SCAC) housed at Stanford University. The ISS covers a wide range of lawsuits, including federal, state, and international class actions, and provides more detailed information on the settlement amounts of lawsuits than the Securities Class Action Clearinghouse (SCAC) housed at Stanford University. The ISS securities lawsuit database has been used in recent securities class action lawsuit studies (Brochet and Srinivasan, 2014; Cheng *et al.,* 2010). We used *Compustat* and the *Center for Research in Security Prices* (CRSP) for firm financial and market data and *ExecuComp* and *Risk Metrics* for governance data. This yielded a sample of 1,929 firms over 17 years.

Dependent variable

The dependent variable is *filing of a class action lawsuit*. To help rule out the potential problem of false targeting, we excluded lawsuits that were later dismissed by court. In other words, we examined only lawsuits that led to a settlement in court. No firm was subject to more than one settled lawsuit in a year, so the dependent variable is binary, receiving a value of "1" if the focal firm is sued and "0" otherwise. Actions that lead to these lawsuits vary on the surface but have one distinguishing feature in common: executives withhold material information from shareholders because revealing that information could degrade the firm's stock (Gande and Lewis, 2009). As such, scholars have used this same dichotomous dependent variable with a range of other predictors (Gong, Louis, and Sun, 2008; Harford, Mansi, and Maxwell, 2008; Peng and Roell, 2008). However, to further address the potential problem of false targeting, we created an alternative dependent variable: securities lawsuits with a settlement of $2 million or more. We selected a $2 million threshold because legal studies suggest this as an appropriate amount to separate frivolous from meritorious lawsuits (Choi, 2007; Grundfest, 1995). Among all the firm-year observations in our dataset, there were 419 total securities class action lawsuits, 206 of which were settled in court, and 155 of those gave rise to a settlement of more than $2 million.

Independent variable

The independent variable is each firm's *vertical pay gap*, which captures tournament incentives among top managers. Based on total compensation, we measured vertical pay gap as the difference between the CEO's pay and the average pay of the other four highest-paid members of the TMT (Henderson and Fredrickson, 2001; Kale *et al.,* 2009). We monotonically transformed all observations by taking the

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natural log of the difference to measure the vertical pay gap (Kale *et al.,* 2009). To test the robustness of our results, we also used the *coefficient of variation* to capture pay dispersion among the top five executives, including the CEO. The coefficient of variation is measured as the standard deviation of the total pay awarded to each of the top five executives, including the CEO, divided by the mean of the total pay awarded to those executives.

Moderators

Our study has two moderators. The first is *unrelated diversification*. We used an entropy index to measure unrelated diversification (Palepu, 1985). This is an objective categorical measure that reflects both the number of fundamentally different businesses in which a firm operates and the extent to which sales are evenly distributed among those types. Unrelated diversification arises from operating between two-digit SIC industry groups, with total firm sales as reference (Hoskisson *et al.,* 1993c). This is calculated as follows:

$$\text{Unrelated Diversification} = \Sigma \mathrm{P_j} * \ln\left(1/\mathrm{P_j}\right)$$

where $\mathrm{P_j}$ is the share of sales in each unrelated segment j and ln(1/P) is the weight for each segment j (i.e., the log of the inverse of its sales). We followed Hoskisson *et al.* (1993c) and used two-digit SIC codes as an indicator of unrelated businesses because the first two digits indicate the major industry group (Baysinger and Hoskisson, 1989).

The second moderator is *environmental uncertainty*, which is a composite index of dynamism and complexity. We measured dynamism by following the procedures outlined by Dess and Beard (1984) and Boyd (1995). To do so, we created a regression with total industry sales (based on four-digit SIC codes) as the dependent variable and time as a predictor, based on five years' of data immediately preceding the focal year of analysis. Dynamism is the standard error of the slope of the regression coefficient of time divided by the mean value of total industry sales over the five preceding years. This is an annual, industry-level variable. To measure complexity, we again followed existing research (Boyd, 1990, 1995) and used a Herfindahl index. To do so, we sum the squares of the sales market shares of all firms in each four-digit SIC industry in Compustat. Complexity is then one minus this Herfindahl index so that low values correspond with low levels of complexity. We standardized dynamism and complexity and created a composite index of environmental uncertainty.

Control variables

We included a number of controls to account for firm characteristics that could potentially bias our results. *Firm size* positively affects the likelihood of class action litigation, so we controlled for the natural log of total assets. Following Peng and Roell (2008), we controlled for *market-to-book ratio* (M/B ratio) because firms with high M/B ratios are more likely to be sued. We also controlled for *firm performance* using annual stock returns because firms are more likely to be sued if they fail to generate desirable returns for shareholders. We controlled for *firm long-term debt ratio* (long-term debt divided by total assets) because a high leverage ratio could drive managers to engage in misconduct (McTier and Wald, 2011). We controlled for firms' *tangible asset ratio* (gross property, plant, and equipment divided by total assets) because Strahan (1998) found that firms with more tangible assets are less likely to be sued owing to lower levels of information opacity. Strahan (1998) also found that firms have a higher likelihood of being sued if they do not issue dividends to shareholders, so we controlled for *dividend issuance* using a dummy variable that takes a value of "1" if a firm issued dividends in a fiscal year and "0" otherwise.

We also included controls for several aspects of the TMT. Tournament theory describes the influence of differences in worker pay, irrespective of the level of workers' pay. Therefore, we controlled for the *level of average vice president (VP) total compensation* by taking the average compensation of the four non-CEO executives for each firm. This variable is log-transformed before being entered into regressions. We controlled for *average TMT age* (including CEOs) for two reasons. First, young top managers typically have long career prospects and are likely to be participants in tournament competition. Second, older top executives have a lower tendency to engage in illegal activity (Zahra *et al.,* 2005). We measured average TMT age as the average age of all the top executives. Lastly, a high proportion of outside directors could increase the effects of monitoring on TMT behaviors, thereby mitigating the likelihood of misconduct, so we included a measure of *board independence*.

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We included two measures of relative TMT compensation. Social comparison theory suggests that non-CEO top executives may compare their compensation to one another (Fredrickson *et al.,* 2010), and feelings of injustice arising from such comparisons could lead top managers to engage in behavior leading to a lawsuit. We, therefore, controlled for pay disparity among non-CEO executives by calculating the *VP Gini coefficient* based on the four non-CEO executives. The *Gini coefficient* measures inequality among values, where 1 (or 100%) represents maximal inequality such that, in our case, one person has all of the compensation, and 0 means that all top managers earn precisely the same amount. Thus, in accordance with Kale *et al.* (2009), we calculate the VP Gini coefficient as follows:

$$\text{Gini coefficient} = 1 + \frac{1}{\mathrm{n}} - \frac{2}{\mathrm{n}^2\overline{\mathrm{y}}} \left(\mathrm{y}_1 + 2\mathrm{y}_2 + \ldots + \mathrm{n}\mathrm{y}_\mathrm{n}\right),$$

where $y_1 \ldots y_n$ is each individual VP's total compensation, $\overline{y}$ is the mean compensation of all the VPs, and n is the number of executives, which in our case, equals 4.

Furthermore, top managers may engage in unethical behavior because they are underpaid compared to their peers in other companies. To address this potential alternative explanation, we first used the following variables to predict the level of top executive total compensation: four dummy variables to identify a top executive's position ("CEO", "President and Vice President", "COO", and "CFO"), firm size (the natural log of market capitalization), firm market performance (annual stock returns), top manager tenure, top manager gender, two-digit SIC industry dummy variables, and year dummy variables. We then calculated residuals from the above regression to determine the level of underpayment or overpayment for each executive of every firm in our dataset. Lastly, we calculated the *average TMT pay residual* by taking the average of regression residuals for all five top managers in the focal firm.

We also controlled for several CEO-level variables related to securities fraud. We controlled for *CEO duality,* set to "1" if the CEO is the chair or co-chair of the board in a given year. To distinguish the effects of relative pay from prior work on the type of pay, we controlled for *CEO stock option pay* (ratio of stock option compensation value to total compensation value) and *CEO equity ownership* (percentage of equity ownership by the CEO) (Harris and Bromiley, 2007; Peng and Roell, 2008). Hayward and Hambrick (1997) argued that a large vertical pay gap reflected CEO overconfidence. To address this alternative explanation, we followed Campbell *et al.* (2011) by controlling for CEO overconfidence with a stock option-based measure of overconfidence. The reasoning behind the option-based measure of CEO overconfidence is that a CEO's wealth is undiversified and a rational CEO should exercise his or her options when they vest. An overconfident CEO would hold options, especially deep in the money options for an extended period. The level of CEO overconfidence is thus captured by the number and value of a CEO's vested options. We, therefore, constructed a measure of *CEO overconfidence* as "average-value-per-option/average-strike-price" (Campbell *et al.,* 2011). The average-value-per-option is the total value of the CEO's option holdings scaled by the number of such options, and the average-strike-price is the firm's stock price at the end of the fiscal year less the value per option. Lastly, Malmendier and Tate (2009) found that CEOs who have won prestigious CEO awards are more likely to engage in earnings management, suggesting that high status CEOs are more likely to commit corporate misconduct. To address this possibility, we used the number of outside directorships held by CEOs to proxy CEO social status and prominence (Connelly *et al.,* 2011; Westphal, 1999).

In addition to firm-, TMT-, and CEO-level control variables, we also included a few industry-related controls. Baucus and Near (1991) found that industry growth rate affected the likelihood of corporate illegal activities, so we controlled for *industry growth rate* at the four-digit SIC level (Baucus and Near, 1991). Because shareholders are more likely to sue firms in certain industries (Strahan, 1998), we controlled for the *accumulative number* of securities class action lawsuits at the two-digit SIC level for each fiscal year. Furthermore, we controlled for *environmental munificence* as firms in an environment abundant with resources may be less likely to engage in corporate misconduct. We followed existing research (Boyd, 1990, 1995) to measure environmental munificence. Lastly, we also included industry dummy variables based on one-digit SIC industry classification. We did not include dummy variables for every four-digit SIC industry because doing so would yield a prohibitively large number of dummy variable controls, particularly given that our statistical models are based on maximum likelihood estimation.

Table 1 reports the descriptive statistics for all variables in our study.

Method of analysis

We argued that a large vertical pay gap can elicit negative effort among tournament contestants and lead top managers to get ahead of each other through illicit means. A firm's vertical pay gap can be endogenous (DeVaro, 2006a, 2006b). That is, there may be unobservable factors associated with vertical pay gaps that influence the likelihood of securities class action lawsuits. To address the potential for endogeneity, we tested our hypotheses using two-stage instrumental variable regressions. Given that the dependent variable is binary, we chose probit models with continuous endogenous regressors ("ivprobit" in Stata) to test our hypotheses.

To use instrumental variable probit models, we first need to identify instrumental variables that predict our independent variable (i.e., vertical pay gaps), but do not directly predict our dependent variable (i.e., the likelihood of securities class action lawsuits). Valid instrumental variables should fulfill two requirements: relevance and exogeneity (Kennedy, 2008). We chose the following two instruments: industry average (two-digit SIC codes) vertical pay gaps and the Gini coefficient of household incomes in the county where a firm is located.

For the former, TMT compensation research has shown that firms often benchmark their compensation structures against commonly used industry practices (Faulkender and Yang, 2010; Porac, Wade, and Pollock, 1999), so the industry average vertical pay gap should predict the pay gap of the focal firm; however, the industry average vertical pay gap is unlikely to exert a direct influence on the likelihood of securities class action lawsuits. To measure the industry average vertical pay gap, we first used ExecuComp to calculate the vertical pay gap for every company in the database, then took the average of vertical pay gaps based on two-digit SIC codes.

For the other instrumental variable, firms located in counties with high levels of household income disparity may have high levels of vertical pay gaps because firm compensation practices could be influenced by community-level institutions (Marquis and Battilana, 2009). Firms located in communities with high levels of income disparity are more likely to use strong tournament incentives; however, there is no reason to expect that the Gini coefficient of household income at the county level should exert a direct influence on the likelihood of securities class action lawsuits. We obtained data on the county-level Gini coefficient of household income from the U.S. Census and matched the data with counties where firms are located.

RESULTS

Primary analyses

Main effects

Table 2 reports regression results used to test Hypothesis 1. The dependent variable of Models 1–3 is securities class action lawsuits that resulted in settlements. Model 1 presents probit regression results. In Model 1, the coefficient estimate of vertical pay gap is positive and statistically significant (0.162, $p < 0.01$). Model 2 presents results from the first-stage regression used to predict the vertical pay gap. Coefficient estimates of the two instruments are positive and statistically significant ($p < 0.05$), suggesting that these two instruments are relevant to the vertical pay gap. Model 3 presents the second-stage regression with the predicted vertical pay gap as the independent variable. The coefficient estimate of vertical pay gap is positive and statistically significant (1.922, $p < 0.01$). The coefficient estimate of the independent variable in Model 3 is larger than that in Model 1 (1.922 vs. 0.162), suggesting that Model 1 may have underestimated the impact of vertical pay gaps on the probability of securities lawsuits.

In Models 4 and 5, we test the same hypothesis but with an alternative operationalization of the dependent variable. In these models, the dependent variable is measured as securities class action lawsuits with a settlement of more than $2 million. Model 4 presents probit regression results wherein the coefficient estimate of vertical pay gap is positive and statistically significant (0.155, $p < 0.05$). Model 5 presents results from the second-stage probit regression with the predicted vertical pay gap as the independent variable. The coefficient estimate of vertical pay gap is positive and statistically significant (1.929, $p < 0.01$), which lends additional support to Hypothesis 1 by showing that the results are robust to an alternative measure of

Table 1. Descriptive statistics

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Settled lawsuit	0.013	0.115	1.000												
2. Two million settlement lawsuit	0.010	0.098	0.738	1.000											
3. Vertical pay gap (in thousands $)	3,575.773	9,711.563	0.035	0.040	1.000										
4. Coefficient of variation	0.666	0.278	0.035	0.035	0.327	1.000									
5. Unrelated diversification	0.206	0.327	−0.019	−0.010	0.058	0.044	1.000								
6. Environmental uncertainty	−0.014	1.458	−0.010	−0.009	−0.001	−0.007	0.044	1.000							
7. Total asset (in millions $)	5,741.422	17,970.710	0.008	0.018	0.128	0.017	0.201	0.064	1.000						
8. Market-to-book ratio	3.162	3.257	0.049	0.071	0.090	0.054	−0.066	−0.062	0.002	1.000					
9. Annual stock return	0.093	0.493	0.012	0.017	−0.026	−0.017	−0.012	0.037	−0.020	0.104	1.000				
10. Long-term debt ratio	0.211	0.175	−0.001	−0.001	0.029	0.058	0.109	0.048	0.083	−0.094	−0.025	1.000			
11. Tangible asset ratio	0.529	0.362	−0.025	−0.028	−0.032	−0.031	0.017	0.167	0.008	−0.103	0.014	0.197	1.000		
12. Dividend	0.539	0.498	−0.030	−0.022	0.061	0.015	0.216	0.062	0.136	0.013	−0.041	0.116	0.184	1.000	
13. Avg VP pay (in thousands $)	1,772.964	2,407.861	0.044	0.060	0.367	0.135	0.100	0.000	0.342	0.151	−0.031	0.026	−0.078	0.079	1.000
14. Avg TMT age	50.846	4.006	−0.035	−0.044	0.017	−0.039	0.145	0.072	0.135	−0.076	−0.017	0.051	0.098	0.196	0.042
15. Board independence	0.686	0.169	−0.013	−0.031	0.043	0.086	0.095	0.034	0.072	0.011	−0.009	0.008	0.026	0.090	0.052
16. VP Gini coefficient	0.179	0.113	0.023	0.034	0.086	0.477	0.004	−0.020	0.014	0.047	−0.035	0.033	−0.072	−0.063	0.203
17. Avg TMT pay residual	0.045	0.561	0.033	0.036	0.149	0.092	0.024	−0.021	−0.007	−0.050	0.003	0.130	−0.059	−0.060	0.184
18. CEO option pay ratio	0.218	0.289	0.040	0.074	0.135	0.145	−0.022	−0.044	−0.019	0.149	−0.041	−0.023	−0.036	−0.081	0.118
19. CEO equity ownership	0.007	0.024	−0.013	−0.022	−0.030	−0.019	−0.025	−0.033	−0.036	−0.019	−0.008	−0.056	−0.047	−0.061	−0.036
20. CEO duality	0.597	0.490	0.009	0.016	0.048	0.058	0.110	0.002	0.068	0.024	−0.016	0.072	0.047	0.098	0.050
21. Number of outside directorships	0.578	0.851	−0.006	−0.002	0.075	0.090	0.146	−0.016	0.064	0.021	−0.017	0.101	0.060	0.156	0.086
22. CEO confidence	0.377	0.690	0.025	0.039	−0.016	−0.023	−0.064	0.001	−0.044	0.224	0.289	−0.075	−0.069	−0.094	0.009
23. Industry growth rate	−0.265	2.919	−0.002	0.002	0.005	0.005	−0.011	−0.083	−0.007	0.030	−0.059	0.003	0.003	0.007	0.005
24. Number of industry suits	6.531	14.815	0.042	0.054	0.049	0.039	−0.117	−0.146	−0.031	0.182	0.028	−0.148	−0.205	−0.180	0.088
25. Environmental munificence	4.712	11.076	0.012	0.014	0.058	0.029	−0.026	−0.012	−0.014	0.142	−0.003	−0.106	0.006	−0.052	0.080
26. Industry vertical pay gap (in thousands $)	3,153.328	1,807.518	0.011	0.008	0.090	0.063	−0.005	−0.093	0.065	0.040	−0.054	0.042	0.003	0.005	0.159
27. Household Gini coefficient	0.462	0.025	0.019	0.022	0.049	0.046	0.040	−0.007	0.073	0.005	0.005	0.004	−0.053	−0.019	0.076

Table 1. *Continued*

Variables	14	15	16	17	18	19	20	21	22	23	24	25	26	27
14. Avg TMT age	1.000													
15. Board independence	0.000	1.000												
16. TMT Gini coefficient	−0.031	−0.116	1.000											
17. Avg TMT pay residual	−0.042	0.069	0.051	1.000										
18. CEO option pay ratio	−0.142	−0.142	0.071	0.085	1.000									
19. CEO equity ownership	0.008	0.000	0.004	−0.033	−0.205	1.000								
20. CEO duality	−0.047	0.050	−0.012	0.052	0.088	0.061	1.000							
21. Number of outside directorships	0.085	0.098	−0.003	0.064	0.063	−0.071	0.159	1.000						
22. CEO confidence	−0.073	−0.082	0.021	0.020	−0.001	−0.001	−0.011	−0.049	1.000					
23. Industry growth rate	−0.016	−0.018	0.017	0.002	0.014	0.000	0.009	0.005	0.011	1.000				
24. Number of industry suits	−0.141	−0.064	0.081	0.025	0.165	−0.014	−0.014	−0.031	0.129	0.052	1.000			
25. Environmental munificence	−0.130	−0.073	0.079	0.054	0.059	0.001	0.010	−0.009	0.096	0.048	0.153	1.000		
26. Industry vertical pay gap (in thousands $)	0.015	0.021	0.060	0.078	0.003	0.011	0.001	0.042	0.037	0.014	0.196	0.139	1.000	
27. Household Gini coefficient	−0.005	−0.018	0.046	0.087	−0.003	0.013	0.021	−0.006	0.015	0.010	0.020	0.029	0.034	1.000

Note: N = 15,758. Absolute value of correlations greater than 0.02 statistically significant at $p < 0.05$ for two-tailed tests.

our dependent variable. Based on results reported in Model 3, we calculated the economic magnitude of the relationship between vertical pay gap and the likelihood of lawsuits. Specifically, we held all other variables at their means and calculated the probability of securities lawsuits when the vertical pay gap takes its 25th percentile value (the probability is 0.56%) and its 75th percentile value (the probability is 15.9%) separately. In other words, the likelihood of securities lawsuits increases by 15.34 percent (15.9% – 0.56% = 15.34%) when the vertical pay gap increases from its 25th percentile value to its 75th percentile value.

To test the validity of our two instruments, we ran generalized method of moments (GMM) instrumental variable regressions using "ivreg2" in Stata, which provides tests of instrument relevance and exogeneity (Baum, Schaffer, and Stillman, 2003). Model 6 presents results from the GMM instrumental variable (IV) regression. The coefficient estimate of vertical pay gap in Model 6 is positive and statistically significant ($p < 0.05$). The Hansen test yielded a value of 0.002 (p-value of 0.969), failing to reject the null hypothesis that the instruments are exogenous. The Cragg-Donald Wald F statistic is 29.936, which exceeds the minimum levels specified by Stock and Yogo (2005) for the strength of the instruments. These test statistics indicate that our two instrument variables can be considered relevant and exogenous. In Model 7, we presented the results with the alternative measure of our independent variable—the variation of coefficient. The coefficient estimate of variation of coefficient is positive and statistically significant (4.058, $p < 0.01$), supporting Hypothesis 1.

Moderating effects

Table 3 presents the regression results used to test the two moderating hypotheses. The dependent variable in Models 1–5 is all settled lawsuits. In Model 1, the coefficient estimate of the interaction between vertical pay gap and unrelated diversification is positive and statistically significant (0.063, $p < 0.05$). In addition, in Model 2, the coefficient estimate of the interaction term between predicted vertical pay gap (based on first-stage regressions including the two instruments) and unrelated diversification is positive and statistically significant (0.053, $p < 0.05$), thus supporting Hypothesis 2, which states that the impact of the vertical pay gap on the likelihood of being the subject of a securities

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Table 2. Tournament incentives and likelihood of securities lawsuits

Variable	Probit Model 1	IV probit Model 2	Model 3	Probit Model 4	IV probit Model 5	GMM Model 6	IV probit Model 7
Constant	−3.353***	5.016***	−11.699***	−3.144***	−11.608***	−0.666**	−3.137***
	[0.564]	[0.192]	[0.758]	[0.637]	[0.636]	[0.324]	[0.652]
Firm size	0.051	0.120***	−0.197***	0.066*	−0.182***	−0.011	−0.151***
	[0.032]	[0.009]	[0.047]	[0.037]	[0.042]	[0.007]	[0.029]
Market-to-book ratio	0.028***	0.010***	−0.004	0.028***	−0.006	0.001	−0.010
	[0.007]	[0.002]	[0.010]	[0.007]	[0.009]	[0.001]	[0.010]
Stock return	0.096*	0.022**	0.012	0.156**	0.046	0.002	−0.020
	[0.057]	[0.011]	[0.044]	[0.064]	[0.050]	[0.003]	[0.040]
Long-term debt ratio	0.177	−0.022	0.109	0.037	0.011	0.007	0.087
	[0.163]	[0.041]	[0.117]	[0.188]	[0.119]	[0.008]	[0.111]
Tangible asset ratio	−0.056	−0.042**	0.046	−0.103	0.011	0.003	0.037
	[0.094]	[0.020]	[0.060]	[0.115]	[0.067]	[0.004]	[0.056]
Dividend	−0.150**	0.066***	−0.192***	−0.133*	−0.180***	−0.010**	−0.085
	[0.066]	[0.014]	[0.044]	[0.077]	[0.045]	[0.005]	[0.059]
CEO option pay ratio	−0.139	0.611***	−1.193***	−0.109	−1.213***	−0.067*	−0.922***
	[0.135]	[0.036]	[0.147]	[0.149]	[0.127]	[0.034]	[0.091]
CEO equity ownership	−1.658	−0.337	−0.160	0.348	0.892	0.013	0.069
	[1.941]	[0.297]	[1.088]	[2.324]	[1.006]	[0.044]	[0.867]
CEO duality	0.044	0.047***	−0.068	−0.021	−0.099**	−0.004	−0.104***
	[0.057]	[0.013]	[0.043]	[0.067]	[0.039]	[0.003]	[0.038]
Number of outside directorships	−0.061*	0.016**	−0.059**	−0.060	−0.063***	−0.004**	−0.081***
	[0.033]	[0.008]	[0.023]	[0.037]	[0.023]	[0.002]	[0.021]
CEO confidence	0.035	−0.022**	0.055	−0.006	0.022	0.004	0.028
	[0.063]	[0.010]	[0.037]	[0.073]	[0.039]	[0.003]	[0.030]
Avg VP pay (log)	−0.052	0.239***	−0.471***	−0.025	−0.462***	−0.028**	0.302***
	[0.067]	[0.018]	[0.073]	[0.079]	[0.070]	[0.014]	[0.031]
Avg TMT age	−0.004	−0.002	0.002	−0.013	−0.001	0.000	0.013***
	[0.008]	[0.002]	[0.005]	[0.009]	[0.006]	[0.000]	[0.005]
Board independence	0.119	0.090**	−0.102	0.011	−0.129	−0.007	−0.589***
	[0.174]	[0.041]	[0.120]	[0.202]	[0.120]	[0.009]	[0.124]
VP Gini coefficient	0.301	−0.463***	1.006***	0.338	1.100***	0.063**	−4.943***
	[0.247]	[0.066]	[0.180]	[0.259]	[0.172]	[0.029]	[0.453]
Avg TMT pay residual	0.092	0.120***	−0.179***	0.099	−0.180***	−0.008	−0.122***
	[0.059]	[0.014]	[0.064]	[0.064]	[0.055]	[0.007]	[0.045]
Industry growth rate	−0.023**	0.002	−0.015**	−0.024**	−0.015**	−0.001**	−0.010
	[0.009]	[0.001]	[0.007]	[0.012]	[0.007]	[0.000]	[0.007]
Industry suits (log)	0.053*	−0.004	0.030	0.080**	0.037	0.002*	0.013
	[0.028]	[0.005]	[0.020]	[0.032]	[0.023]	[0.001]	[0.021]
Environmental munificence	−0.000	0.001	−0.002	−0.001	−0.003*	−0.000	−0.002*
	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]	[0.000]	[0.001]
Industry vertical pay gap (log)		0.028**					
		[0.012]					
Household Gini coefficient		0.565**					
		[0.281]					
Industry and year fixed effects	Y	Y	Y	Y	Y	Y	Y
Vertical pay gap (log)	0.162***		1.922***	0.155**	1.929***	0.111**	
	[0.060]		[0.225]	[0.067]	[0.173]	[0.055]	
TMT variation of coefficient							4.058***
							[0.335]
Cragg-Donald Wald F statistic						26.936	
Stock-Yogo critical value						19.93	
Hansen J statistic						0.002	
Observations			15,181	13,680	13,133	15,298	15,346
Chi-squared	185.2		1,386	205.1	1,578		3,286
Log-likelihood	−1,029		−11,167	−755.3	−9,687	10,109	−830.3

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$. Two-tailed tests

The dependent variable for Models 1–3 and Models 6 and 7 is all the settled lawsuits and the dependent variable for Models 4 and 5 is lawsuits with a settlement more than $2 million. The independent variable for Model 7 is the variation of coefficient for all the top managers, including CEOs. Models 5 and 7 only report results for second-stage results.

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Table 3. Moderating effects of unrelated diversification and environmental uncertainty

	Settled lawsuits					More than $2 million settlement lawsuits				
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Constant	−1.840***	11.155**	−2.026***	8.278*	11.480**	−1.823***	10.733**	−1.831***	12.930**	11.691**
	[0.616]	[4.944]	[0.520]	[4.307]	[4.907]	[0.618]	[4.985]	[0.591]	[5.473]	[4.995]
Firm size	0.046	−0.500**	0.052	−0.381**	−0.506**	0.054	−0.472**	0.066*	−0.498**	−0.506**
	[0.039]	[0.211]	[0.032]	[0.178]	[0.205]	[0.039]	[0.212]	[0.037]	[0.210]	[0.209]
Market-to-book ratio	0.033***	−0.010	0.027***	−0.007	−0.013	0.031***	−0.010	0.027***	−0.022	−0.016
	[0.008]	[0.018]	[0.007]	[0.015]	[0.018]	[0.008]	[0.018]	[0.007]	[0.020]	[0.018]
Stock return	0.156**	0.060	0.098*	0.021	0.069	0.162**	0.071	0.158**	0.032	0.065
	[0.066]	[0.075]	[0.058]	[0.064]	[0.072]	[0.066]	[0.075]	[0.064]	[0.079]	[0.073]
Long-term debt ratio	0.047	0.073	0.169	0.206	0.098	0.013	0.034	0.034	0.153	0.066
	[0.192]	[0.196]	[0.164]	[0.167]	[0.192]	[0.194]	[0.199]	[0.189]	[0.208]	[0.195]
Tangible asset ratio	−0.060	0.111	−0.049	0.082	0.067	−0.078	0.088	−0.102	0.043	0.074
	[0.119]	[0.147]	[0.095]	[0.111]	[0.141]	[0.119]	[0.148]	[0.117]	[0.137]	[0.141]
Dividend	−0.134*	−0.424***	−0.152**	−0.376***	−0.429***	−0.135*	−0.415***	−0.136*	−0.437***	−0.434***
	[0.081]	[0.145]	[0.066]	[0.119]	[0.140]	[0.082]	[0.146]	[0.077]	[0.146]	[0.143]
CEO option pay ratio	−0.170	−2.933***	−0.138	−2.310***	−2.944***	−0.123	−2.792***	−0.106	−2.950***	−2.973***
	[0.150]	[1.046]	[0.135]	[0.895]	[1.028]	[0.150]	[1.054]	[0.149]	[1.058]	[1.047]
CEO equity ownership	0.350	2.200	−1.582	−0.195	2.723	0.379	2.166	0.410	2.238	2.395
	[2.317]	[2.484]	[1.925]	[1.999]	[2.273]	[2.295]	[2.465]	[2.317]	[2.497]	[2.466]
CEO duality	−0.036	−0.253**	0.046	−0.126	−0.226**	−0.040	−0.250**	−0.017	−0.264**	−0.250**
	[0.068]	[0.107]	[0.057]	[0.092]	[0.105]	[0.068]	[0.108]	[0.067]	[0.114]	[0.106]
Number of outside directorships	−0.067*	−0.134***	−0.065**	−0.119***	−0.130***	−0.070*	−0.133***	−0.062*	−0.144***	−0.134***
	[0.040]	[0.049]	[0.033]	[0.040]	[0.046]	[0.041]	[0.049]	[0.037]	[0.049]	[0.047]
CEO confidence	−0.040	0.045	0.037	0.110	0.075	−0.040	0.039	−0.005	0.118	0.082
	[0.077]	[0.086]	[0.063]	[0.070]	[0.081]	[0.077]	[0.086]	[0.073]	[0.088]	[0.082]
Avg VP pay (log)	−0.026	−1.111***	−0.052	−0.909**	−1.124***	−0.034	−1.082**	−0.030	−1.262***	−1.146***
	[0.080]	[0.425]	[0.068]	[0.365]	[0.416]	[0.080]	[0.428]	[0.079]	[0.469]	[0.424]
Avg TMT age	−0.013	−0.004	−0.004	0.004	−0.001	−0.013	−0.004	−0.012	−0.003	−0.002
	[0.009]	[0.010]	[0.008]	[0.008]	[0.010]	[0.009]	[0.010]	[0.009]	[0.010]	[0.010]
Board independence	0.022	−0.456*	0.133	−0.206	−0.380	−0.007	−0.474*	0.021	−0.529**	−0.423*
	[0.207]	[0.252]	[0.174]	[0.209]	[0.240]	[0.206]	[0.252]	[0.202]	[0.253]	[0.243]
VP Gini coefficient	0.539*	2.614***	0.306	1.976***	2.543***	0.559**	2.567***	0.336	0.725**	2.659***
	[0.277]	[0.830]	[0.247]	[0.729]	[0.809]	[0.278]	[0.837]	[0.261]	[0.299]	[0.823]
Avg TMT pay residual	0.125*	−0.422*	0.096	−0.336*	−0.445**	0.115*	−0.413*	0.100	−0.537**	−0.470**
	[0.065]	[0.218]	[0.059]	[0.192]	[0.212]	[0.065]	[0.220]	[0.064]	[0.242]	[0.216]
Industry growth rate	−0.023*	−0.032**	−0.022**	−0.027***	−0.031**	−0.023*	−0.032**	−0.023*	−0.033***	−0.031**
	[0.012]	[0.013]	[0.009]	[0.009]	[0.012]	[0.012]	[0.013]	[0.012]	[0.012]	[0.012]

Table 3. *Continued*

	Settled lawsuits					More than $2 million settlement lawsuits				
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Industry suits (log)	0.078**	0.086***	0.051*	0.060**	0.087***	0.076**	0.085***	0.079**	0.094***	0.091***
	[0.033]	[0.032]	[0.028]	[0.028]	[0.032]	[0.033]	[0.032]	[0.032]	[0.032]	[0.032]
Environmental munificence	−0.002	−0.007**	−0.001	−0.005*	−0.008***	−0.001	−0.006**	−0.001	−0.005**	−0.008***
	[0.002]	[0.003]	[0.002]	[0.003]	[0.003]	[0.002]	[0.003]	[0.002]	[0.002]	[0.003]
Industry and year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Unrelated diversification	−0.014	0.005			−0.024	−0.011	0.007			−0.015
	[0.040]	[0.039]			[0.039]	[0.040]	[0.039]			[0.039]
Environmental uncertainty			−0.013	0.005	0.023			−0.006	0.026	0.026
			[0.020]	[0.029]	[0.032]			[0.025]	[0.032]	[0.032]
Vertical pay gap	0.090**		0.094**			0.085*		0.094**		
	[0.044]		[0.041]			[0.044]		[0.044]		
Predicted vertical pay gap		2.159***		1.720**	2.198***		2.083***		2.354***	2.236***
		[0.793]		[0.677]	[0.775]		[0.800]		[0.843]	[0.790]
Pay gap × unrelated divers.	0.063***					0.062**				
	[0.025]					[0.025]				
Predicted pay gap × unrelated divers.		0.053**			0.050**		0.052**			0.046*
		[0.026]			[0.025]		[0.026]			[0.025]
Pay gap × uncertainty			−0.045**					−0.034**		
			[0.020]					[0.014]		
Predicted pay gap × uncertainty				−0.053**	−0.034*				−0.038*	−0.033*
				[0.021]	[0.020]				[0.020]	[0.019]
Observations	13,057	12,594	15,734	15,170	13,111	13,057	12,594	13,666	13,185	13,111
Chi-squared	196.4	186.0	196.2	176.9	204.6	191.7	182.6	214.6	199.4	197.2
Log-likelihood	−715.2	−703.2	−1,026	−1,008	−754.1	−709.4	−697.1	−754.0	−740.8	−735.0

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$. Two-tailed tests
The dependent variable for Models 1–5 is all the settled lawsuits, and the dependent variable for Models 6–10 is lawsuits with a settlement more than $2 million. The independent variable for Models 1, 3, 5, 7, and 9 is vertical pay gap, and the independent variable for Models 2, 4, 6, 8, and 10 is predicted vertical pay gap from first-stage regressions with the two instruments. Vertical pay gap, predicted vertical pay gap, unrelated diversification, and uncertainty are standardized.

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lawsuit is stronger for firms with high levels of unrelated diversification. In Model 3, the coefficient estimate of the interaction between vertical pay gap and environmental uncertainty is negative and statistically significant (-0.045, $p < 0.05$). In Model 4, we interacted the predicted vertical pay gap with environmental uncertainty and found that the coefficient estimate is still negative and statistically significant (-0.053, $p < 0.05$). This lends support to Hypothesis 3, positing that the influence of the vertical pay gap on the likelihood that a firm will be the subject of a securities class action lawsuit is weaker in the presence of high environmental uncertainty. Model 5 shows a saturated model with both interaction terms, and the coefficient estimates are still statistically significant in the hypothesized directions.

In Models 6–10 of Table 3, we test the same moderators, but with our alternative operationalization of the dependent variable—securities lawsuits with a settlement of more than \$2 million. In Model 6, the coefficient estimate of the interaction between vertical pay gap and unrelated diversification is positive and statistically significant (0.062, $p < 0.05$). In Model 7, the coefficient estimate of the interaction between predicted vertical pay gap and unrelated diversification is also positive and statistically significant (0.052, $p < 0.05$), thus lending further support to Hypothesis 2. In Model 8, the coefficient estimate of the interaction between vertical pay gap and environmental uncertainty is negative and statistically significant (-0.034, $p < 0.01$). In Model 9, the coefficient estimate of the interaction between predicted vertical pay gap and environmental uncertainty is also negative and statistically significant (-0.038, $p < 0.01$), providing further support for Hypothesis 3. Model 10 again shows a saturated model.

To gain a richer understanding of the moderating effects of unrelated diversification and environmental uncertainty, we graphed 3-D interactions based on the predictive equation derived from the coefficient estimates of Model 5 of Table 3 (the saturated model using our primary operationalization of the dependent variable). Figure 1 shows that the firms with low levels of unrelated diversification and a low vertical pay gap face the lowest likelihood of encountering a securities class action lawsuit. In contrast, firms with high levels of unrelated diversification and a large vertical pay gap face the greatest likelihood of becoming the subject of a securities class action lawsuit. Similarly, Figure 2 shows that firms face the highest likelihood of becoming the subject of a lawsuit when they have a high vertical pay gap and operate in a low-uncertainty environment. Conversely, they have the lowest likelihood of experiencing a lawsuit when their vertical pay gap is low and they operate in a highly uncertain environment. As shown in Figure 2, a high vertical pay gap is still positively associated with the likelihood of securities lawsuits when environment uncertainty takes its highest value.

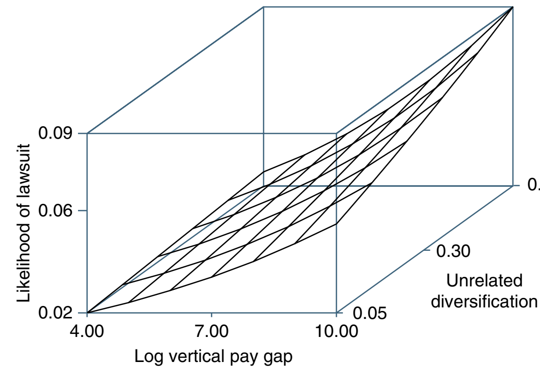

Figure 1. The moderating effect of unrelated diversification

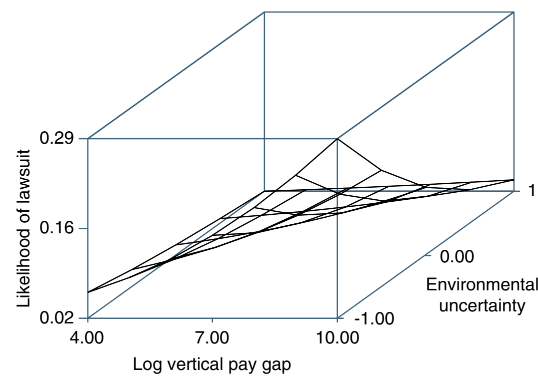

Figure 2. The moderating effect of environmental uncertainty

Supplementary analyses

Extraneous unobservable factors

To control for the influence of unobservable time-invariant firm-level heterogeneity on the likelihood of securities lawsuits, we repeated our analyses using fixed-effects logistic regressions and fixed-effects OLS regressions. Using fixed-effects logistic regressions, we found that the coefficient estimate of vertical pay gap is positive and statistically significant (0.341, $p < 0.05$). Our results for the two moderators also remain largely the same using fixed-effects logistic regressions. Fixed-effects logistic regressions can only model firms that have time-variant dependent variables (Allison, 2005), so we repeated our analyses using fixed-effects OLS regressions. Doing so allowed us to include firms with time-invariant dependent variables, while controlling for time-invariant firm-level unobservable factors. With fixed-effects OLS regressions, we found that the coefficient estimate of vertical pay gap is positive and statistically significant (0.009, $p < 0.05$). We also found statistically significant results for the moderating hypotheses. These results provide relatively consistent support that our results are not affected by extraneous time-invariant firm-level unobservable factors. Results for supplementary analyses are available on request.

False targeting

Some companies may be targeted by shareholders in securities class action lawsuits (Graffin *et al.,* 2013) even though those companies may have done nothing particularly wrong. This is essentially a false positive, or Type I error. To the extent that this becomes commonplace, it could bias our results. To address this potential problem, we created a matched-pair sample of treatment firms (i.e., sued firms) and control firms (i.e., firms that were not sued) using propensity score matching. We exact-matched on two-digit SIC codes and lawsuit year. We matched firms based on size (natural log of market capitalization), performance (annual stock returns), and natural log of CEO total compensation. We used the nearest-neighbor matching technique without replacement (Rosenbaum and Rubin, 1983). This yielded 206 lawsuit firms and 206 control firms. To analyze this data, we used conditional logistic regression, which recognizes the conditional nature of the probabilities that matched-pair samples create (Manski and Lerman, 1977). Using this matched sample, we found statistically significant results for our three hypotheses.

We also addressed the potential problem of false targeting in another way. Studies find that, in the aftermath of corporate misconduct, TMT members face a more than doubled likelihood of losing their job (Agrawal, Jaffe, and Karpoff, 1999). Although top managers are defendants in most securities litigation, there may be cases where top managers are not directly responsible for securities fraud. Therefore, to better capture our intended construct of managerial fraud, we conducted a supplementary analysis wherein we limited our sample to firms that were subject to a securities class actions lawsuit and lost a member of the TMT within three years. Using this limited subsample, we found that the coefficient estimate of vertical pay gap remain positive and statistically significant ($p < 0.05$). The coefficient estimates of the interaction terms also remain statistically significant in these models. These results suggest that false targeting is unlikely to be driving our results.

Unobserved fraud

Studies on corporate misconduct suffer from a common problem wherein researchers can only observe securities fraud that has been detected or, in our case, has resulted in a securities class action lawsuit. We cannot directly observe fraud that has been committed but not yet detected or brought to court. This is essentially a false negative, or Type II error. To address this concern, we re-examined our main effects using a bivariate probit analysis with partial observability (Wang, 2013; Wang, Winton, and Yu, 2010). In this analysis, to further rule out frivolous lawsuits, we used securities lawsuits with a settlement of more than \$2 million as the dependent variable. Among these, there could be some frivolous lawsuits; therefore, we defined this dependent variable as alleged fraud. The alleged fraud is modeled as a function of the joint outcome of two latent variables: fraud commitment and fraud detection (i.e., a securities class action lawsuit) given fraud commitment. Though bivariate probit models with partial observability are theoretically attractive, such models are empirically difficult to implement because they cause significant loss of efficiency and often give rise to parameter estimation failures (Poirier, 1980). There are two requirements for successful implementation of bivariate probit models with partial observability. First, variables used estimate fraud commitment and fraud detection need to be different. Second, variables need to exhibit substantial variation in the sample (Wang, 2013). We were unable to test the two moderating hypotheses using bivariate probit model with partial observability because there may not be sufficient variation among interaction terms, the independent variable, and moderators. We, therefore, used bivariate probit models with partial observability to check our main effect.

To estimate a bivariate probit model with partial observability, we followed Wang (2013) to identify factors that separately influence the likelihood of securities fraud commitment and the likelihood of securities fraud detection. We found that the coefficient estimate of vertical pay gap is positive and statistically significant for fraud commitment ($p < 0.05$), suggesting that our results may not be biased by Type II error, or unobserved fraud.

DISCUSSION

Relying on tournament theory, our study examined the influence of relative executive compensation on the likelihood of a securities class action lawsuit. We found that the vertical pay gap between the CEO's compensation and the average compensation of the non-CEO TMT is positively associated with securities class action lawsuits. Our results held using an alternative operationalization of the dependent variable and in supplementary analyses that consider the possibility of both Type I (false targeting) and Type II (unobserved fraud) error with respect to the lawsuits. Our examination also uncovers two key boundary conditions that moderate the influence of tournament incentives on the likelihood of securities lawsuits. As shown in Figures 1 and 2, the influence of the vertical pay gap on lawsuits is strong in firms with high levels of unrelated diversification but diminished in highly uncertain environments. We expect these results could have important implications for research on misconduct, top management teams, and tournament theory.

For management researchers working in the area of organizational misconduct (Greve *et al.,* 2010), our study offers some intriguing new ideas. To begin, we analyze a specific type of misconduct—securities fraud—that has garnered considerable interest from Wall Street to Washington, DC, but that has yet to receive sufficient attention from management researchers. We believe that management research on promotion tournaments adds value to the extant, mainly atheoretical, treatments of securities fraud (McTier and Wald, 2011). Although a large vertical pay gap may elicit positive effort from top executives to improve firm performance, our findings reveal that it may also motivate top managers to engage in behavior that leads to outcomes exactly opposite to what shareholders want.

Future management research on corporate misconduct might build on our foray into securities class action lawsuits by incorporating new ideas and organizational theories. For instance, it would be interesting to integrate our study with social network theory to help explain how securities fraud diffuses throughout the network of top managers. Similarly, upper echelon research could be informative as well, and help us understand which top managers' personal attributes and experiences shape the influence of the vertical pay gap on the likelihood of securities fraud. Researchers might also identify other boundary conditions of our theory. For example, the tournament relationships we examine may be less pronounced in cultures with high power distance or in firms with celebrity CEOs.

Our study also has implications for research on TMT compensation. Our findings show that the negative influence of a large vertical pay gap extends beyond shirking (Bloom and Milkovich, 1998) and uncooperativeness (Bloom, 1999) to the more dire consequence of a securities class action lawsuit. Further consideration of this matter might incorporate the aspect of time. We expect that wide vertical pay gaps could potentially yield competitive benefits for the firms that increase short-term performance, but have negative implications in the form of increased risk of a securities lawsuit may take hold over time (Connelly *et al.,* forthcoming). Future research might inquire about what actions boards can take to mitigate the risks associated with wide vertical pay gaps. For instance, stacking the board with prestigious directors changes the relative power of the CEO vis-à-vis the board, which could change the nature of competition among top executives for the top spot.

Lastly, our study may also be of interest to those that use tournament theory. Research on promotion tournaments is mainly concerned with positive effort brought on by wide vertical pay gaps (Kepes, Delery, and Gupta, 2009), but some have extended this to describe a "dark side" of promotion tournaments that results in activities, such as withholding of information and turnover (Bloom and Michel, 2002). We build on this work by examining the extent to which vertical pay gaps have unique influences on extremely negative, and illegal, behavior. Furthermore, our results reinforce the notion that TMT compensation and organizational characteristics should be studied in tandem because the effects are far from uniform across different types of organizations. Our findings on the moderating influence of unrelated diversification confirm that tournament theory is most predictive

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of behavioral outcomes when workers operate independently and when principals cannot readily monitor worker processes. Moreover, management researchers examining promotion tournaments have yet to incorporate randomness into their models. This is a foundational aspect of tournament theory, and our findings reveal that it serves as a restriction on the theory's predictions.

Future research could also delve into tournament theory more deeply. For instance, we examined randomness using one operationalization that made sense for our broad sample, but scholars might consider the influence of other aspects of randomness. We would expect tournament outcomes to be less pronounced in firms that historically make promotions based on factors other than effort (e.g., gender, race, or within the family). In addition, a firm's ownership structure could change the nature of the tournament theory relationships investigated herein. Those with high-quality shareholders dedicated to long-term ownership might find themselves under a higher level of external scrutiny such that a wide vertical pay gap has less influence on the likelihood of fraud.

Practical implications

Our findings present a paradox for boards of directors who make top manager compensation decisions. On the one hand, a large vertical pay gap can motivate top managers to increase their productivity. On the other, such motivation may also drive top managers to engage in undesirable and even destructive activities to boost their relative ranking, which is detrimental to shareholder interests. Directors are highly motivated to ensure that the firm is consistently improving their performance and increasing quarterly earnings as the shareholders they represent typically demand; however, our findings may give them pause. Directors are, after all, gatekeepers who are responsible for ensuring that managers act in appropriate ways so that shareholders do not get burned. While firms may wish to pay some top managers more than others to attract outside hires, recognize particular effort, or retain talent, we show that doing so comes with a potential cost.

Investors and regulators may also have a vested interest in our findings insofar as it could help them identify at-risk firms. Institutional investors, which represent the majority of U.S. equities, aggressively look for profit potential in the firms in which they invest, but many of them, including pension funds, insurance companies, endowments, and other dedicated institutional investors, are also highly concerned about the reputation and long-term competitiveness of firms in their portfolio. Such investors may wish to avoid firms where executive compensation structures point to considerable risk of a securities class action lawsuit, or at a minimum, devote an extra measure of attention to those firms. Furthermore, given the links we found here, the SEC may be interested in considering rules that allow shareholders further control over executive compensation beyond the relatively toothless say-on-pay rules that exist now.

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