

Pay Harmony: Peer Comparison and Executive Compensation

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Abstract:

Using rich panel data on division manager pay, we investigate whether peer effects in the form of horizontal wage comparisons affect firm policies on executive pay. We find pay co-movement (or pay-*referent* sensitivity, PRS) to be more pronounced in geographically-concentrated firms where we expect divisional proximity to facilitate information sharing about pay and magnify peer comparisons. To separate the peer effect of PRS from other factors that may drive co-movement of firm pay, we exploit exogenous increases in access to pay information using the SEC 1992 Proxy Disclosure Rule which differentially affected firms. Based on differences-in-differences models, we find increased PRS and decreased pay-performance sensitivity (PPS) after 1992 within geographically-dispersed firms relative to firms with proximate divisions. The effects are strongest in dispersed firms with relatively less pay disclosure prior to 1992, a subsample for which the ruling had a relatively larger impact. Finally, based on analysis of manager pairs within a firm, we find that mean distance in pay between different-state managers increased by less relative to same-state managers after the rule change. Taken together, our findings suggest that peer comparison decreases pay disparity within firms and that principals face a tradeoff between the incentive effects of performance-based pay and costs of peer comparison.

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I. Introduction

There has been extensive research on the notion that peer comparisons affect the utility that individuals derive from pay and that individuals care about both their absolute income and their income *relative* to others (e.g., Frank, 1985). Recent empirical research based on field experiments focuses on various types of employees (e.g., Card, Mas, Moretti, and Saez, 2011 for university employees; and Cohn, Fehr, Herrmann, and Schneider, 2011 for temporary workers) to demonstrate the importance of relative income, while laboratory experiments provide some confirmatory evidence (e.g., Fehr and Schmidt, 1999). Other studies suggest that peer comparisons of pay are also relevant among executives, workers at the extremes of the pay distribution and generally a highly-networked and competitive group of individuals. Shue (2012) shows that CEO pay responds to pay shocks of peers, while Wade, O'Reilly and Pollock (2006) show that over- or underpayment of CEOs cascades down to lower managerial levels. However, to date, no research has considered the effect of horizontal comparisons in influencing managerial wage contracts within firms and, in particular, the potential tradeoff faced by principals (CEOs and compensation committees of the boards of directors) between implementing a strong performance-based pay system versus one that minimizes peer comparison costs between agents.

Peer comparison of pay can be illustrated by the following (non-executive) anecdote related in Baron and Kreps (1999):

“We recall an eminent labor economist who, while doing his stint as chair of his economics department – one of the best in the world – remarked in somewhat mystified fashion that his best-paid colleagues seemed particularly concerned not with how their annual raises compared with inflation, but instead how they stacked up with the raises earned by their other highly paid colleagues.” (pg. 256)

Closer to our setting, and in a paper on social comparison costs and firm boundaries, Nickerson and Zenger (2008) relate how Harvard University was forced to reduce compensation of high-performing fund managers of the Harvard Management Company, the subsidiary managing Harvard's \$27 billion endowment. Harvard took these actions largely due to faculty and alumni uproar over fund manager pay that, while appropriate for the external finance market, were several orders of magnitude greater than

typical faculty salaries. In another example, Williamson (1985) discusses the purchase of Houston Oil and Minerals Corporation by a much-larger conglomerate, Tenneco, Inc. in 1980. To retain Houston Oil's experienced exploration employees, Tenneco offered specialized compensation packages prior to the acquisition. One year later, Tenneco effectively reneged on this offer with Tenneco's VP for administration stating, "We have to ensure internal equity and apply the same standard of compensation to everyone." By the end of 1981, 34% of Houston Oil's management had left.

In practice, compensation consulting firms that specialize in designing executive pay emphasize the importance of "pay harmony" among managers within a firm.¹ While firms match an executive's outside option to retain talent, internal comparisons can be equally, if not more important (e.g., Lazear and Oyer, 2004). When managers directly care about relative income or interpret pay differentials as a signal about future pay prospects, firms face costs from peer comparisons (e.g., Camerer and Malmendier, 2007; Nickerson and Zenger, 2008). To ensure some semblance of internal equity and to minimize "perceived inequities" in pay and associated morale problems (Baron and Kreps, 1999), firms' internal pay structures are commonly based on systems that specify pay ranges by job and level (e.g., Hay points). An offsetting factor which differentiates pay is that over the past several decades firms have significantly increased performance-based pay for executives (e.g., Hall and Murphy, 2003; Frydman and Jenter, 2010). A critical tradeoff faced by firms, therefore, in structuring executive pay is the balance between the productivity benefits of a strong pay-for-performance compensation system (Murphy 1999) and peer comparison costs caused by the resulting pay inequality within the firm. However, this tradeoff and, more generally, the effects of horizontal peer comparison have not systematically been studied for high-level managers within firms.²

¹ The term *harmony* derives from the Greek *ἀρμονία* (*harmonía*), meaning "joint, agreement, concord."

² Previous research suggests that vertical comparisons of pay across organizational levels are important. Using compensation survey data (1981-1985), Wade, O'Reilly and Pollock (2006) document higher exit rates when lower-level managers are underpaid relative to the CEO. However, they do not have the advantage of a change in regulation of pay disclosure for identification.

In this paper, we use a rich dataset of pay practices for the senior-most executives within divisions to ask whether horizontal comparisons between managers in similar jobs affect pay. Furthermore, we evaluate evidence in support of a tradeoff between pay harmony and performance pay. We define *pay-referent* sensitivity (PRS) as the change in division manager pay with a change in the firm-wide average pay of all *other* division managers. We measure *pay-performance* sensitivity (PPS) as how pay changes with changes in division performance. The primary empirical challenge that we face in this paper is to separately identify pay harmony or peer effects from unobserved factors that cause co-movement of division manager pay. The most obvious unobserved factors in our setting are production interdependencies (or team-production), selection effects (e.g., firm-manager matching), and common shocks or changes in the firm's environment (e.g., local labor market conditions) (Manski, 1993).

To address this identification challenge, we exploit an exogenous increase in access to information about pay introduced by new SEC regulation in 1992. This regulation mandated additional disclosure of top executive pay in a firm's annual proxy statement. We argue that this ruling led to greater sensitivity to and comparison of pay differences at *all* senior management levels in the organization. Moreover, we argue that the new rule differentially impacted firms based on the ease of which pay information was shared prior to the SEC ruling. Specifically, we argue that: (i) geographically dispersed firms were relatively more impacted by the rule than concentrated firms because greater distance between divisions would have impeded managers from sharing information prior to 1992, and (ii) firms with more performance-based pay prior to the ruling were also impacted more because a relatively higher proportion of pay was obfuscated in the proxy statements before 1992.

Using a differences-in-differences approach to model position-level wage equations, we find increases in PRS (*pay-referent* sensitivity) and decreases in PPS (*pay-performance* sensitivity) after new regulation in geographically-dispersed firms, but not in concentrated firms. We also find this effect to be stronger in firms with less pay disclosure prior to the rule. Therefore, we find evidence in support of peer

effects and a tradeoff when setting wage contracts between the incentive effects of performance-based pay and costs of peer comparison that arise from unequal pay.

While pay co-movement is one measure of responsiveness to referent pay, it says little about pay disparity within firms. To address disparity, we examine the mean distance between the excess pay of pairs of division managers within a firm. We find that pay distance increases after the 1992 SEC ruling, consistent with an overall trend toward more pay disparity within firms over this time period. We also find that distance increases less between managers of divisions located in different states (most affected by the rule change) relative to managers located in the same state, who were likelier to have been sharing pay information prior to the rule change. This result is consistent with peer effects leading to reduced pay disparity in firms.

Why are peer effects in pay-setting for division managers important? Division managers are in key positions within firms and central to many agency models of internal capital markets and firm choice ranging from project investments and R&D (e.g., Aghion and Tirole, 1997; Scharfstein and Stein, 2000) to executive development and succession decisions in internal labor markets (e.g., Gibbons and Waldman, 1999). While these models do not, in general account for social effects, peer comparison may well limit what multi-business firms can do to attract, motivate, and retain critical talent. From an economic perspective, differentiated pay can strengthen incentives for managers. However, from a psychological and sociological perspective, perceived “pay inequities” lead to lower productivity, decreased employee morale, and increased turnover. More generally, Nickerson and Zenger (2008) highlight the effect of social comparisons on a broader set of critical choices for the firm, including mergers, scope and location decisions. Overall, peer comparisons among managers may lead to a “dark side” of internal labor markets with consequences beyond the determination of the optimal wage contract.

The unique contribution of the paper is to demonstrate how the pay policies of firms respond to concerns about internal equity which, to our knowledge, has not been documented elsewhere. More generally, our findings are important to several literatures and have direct policy consequences. The

existence of a peer effect in executive pay and the tradeoff between pay harmony and pay-for-performance is informative to the literature on the relative importance of external versus internal labor markets on wage policies of firms (e.g., Baker, Gibbs and Holmstrom, 1994; Lazear and Oyer, 2004) but also to research on peer effects in both behavioral economics and management/strategy. Our findings suggesting heightened peer comparisons in response to increased pay disclosure is relevant to literature on firm policies with respect to pay secrecy (e.g., Lawler, 1965, Card, Mas, Moretti, and Saez, 2011). Our results contribute to the ongoing policy debate on the consequences of transparency and mandatory information disclosure and potential ratchet-effects in executive pay (e.g., Hall, and Murphy, 2003). For practitioners involved in designing the structure of executive compensation and pay disclosure policies for firms -- including compensation committee directors, senior human resource executives, and compensation consultants -- our findings suggest it is important to recognize the tradeoff between the incentive effects of performance-based pay and costs of peer comparison that arise from unequal pay when designing executive wage contracts.

The remainder of the paper is organized as follows. Section II discusses theory related to executive pay and corresponding implications. Section III describes our empirical strategy and the data. Section IV outlines and discusses our results. Section V concludes.

II. Theoretical Perspectives and Implications: Pay-for-Performance vs. Peer Comparison

The principal-agent model is a workhorse in economics that has implications for how firms set executive pay (Jensen and Meckling, 1976). The main theoretical implication for firms is that, to elicit optimal effort from agents, principals should link pay to performance. Extensive research has focused on the benefits of “high-powered” incentives where managers are paid based on their output (and pay exhibits high pay-performance sensitivity or PPS). However, incentives have associated costs in the context of either risk-averse agents or imperfect performance measures (e.g., Holmstrom, 1979, 1982; Baker, 1992; Holmström and Milgrom, 1991).

Pay-performance sensitivity is typically defined as b_1 in the following linear wage contract (Murphy 1999), in which the choice of b_1 depends on the underlying model:

$$(1) \text{ Pay} = a + b_1 \text{ Performance}$$

In these models, pay is determined by a fixed amount, a , and b_1 , the pay-performance sensitivity. Generally, a is determined by time-invariant personal and market characteristics, as well as time-varying factors that affect the individual's participation constraint (and bargaining power) within a firm. The magnitude of b_1 is chosen to elicit the optimal effort from the agent. Pay setting within a firm, therefore, is a function of both external and internal markets (e.g., Baker, Gibbs and Holmstrom, 1994; Lazear and Oyer, 2004) and the underlying utility of the agent.

However, while there is extensive research in economics on these determinants of executive pay, in practice, the process is more social than the existing research suggests.³ To ensure internal equity and consistency, firms commonly adopt compensation systems (e.g., Hay points) that specify levels and pay ranges for all jobs throughout the firm (e.g., Kreps and Baron, 1999). Social comparison has long been studied in the social psychology literature (e.g., Homans 1961; Festinger, 1954). More recently, and consistent with this research, Frank (1985), Luttmer (2005) and Card, et al (2011) show in general contexts that individuals value *relative* income. A key question central to peer comparisons of pay is: who is the salient referent? Festinger's original proposition that similar others would be frequently chosen as referents has received widespread support (e.g., Kruglanski and Mayesless, 1990; Miller, et al, 1988, and Wood, 1989). In our setting, we maintain that division heads managing business units in a multibusiness firm represent each other's salient referents: they are in roles of similar responsibilities within the firm, compete for the same pools of resources and positions for promotion.

³ This is despite an early mention of fairness in wages dating back to Hicks (1963) in *The Theory of Wages* (pg. 317). "The labor market is a very special kind of market which is likely to develop 'social' as well as purely economic aspects ... For the purely economic correspondence between wages paid to a particular worker and his value to the employer is not a sufficient condition of efficiency: it is also necessary that there should not be strong feelings of injustice about the relative treatment of employees since these would diminish the efficiency of the team."

Peer effects of pay can be incorporated into the standard wage contract in the following manner:

$$(2) \text{ Pay} = a + b_1 \text{Performance} + b_2 \text{ReferentPay}$$

The addition of the factor $b_2 \text{ReferentPay}$ reflects this body of research that an agent's utility depends on the pay of peers.⁴ There are several reasons for this relationship. For example, managers may care directly about *relative* income in addition to absolute income as represented by interdependent preferences (e.g., Frank, 1985; Camerer and Malmendier, 2007; Larkin, Pierce, and Gino, 2012). Another broad explanation for peer effects is that managers use information about pay differences as a signal to update expectations of future pay and career prospects, for example, through a promotion (e.g., Card, Mas, Moretti and Saez, 2011). In both cases, if managers incur disutility from pay differences, they may shirk, leave the firm or take other costly actions. One implication, therefore, of peer comparison is that there will be less pay disparity in firms relative to contracts set in the absence of peer effects.⁵

From equation 2 and the associated discussion, we generate three theoretical predictions that can be empirically tested with our data:

- Consistent with agency models, executive pay will exhibit pay-performance sensitivity or PPS. That is, b_1 in equation 2, will be positive and significant, particularly for measures of performance over which they have direct control (i.e., performance of their own division).
- Consistent with peer comparisons, executive pay will also exhibit pay-referent sensitivity or PRS. Specifically, b_2 in equation 2, will similarly be positive and significant, particularly when pay

⁴ Note that, in an alternative approach, a principal could retain equation (1) as the wage structure and adjust a to reflect peer effects. In this scenario, effort remains optimal and lower performers are compensated for the negative utility of peer comparison by raising a , the fixed component of wages. This leads to an inverse relationship between worker skill and a and no observed tradeoff between PRS and PPS. While this scenario is theoretically possible, it is difficult to implement in practice and not how compensation consultants described the process of “pay harmonization.”

⁵ For example, while pay co-movement may offset low morale for lower paid managers, it may cause talented workers to be disgruntled and leave. So, while firms may “harmonize” pay to minimize morale problems and to encourage a team spirit, one might argue that it is “more important to keep the best workers happy than the worst ones.” (Lazear, 1989 and 1991). That is, the positive effects on less talented managers are outweighed by the negative effects on more talented managers whose high productivity is ignored.

information about peers is more readily accessible or peers are immediately salient (for example, geographically proximate).

- The existence of both agency behavior and peer comparison within firms leads to a different optimal wage contract for firms, and implies a tradeoff between PPS and PRS; that is, we expect higher PRS to be associated with lower PPS.

III. Empirical Strategy

III.A. Division Manager Pay in Multidivisional Firms

To analyze the tradeoff between pay-for-performance contracts for executives versus pay harmony, we use a proprietary dataset based on a confidential compensation survey conducted by Hewitt Associates, a leading human resources consulting firm specializing in executive compensation and benefits (described in detail in section III D). We analyze pay for multiple division manager positions inside large US firms over a 14-year period. A division manager in our data, also known as business unit head, is the most senior manager in a division and has overall P&L responsibility. Our data and setting are advantageous in evaluating peer effects within firms for a number of reasons.

- First, our panel data include multiple “like” positions within firms -- a well-defined reference group -- that allow comparisons of similar, standard positions. Importantly, division heads are senior positions with bargaining power over pay-setting.
- Second, we have detailed pay data for multiple division managers within a firm and performance data for their respective divisions which allows us to estimate both pay-performance sensitivity (PPS) and pay-referent sensitivity (PRS) and the tradeoff between the two.
- Third, we observe and exploit variation in the geographic location of divisions within firms in our sample, but the divisions are primarily located within the US (so, roughly similar labor markets). Moreover, according to Hewitt, the market for division managers is generally a national, rather than local, labor market and so local market effects should be less of a challenge in this setting versus studies of less senior employees.

- Finally, the types of firms in our sample and the period covered allow us to exploit the 1992 SEC Pay Disclosure Rule for more compelling identification of peer effects. Our sample includes large, publicly-traded US firms (300+ of Fortune 500) – precisely the target of the 1992 disclosure law which conveniently occurs in the middle of our sample period (1986-1999).

III.B. Empirical Design

III.B1. Identification and the SEC 1992 Proxy Disclosure Rule on Executive Pay

The most important empirical challenge that we face is to separately identify peer effects from unobserved factors that cause co-movement of division manager pay (PRS). The most obvious unobserved factors in our setting are production interdependencies (or team-production), selection effects (e.g., firm-manager matching), and common shocks to the firm or changes in the firm’s environment.⁶ We assert that division managers in close proximity are salient referents because they are more likely to compare themselves to each other and to share information about pay. As such, we expect greater pay co-movement in geographically-concentrated firms. However, concentrated firms may have other characteristics unrelated to peer comparison that also result in pay co-movement. If firms co-locate divisions to exploit production interdependencies, for example, by sharing a manufacturing plant or customers, division manager pay may co-move to reflect this coordination that has little to do with peer comparison. A second challenge is that selection might be driving pay co-movement between proximate divisions. If concentrated firms hire similarly productive managers, pay may co-move because output is similar. Finally, division managers in close proximity may be more likely to face a common shock to their environment or share local market conditions. A local, weather-related disaster may dramatically reduce firm performance causing all managers’ pay to decline, or regional economic shocks may affect the local market of where the firm is headquartered, causing co-movement of pay.

⁶ These challenges are similar to those raised by Manski (1993) in his discussion of the reflection problem and the identification problems associated with selection and common shocks. See Blume, Brock, Durlauf and Ioannides, (2010) for a review of identification in social interactions.

To address these identification challenges, we exploit exogenous variation in access to pay information resulting from a new SEC regulation in 1992 that required greater pay disclosure for top paid executives (described in detail in Appendix A). The SEC 1992 Proxy Disclosure Rules led to better disclosure of executive pay, particularly performance-based pay. The most important changes for our research are three-fold: the ruling (i) replaced narrative descriptions of compensation plans with five tables based on a standardized format that allow more direct comparisons across firms (and across positions within firms), (ii) required salary and bonus to be reported separately, instead of aggregated cash compensation, which combined salary and bonus, and (iii) required all forms of long-term incentives (i.e., restricted stock, stock options, other forms of long term incentive pay (LTIP), e.g., performance units) to be reported separately in a set of detailed tables with dollar valuations.

We argue that this increased pay disclosure for top executives led to greater sensitivity to and comparison of pay differences at *all* senior management levels in the organization and also that the new rule had a differential impact on firms. This differential impact arises because we expect managers in concentrated firms to have been more likely to share pay information prior to 1992. As such, we argue that (i) managers in dispersed firms increased the degree to which they shared pay information after 1992 more than managers of concentrated firms,⁷ and (ii) managers in firms with less pre-1992 disclosure (i.e., firms with more performance-based pay) increased the degree to which they shared information more than managers of firms with more pre-1992 disclosure. In the empirical specifications that follow, we exploit the exogenous and differential increase in access to pay information from the new rule.

⁷ To illustrate the importance of geographic proximity in peer comparisons of pay, let us share a story about investment bankers as told to us by the Chief Development Officer (CDO) and Managing Director at a large US investment bank from 1992 to 1997. Two MDs in NYC headquarters had similar jobs (e.g., number of accounts, number of days travel) and similar performance. On the same day, near the end of 1993, the MDs were individually informed by the CDO about their own annual compensation (bonuses and proposed salary increases). The following day, the lower-paid MD was in the office of the CDO to ask: “Why am I paid less? Is this a signal about my odds of promotion?” This dynamic was much less common with MDs working in the firm’s international offices. For example, not only was the MD in Hong Kong less informed about pay differences (due to delays in information sharing about pay), but also had less access to the CDO since they didn’t bump into each other in the hallways of headquarters.

III.B2. Empirical Models

III. B2.1 Wage Equation

Equation 2, translated into a form that can be empirically tested, becomes a standard wage model augmented by a linear-in-means specification to capture peer effects:⁸

$$(3) w_{dt} = \alpha + \beta_1 s_{dt} + \beta_2 \bar{w}_{-dt} + D'_{dt} \beta_{31} + F'_{dt} \beta_{32} + \eta_d + d_t + \epsilon_{dt}$$

Here, d indexes divisions within a firm at time t . A division manager's (log) wage in period t is a function of division performance, s_{dt} , referent pay or the average (log) wage of all *other* division managers within the firm excluding own wage, \bar{w}_{-dt} , and a vector of both division, D'_{dt} and firm characteristics, F'_{dt} . We also include year fixed effects, d_t , and cluster standard errors at the firm-level. Our basic specification includes division fixed effects, η_d , which control for unobserved, time-invariant, division or firm heterogeneity and allows us to interpret coefficients as the change in manager pay with changes in the independent variables. This division fixed effects specification analyzes similarities in pay *changes*.⁹ However, to explore peer comparisons in pay *levels*, we also estimate regressions without division fixed effects.

The two coefficients of interest in this specification are β_1 which represents pay-performance sensitivity (PPS), and β_2 which captures pay-referent sensitivity (PRS). As mentioned above, the main empirical challenge in estimating β_2 is to separate peer effects from unobservable factors that also cause pay co-movement.

To be more precise and illustrate our identification strategy, we introduce the following two (unobservable) variables: ψ and θ . $\psi(I) \in [0,1]$ represents the strength of peer effects on pay as a

⁸ Linear-in-means specifications typically use the average of the whole group, with the underlying assumption that any one participant has a small marginal impact on the whole group. Because that assumption is not valid in our context, we use the average of all other division managers to calculate our mean pay variables. We discuss implications of this calculation for potential biased estimates and serial correlation in the errors in a later footnote

⁹ Importantly, while we know the state of location for the division, the inclusion of division fixed effects subsumes fixed effects for the state of location and, as such, controls for time-invariant, local labor market conditions. Also, while we have rich information about division manager positions, we know little about the individual manager filling the position. We do know the tenure of the manager in the position and hence can estimate our regressions with manager fixed effects instead of division fixed effects. The results are qualitatively similar.

function of I , the degree of pay information available in the environment, where $\frac{\partial \psi}{\partial I} > 0$. As such, the elasticity of pay with respect to referent pay can be represented as $\beta_2 \psi(I)$. $I=1$ is an environment with full information about peer pay; $I=0$ is an environment with no information.

The variable θ represents all unobservable factors that simultaneously affect pay across division managers that are not captured through existing controls (i.e., team production, selection, common shocks). Critically, $\rho_{w\theta} = \text{corr}(\bar{w}_{-dt}, \theta) > 0$; that is, an increase in θ is correlated with an increase in peer pay. This correlation creates our challenge in separately identifying the effect of ψ and θ on pay and will bias upward the estimate of β_2 in equation (3) such that $\hat{\beta}_2 = \beta_2 + \rho_{w\theta} \frac{\sigma_\theta}{\sigma_w}$.

To address this problem, we estimate β_2 for firms operating in different information environments. More specifically, consider the following equation that includes θ and an unbiased β_2 :

$$(4) w_{dt} = \alpha + \beta_1 s_{dt} + \beta_2 \psi(I) \bar{w}_{-dt} + \beta_\theta \theta + \dots$$

Where β_θ measures the association between wages and unobservable factors unrelated to peer effects. We assume $\psi(1)$ is full information sharing and $\psi(0)$ is no information sharing and that $\psi(1) > \psi(0)$, leading to the following two equations:

$$w_{dt} = \dots \beta_2 \psi(1) \bar{w}_{-dt} + \beta_\theta \theta + \dots$$

$$w_{dt} = \dots \beta_2 \psi(0) \bar{w}_{-dt} + \beta_\theta \theta + \dots$$

In our differences-in-differences models, we subtract the two equations and eliminate $\beta_\theta \theta$ giving us an unbiased estimate of $\beta_2 \psi$. To simplify and without loss of generality, if we define $\psi(0)=0$ and $\psi(1)=1$, then subtracting these two equations will yield an unbiased estimate of β_2 . Similar logic applies for estimates of β_1 (PPS).

We make two underlying identifying assumptions. First, the 1992 SEC ruling did not differentially increase θ in dispersed over concentration firms. So, for example, we assume that the ruling did not cause dispersed firms to hire more similarly-productive managers relative to concentrated firms. More generally, we assume that there were no other concurrent secular changes around the time of the

ruling that caused differential increases in θ in dispersed over concentration firms. We discuss potential scenarios in which these assumptions may be violated in a later section on alternative explanations.

Turning to our empirical models, we compare estimates of β_1 and β_2 for firms operating in different information environments in several different ways. First, we estimate differences in β_1 and β_2 between two types of firms: geographically-concentrated versus dispersed firms, without incorporating the 1992 SEC rule change. We assume full information about pay in geographically-concentrated firms ($I=1$), specifically, proximate managers are informed about each other's pay and engage in peer comparison; and no information in dispersed firms ($I=0$). However, for this analysis to isolate the effect of ψ , we have to make a strong (and unrealistic) assumption: that increases in geographic concentration are correlated with increases in information, but with no change θ . Or, said another way, θ is the same in concentrated and dispersed firms. This would be violated, for example, if geographically-concentrated firms relied more on team production in comparison to dispersed firms, which is entirely plausible.

Our second approach relaxes this assumption by employing a differences-in-differences approach (described above) and compares the changes in β_1 and β_2 as responses to the SEC ruling in dispersed and concentrated firms. To isolate the effect of ψ , we need to make two assumptions. We assume that increases in information from the new ruling are greater in dispersed firms than concentrated firms ($\Delta I_{disp} > \Delta I_{conc}$) and that any changes in θ due to the ruling are no different in concentrated and dispersed firms ($\Delta \theta_{disp} = \Delta \theta_{conc}$). So, for example, pay disclosure from the new ruling cannot increase team-production in concentrated firms more than dispersed firms.

The differences-in-differences wage regressions that we estimate classify concentrated firms for the entire period and dispersed firms after 1992 as full information environments. Note then that our approach leads to a conservative analysis of peer effects, since it is likely that $(\Delta I_{disp} - \Delta I_{conc}) < 1$, either because sharing pay information increased in concentrated firms post 1992, there was some sharing of pay information within dispersed firms prior to 1992, or incomplete sharing of pay information in dispersed firms after 1992.

Our baseline specification is advantageous in that it estimates both PPS and PRS and so can isolate any negative correlation (tradeoff) between PPS and PRS. The measure of PPS, β_1 , estimates how division manager pay changes with changes in division performance. The measure of PRS (β_2) is defined as a pay elasticity: the percentage change in a division manager's pay with a percentage change in the average pay of *other* division managers within the firm. The changes in β_1, β_2 as information changes between concentrated versus dispersed firms and before and after the law change isolates the peer effect, ψ , on PPS and PRS. As an additional test, we consider a third difference: we argue that firms with less disclosure pre-1992 were forced to disclose more information after the rule change. Our approach is illustrated in Figure 1.

III. B2.2. Pairs Distance Analysis and Pay Disparity

While our wage regressions isolate the effect of peer comparison on pay co-movement, it says little about pay disparities within the firm. To capture this, we conduct a second analysis, building on Shue (2012), using distances between pay of pairs of division managers within firms.¹⁰ This main advantage of the pairs distance measure is that it is a simple statistic that conveys the degree of pay disparity between managers, while the drawback is that we cannot estimate PPS and the tradeoff between pay-for-performance and pay harmony.

The pair distance analysis compares the mean absolute difference in pay residuals between two division managers operating in the same state within a firm to the difference between two managers operating in different states. We again exploit the SEC 1992 rule change and measure whether the difference between the pay distance of same- and different-state managers decreases with increased pay disclosure. As a general response to the rule, aggregate pay distance between managers may have increased after 1992 as firms increased overall performance-based pay. However, as with concentrated firms in our earlier analysis, we assume that managers operating in the same state shared more pay

¹⁰ This method is analogous to Shue, 2012. She compares section vs. class cohorts of randomly-assigned HBS MBA students. We compare pay for division managers within a firm that are located in the same state vs. different state, before and after disclosure of information about pay.

information before the SEC ruling than managers in different states and, therefore, that the SEC ruling had less impact on same state pairs of managers. Estimation follows a two-stage estimation procedure similar to that in Shue (2012).

$$(5) \text{ 1}^{\text{st}} \text{ Stage: } w_{dt} = \gamma_0 + \gamma_1 X_{dt} + \widehat{w}_{dt}$$

$$(6) \text{ 2}^{\text{nd}} \text{ Stage: } |\widehat{w}_{dt} - \widehat{w}_{et}| = \delta_0 + \delta_1 * post92 + \delta_2 diff_{state} + \delta_3 diff_{state} * post92$$

As earlier, d indexes division managers within a firm and t indexes firm years in the panel data. Observations in the first stage are unique at the manager-position, firm-year level. The regression is similar to the wage regressions in the earlier analysis (i.e., equation 3), with one important difference in that it excludes mean pay of other managers. Division manager wages w_{dt} is regressed on X_{dt} which can consist of manager, division, firm, industry, and time controls. The purpose of controls in the first stage is to allow estimation of “abnormal” wages beyond that explained by observable determinants of division manager pay, e.g., division size and tenure in position. Residuals \widehat{w}_{dt} from the first stage regression measure the unexplained component of w_{dt} and are used in the second stage.

In the second stage, we create all possible pairs of division managers within the firm in a given year. Note that division manager positions in different firms are never paired, nor are division managers across years. The unit of observation in the second stage is a pair of division manager positions within a firm in a given year. In our tables, we use one measure of pay similarity for the dependent variable in the second stage regression which is based on pay *levels* and is equal to the absolute value of the pair difference in first stage residuals, \widehat{w}_{dt} . We calculate another measure that is based on pay *changes*, by calculating distance between *changes in* residuals (unreported). The pair absolute difference is then regressed on several dummy variables and associated interactions: $diff_{state}$ for whether d and e are

located in different states and *post92* to designate years after increased pay disclosure from the SEC 1992 ruling.¹¹

Referring to equation (6), δ_0 represents the mean distance in pre-1992 pay residuals between two managers in a firm that are located in the same state, while $\delta_0 + \delta_1$ are post-1992 distances for same-state managers. Similarly, $\delta_0 + \delta_2$ is the pre-1992 mean distance between two different-state managers, while $\delta_0 + \delta_1 + \delta_2 + \delta_3$ is post-1992 distance for different-state managers. Evidence in support of peer effects is a negative and statistically significant estimate of δ_3 , which indicates that the change in mean distances for different-state managers *within the same firm* before and after 1992 is less than the analogous change for same-state managers within the same firm.

We summarize the empirical implications for peer comparisons as discussed above in Table A. Panel 1 presents implications for wage regressions and Panel 2 for the pairs distance analysis.

III.B3. Data

The primary dataset used in this study includes a panel of more than 300 publicly-traded U.S. firms over the years 1986-1999, spanning a number of industries. The data are collected from a confidential compensation survey conducted by Hewitt Associates, a leading human resources consulting firm specializing in executive compensation and benefits. The survey is the largest private compensation survey (as measured by the number of participating firms) and the participants are typically leaders in their sectors. More than 75% percent of the firms in the dataset are listed as Fortune 500 firms in at least one year and more than 85% are listed as Fortune 1000 firms. In general, Hewitt survey participants also participate in other compensation consulting firm surveys (e.g. Hay Associates, Mercer, Towers Perrin, to name a few) and do so primarily to receive information about pay practices to use as a competitive

¹¹ Calculation of significance levels is complicated by each manager appearing in multiple pair-wise observations in a given year. To address this correlation issue, we follow methods in Shue (2012), Fisher (1992) and Rosenbaum (1996) and estimate standard errors and significance levels using Monte Carlo simulations that employ non-parametric permutation tests. For each permutation, managers are shuffled into random states and manager-pairs are shuffled into random post92 designations. Both the state and post92 assignments match the underlying distributions for each firm. State and firm assignments persist for the entire placebo test to account for autocorrelation and firm-specific factors. We generate 10,000 placebo estimates and calculate 2-sided standard errors and p-values.

benchmark in evaluating their own compensation programs. It is important to note that the sample includes many more firms than Hewitt's consulting client base with at least 50% of the firms as survey participants with no other relationship to Hewitt. Based on several analyses described in Appendix B, we conclude that the survey sample is most representative of Fortune 500 firms.

The survey is exceptionally broad in that it collects data on many senior and middle management positions including both operational positions (e.g. Chief Operations Officer and Division CEO) and staff positions (e.g. Chief Financial Officer and Head of Human Resources). The survey typically covers all the positions at the top of the hierarchy and a sample of positions lower down. In this paper, we focus on the most senior position in a division, which is defined in the survey as 'the lowest level of profit center responsibility for a business unit that engineers, manufactures and sells its own products.' We focus on the division manager position because we have multiple observations per firm and it is a managerial position that is consistently defined across firms. The dataset is rather unique because it allows us to identify changes in pay within division manager positions over a 14-year period that is characterized by significant change in pay practices.

The data for each position include all components of compensation including salary, bonus, restricted stock, stock options, and other forms of long-term incentives (e.g. performance units).¹² An observation in the dataset is a division managerial position within a firm in a year. To ensure consistency in matching these positions across firms, the survey provides benchmark position descriptions and collects additional data for each position leading to a dataset rich in position characteristics. As a result, in addition to data on all aspects of compensation for multiple division manager positions, the dataset includes division-specific characteristics such as: job title, the title of the position to whom the position reports (i.e. the position's boss), division sales, number of employees under the position's jurisdiction, industry of operation, geographic state of location, number of positions between the division manager

¹² The value of long-term incentive pay is computed by Hewitt. Stock options are valued using a modified version of Black-Scholes that takes into account vesting and termination provisions in addition to the standard variables of interest rates, stock price volatility, and dividends. As is standard practice among compensation consulting firms, the other components of long-term incentives are valued using an economic valuation similar to Black-Scholes that takes into account vesting, term provisions, and the probability of achieving performance goals.

position and the CEO in the organizational hierarchy (division depth), an indicator of the incumbent's status as a corporate officer and the manager's tenure in the position.

We believe the survey data are accurate for several reasons. First, Hewitt personnel are knowledgeable about survey participants because they are assigned to specific participants for several years. Furthermore, while the participating firms initially match their positions to the benchmark positions in the survey, Hewitt personnel follow up to verify accuracy and spend an additional 8-10 hours on each questionnaire evaluating the consistency of responses with public data (e.g. proxy statements) and across years. Finally, participants have an incentive to match positions correctly and provide accurate data because they use the survey results to set pay levels and design management compensation programs.

The above data are supplemented with financial and headquarters location information from Compustat and firm-level information technology investments from Harte-Hanks. Finally, we construct a number of variables that are used as controls and that we will describe in the results section.

In Table 1 (Panel A), we present descriptive statistics for the firms and divisions in the sample. While the dataset includes more than 300 firms, the exact number varies over the period, as firms enter and exit as survey participants. The firms in the sample are large, well established and profitable with average size of sales of \$8.5 billion, market capitalization of \$9.4 billion, 44,000 employees and return on assets of 5%. The average number of divisions reported in the survey for the sample firms is 4.6. Next, turning to divisional statistics, the mean size of divisions is \$752 million in sales and approximately 3000 employees. The average tenure in position is 42 months, approximately 23% of the division managers are corporate officers, and there are 1.4 positions between the CEO and division managers on average. Average annual division manager pay is \$209K (salary), \$300K (salary plus bonus), and \$460K (total compensation). Finally, the sample firms span many industrial sectors of the economy, with some concentration in the food, paper, chemical, machinery, electrical, transportation equipment, instrumentation, communications and utilities industries.

Using the information on division state of location from the Hewitt dataset and headquarters' state and county of location from COMPUSTAT, we attempt to characterize divisional proximity to

headquarters. We construct a firm-level measure of geographic dispersion by computing the proportion of divisions in the same state as headquarters (mean of 0.48 for the sample). We then construct quintiles of geographic concentration using this firm measure and assign values ranging from 1 (least concentrated) to 5 (most concentrated). In Table 1 (Panel B), we split the sample into concentrated firms (4th and 5th quintile) and dispersed firms (1st and 2nd quintile) and report key statistics for these two subsamples. As can be seen from this table, firms in these two categories are roughly similar in several characteristics. The biggest difference is that concentrated firms have fewer and bigger divisions than dispersed firms based on means. However, in comparing median sales and employees, division size is generally comparable across firm geography.

IV. Results

In this section, we present our results. We begin by documenting both pay-performance sensitivity (PPS) and pay-referent sensitivity (PRS) in our sample of firms in standard, position-level, wage regressions (Table 2) and then explore how these measures vary by the geographic proximity of divisions -- concentrated versus dispersed (Table 3). Next, we exploit the exogenous change in access to information from the SEC 1992 Proxy Disclosure Rule in wage regressions (Table 4, 5, and 6) and in the pairs distance analysis (Table 7). Finally, we consider several alternative explanations.

We use three pay measures -- salary, salary plus bonus, and total compensation – throughout our analysis.

IV.A. Pay-Performance Sensitivity (PPS) vs. Pay-Referent Sensitivity (PRS)

We begin by estimating a standard wage equation for division manager positions (equation 3). In Table 2, columns 1-3, we regress the logarithm of the three pay measures on division and firm performance while controlling for a set of covariates common to wage regressions. All regressions include division manager fixed effects (and cluster standard errors by firm) and hence the coefficients can be interpreted as correlations between the changes in pay and changes in the independent variables.¹³

¹³ To calculate PRS, we define referent pay as the sum of pay for all other managers within a firm complicates interpretation of the standard errors and estimates because of the potential for correlated errors between observations

Division performance is measured as log division sales, which can be interpreted as sales growth in our fixed effects specifications. We use two measures of firm performance: return on assets (%) and log firm sales, also interpreted as changes in those measures in our fixed effect specifications.¹⁴

Consistent with pay-for-performance contracts, we find evidence that firms link pay to both division (local) and firm (global) performance.¹⁵ The coefficient on division sales represents the pay-*division* performance sensitivity which is positive and significant for all three pay measures. The coefficients on firm performance measures represent the pay-*firm* performance sensitivity and are positive and significant for salary plus bonus and total compensation measures, but not for salary. While annual bonuses and long-term incentives are related to firm performance measures, salary increases (i.e., raises) appear to be primarily driven by division performance. The correlations with the additional controls are as expected. Pay is higher for managers with longer tenure in the job, managers that are officers, and managers closer to the top of the organizational hierarchy (lower depth). We find no relation with the number of other divisions in the firm.

In Table 2, columns 4 through 6, we add both referent pay (the log of the firm-wide average pay of other division managers) and an external benchmark (log of industry average pay for all division managers in the division's industry, but external to the firm). The most notable result is that division manager pay increases as the firm-wide average pay of *other* division managers increases. The coefficients on referent pay are positive and significant for all pay measures. So, in addition to pay-performance sensitivity (PPS), we find evidence for pay-referent sensitivity (PRS). Our PRS measure (the coefficient on referent pay in a log-log specification) can be interpreted as the elasticity of a manager's

within a given firm-year. In addition to clustering by firm and using division fixed effects for our primary specifications, we also run simulations to test whether this calculation can introduce spurious correlations and significance levels in the data. We find that, under some specifications, a spurious negative association between wages and PRS (opposite to our finding) can arise, while under most specifications, no associations exist. Our estimates, therefore, should be relatively conservative calculations both of point estimates and significances of PRS.

¹⁴As a robustness test, we also include growth in market capitalization (change in logarithm of market capitalization). Our results are qualitatively similar. We exclude this variable from the basic specifications for ease of exposition.

¹⁵Note, we do not focus on the tradeoff between risk and incentives which is an important prediction of the standard agency model. See Wulf, 2007 for analysis of this tradeoff.

pay with respect to referent pay. In column 4, the elasticity of base salary is 0.28 (column 4)—which means a doubling of the average salary of other division managers inside the firm is associated with an increase of 28% in the salary of an individual division manager. The corresponding PRS measures for the other two pay measures are 0.44 (column 5) and 0.55 (column 6), respectively.

Positive PRS is consistent with peer effects (ψ in our discussion above), but also consistent with omitted factors that also can drive pay co-movement (θ in our discussion above). As discussed earlier, one factor is division managers sharing a common performance shock or a common change in their environment that affects pay for all managers and is not captured by existing controls. Indeed, coefficients on all measures of firm performance drop dramatically with the addition of referent pay in columns 5 and 6 (less so in column 4 because salary is sticky), while those on division performance are stable, evidence that pay co-movement reflects broader firm-level performance.¹⁶ Note that other covariates are relatively stable.

IV.B. Pay, Geography, and Peer Comparisons

Next, to further explore peer effects, we use geographic concentration of the firm’s divisions as a proxy for the degree of peer comparison and the accessibility of pay information among division managers. We classify firms into quintiles of geographic concentration (*conc*) as measured by the proportion of divisions in the same state as headquarters. In Table 3, we interact this measure which ranges from 1 (dispersed divisions) to 5 (concentrated divisions) with our performance measures (both division and firm) and referent measure to capture changes in PPS and PRS as a function of firm geography, as below.

$$w_{dt} = \alpha + \beta_1 s_{dt} \cdot conc_{dt} + \beta_2 \bar{w}_{-dt} \cdot conc_{dt} + D'_d \beta_{31} + F'_d \beta_{32} + \eta_d + d_t + \epsilon_{dt}$$

¹⁶ One other notable point is that the standard principal-agent model also predicts that external benchmarks are important in setting wages, as firms may match outside options for executives to retain talent. Consistent with this, we find some (weak) evidence that salaries are matched to the external market (positive and weakly significant coefficient in column 4). While firms use compensation surveys to set executive pay (in fact, the main purpose of the Hewitt survey), the criteria used to set pay can vary substantially: division industry (the measure we use), firms used as peers, wages in local labor markets, firm or division size, or a combination of these criteria. As mentioned earlier, and as claimed by Hewitt consultants, the labor market for executives at the division manager level is more of a national market than a local market.

We include the same set of controls as in Table 2 and we report two sets of regressions for each pay measure: without division fixed effects (columns 1, 3 and 5) and with division fixed effects (columns 2, 4, and 6). Importantly, we also include interactions between all firm performance measures and $conc_{dt}$, as well as the direct effects of all variables in each interaction. The results are qualitatively similar across these two specifications and similar across all three pay measures. We find that geographically concentrated firms have higher pay-referent sensitivity (PRS or β_2) and lower pay-performance sensitivity (PPS or β_1). The coefficients on the interaction terms $PRS*Concentration$ and $PPS*Concentration$ are positive and negative, respectively, and statistically significant. Higher PRS and lower PPS in geographically concentrated firms is consistent with peer comparisons and a tradeoff between PRS and PPS.

However, as discussed earlier, treating this specification as a test for peer effects requires the strong assumption that θ , the unobservable measure of non-peer factors driving pay co-movement, is unrelated to geographic concentration. There are several reasons why this is implausible. As discussed earlier, firms may locate divisions close to headquarters to “team produce” and, as such, pay co-movement reflects coordination between divisions. These results can also be explained by selection effects, such as concentrated firms hiring more similar managers than dispersed firms. Concentrated firms may also be more susceptible to common shocks in local economies than dispersed firms.

To address the limitations of this analysis, we next look at the differential effect of the SEC 1992 Proxy Disclosure Rule on concentrated and dispersed firms to separately identify peer effects from other, unobservable factors.

IV.C. Peer Comparisons, Pay-for-Performance and the SEC 1992 Proxy Disclosure Rule

In Table 4, we explore pay differences after 1992 by interacting key variables with the post-92 indicator. Ultimately, we are interested in how pay differs across firms by type (geographically-dispersed vs. concentrated) and across time periods (before and after 1992).¹⁷

$$w_{dt} = \alpha + \beta_1 s_{dt} \cdot disp_{dt} \cdot Post92 + \beta_2 \bar{w}_{-dt} \cdot disp_{dt} \cdot Post92 + D_d' \beta_{31} + F_d' \beta_{32} + \eta_d + d_t + \epsilon_{dt}$$

First, in Panel A, we implement the above specification by splitting the sample by firm geography and report results for concentrated firms (highest two quintiles of geographic concentration) and dispersed firms (lowest two quintiles of geographic concentration).¹⁸ Across both types of firms, we see that all three measures of division manager pay are sensitive to referent pay (PRS) and division performance (PPS). We also see that PRS before 1992 is much higher for concentrated firms relative to dispersed firms (e.g., in column (4), 0.57 vs. 0.28), while PPS is lower in concentrated firms relative to dispersed firms (e.g., in column (4), 0.066 vs. 0.109).

Next, we turn to how pay sensitivity changes after the SEC rule. In concentrated firms, there are no differences in any measure of PRS or PPS after 1992 (all interaction terms with post92 are statistically insignificant and the point estimates have the opposite signs from our predictions). As such, concentrated firms do not appear to respond to changes in pay disclosure as mandated by the SEC rule. In contrast, pay practices in dispersed firms are significantly different after 1992. Most importantly, the coefficient on the interaction between referent pay and the post92 indicator is positive and significant for all three pay measures (and economically meaningful). We argue that this increase in PRS in dispersed firms after 1992 provides an unbiased, though conservative, estimate of β_2 , as we do not expect any systematically greater increases in θ in dispersed firms relative to concentrated firms after 1992.

Overall, these results provide evidence for the presence of peer effects in wage setting within firms. They are also consistent with our prediction that greater pay disclosure intensifies peer

¹⁷ In this specification, *disp*, a dummy variable whether the firm is dispersed (bottom 2 quintiles of concentration) or concentrated (top 2 quintiles).

¹⁸ For this and all subsequent analyses, all direct and pair-wise interactions are included in our specifications. Additionally, any variable that is interacted with division performance is also interacted with our firm-wide performance measures.

comparisons and facilitates sharing of pay across non-proximate division managers. Also, our finding that PPS is lower after 1992 suggests a tradeoff between PPS and PRS in dispersed firms.

In Table 4, Panel B, we confirm that the differences between firm types across time periods are indeed statistically significant by combining our sub-samples of concentrated and dispersed firms as defined above, and estimating three-way interactions, e.g., $PRS*post92*dispersed$, to confirm that PRS (and PPS) for dispersed firms is larger (and smaller) after the rule change. We find statistically significant differences in the specification without division fixed effects (and the correct signs in the fixed effects specifications).

As argued earlier, we expect the disclosure law to differentially affect pay-setting in firms with less pre-1992 disclosure, which we explore next. In Table 5, we focus on our sample of geographically-dispersed firms and explore whether these firms respond differently to the disclosure rule when they have less disclosed pay prior to the rule. As discussed earlier, the amount of information disclosed from the rule is greater for firms with more performance-based pay since the rule requires detailed disclosure of bonuses, restricted stock, stock options, and LTIP. To capture these differences, we further split the sub-sample of geographically-dispersed firms by the ratio of performance-based pay (i.e., annual bonus plus the value of all long-term incentives divided by total compensation) and report results for (i) less pre-1992 disclosure (high-ratio firms defined as highest three quintiles) and (ii) more pre-1992 disclosure (low-ratio firms defined as lowest two quintiles). We calculate the ratio of performance-based pay using the 3-year average ratio of bonus and long term incentive compensation to total compensation for division managers (1990-1992).

There are two notable differences between the sub-samples of dispersed firms. First, pay-referent sensitivity is greater after 1992 in firms with less pre-1992 disclosure (positive and significant coefficient on $PRS*post92$ interaction in columns 2 through 6) while there is no difference for firms with more pre-1992 disclosure. Also, pay-performance sensitivity is lower after 1992 for the less disclosure sample (negative and statistically coefficient on $PPS*post92$ interaction in 4 of the 6 specifications). In Table 5, Panel B, we estimate the triple interactions (e.g., $PRS*post92*low\ disclosure$) and find the expected signs

on coefficients, but weak support for statistically significant differences between sub-samples. This may be due to smaller sample sizes reducing power of tests. Nevertheless, these findings are suggestive of a greater effect of peer comparison on pay after the rule: geographically-dispersed firms that are forced to disclose more information about pay increase RPS and decrease PPS. These are exactly the subset of firms that are most affected by the information disclosure ruling.

In the last table of wage regressions (Table 6), we explore the dynamics of pay changes over time to see if the changes are consistent with pay effects from the SEC Disclosure Rule. We would expect to see no effect prior to 1992 (and no-pre-existing trend) and a discrete jump after 1992. We focus on the geographically-dispersed firms and include a set of dummy variables representing different time periods. In Table 6, we see that PRS increased in the years immediately following the rule (1993-1995) and generally stayed at the same level throughout the remaining time periods. Notably, there was no change in PRS in the period preceding the rule change (1990-1992) nor are the interactions in the 1996-1999 period statistically different from the 1993-1995 period, additional evidence that the changes are associated with increased access to information about pay. Importantly, we find minimal changes in PRS over time in geographically-concentrated firms (unreported).

In Figure 2, we plot the regression results from Table 6 and compare changes in PRS over the period for both samples of firms. For all three pay measures, we see higher levels of PRS for concentrated firms relative to dispersed firms. However, as mentioned above, PRS changes little over time for concentrated firms. Importantly, PRS is relatively flat for dispersed firms in the period prior to the new law (1986-1992), and the biggest increase occurs in the 3-year period following the new law (1993-1995). This evidence is consistent with increased information from the SEC disclosure law leading to greater pay co-movement in geographically-dispersed firms.

IV.D. Pairs Distance Analysis and Pay Disparity

In our last analysis, we turn to the pairs distance analysis, which measures whether the mean absolute distance in pay between proximate (same-state) managers differs from non-proximate (different-state) managers. We estimate the second stage equation 7 as below:

$$|\widehat{w}_{dt} - \widehat{w}_{et}| = \delta_0 + \delta_1 * post92 + \delta_2 diff_{state} + \delta_3 diff_{state} * post92$$

We use two different first stage regressions to calculate pay residuals. First, we use the minimum set of controls in the first stage: division-level controls (tenure, officer corp, and division depth) and year fixed effects and report results in columns 1, 3, and 5. Next, we include firm fixed effects and division state fixed effects in addition to the division-level controls in the first stage regressions and report results in columns 2, 4 and 6. Together, these tests capture two measures for “abnormal” peer influence, i.e., peer similarities in pay beyond what can be explained by observable similarities in division manager positions and in time-invariant firm characteristics and division location. We are agnostic about which test is more appropriate, although one can argue that the residuals calculated from a first stage excluding firm and local geographic fixed effects may include pay that is not rightly considered “excess” by managers who are aware of firm and local pay practices.

A similar pattern holds for all pay measures, but is most pronounced for total compensation. There are several findings which are notable. First, we find that mean distance in pay residuals between same-state divisions is lower than that of different-state divisions in each time period and across all pay measures (i.e., $\delta_2 > 0$ and $\delta_2 + \delta_3 > \delta_1$). That is, there is less pay disparity in proximate divisions before and after the disclosure law. This is consistent with stronger peer comparisons between division managers that are physically close. Second, we find that mean distance increases after 1992 for both pair types and for all pay measures (i.e., $\delta_1 > 0$ and $(\delta_1 + \delta_2 + \delta_3 + \delta_4) > 0$). That is, there is more pay disparity after the disclosure law for both proximate and non-proximate managers -- consistent with greater performance-based pay after the rule change.

Finally, and most importantly, the increase in distance after 1992 is *less* in different-state divisions in comparison to same-state divisions. We find a negative and statistically significant coefficient on the interaction term: `diff_state*post92` (i.e. $\delta_3 < 0$), suggesting a lower increase in pay disparity for non-proximate division managers. This last finding suggests more pronounced peer effects in non-proximate divisions after the new SEC rule in comparison to proximate divisions. The magnitude of this coefficient is also economically meaningful. Looking at total compensation in column (6), we see that the increase in distance for same-state divisions is 6.74% between periods, while the comparable increase for different-state divisions is 2.94%. That is, the increase in distance after 1992 for non-proximate divisions is approximately half of that for proximate divisions.

We present the baseline results of this analysis in Figure 3. We plot the mean pair distance of pay residuals within firms for proximate (same-state) and non-proximate (different-state) divisions for two time periods: pre 1992 and post 1992. We do this for all three pay measures. As shown in the figures, a similar pattern holds for all pay measures, but is most pronounced for total compensation. Most notably, the mean distance in pay residuals between different-state managers declines by less after 1992 in comparison to same-state managers. As a robustness check, we also estimate the same set of regressions using only hybrid firms, i.e., firms with both same and different state divisions and find qualitatively similar results.

The pairs distance analysis complements the earlier analysis using wage regressions because it captures a measure of pay disparity. Our finding of increasing pay disparity after 1992 is consistent with more performance-based pay after the disclosure law. However, despite the general trend toward more performance pay, we find relatively less pay disparity between non-proximate divisions after 1992. If we assume that performance-based pay and pay disparity are related, then, analogous to the wage regression analyses, these findings are suggestive that firms face a tradeoff between higher-powered incentive contracts versus less pay disparity in the face of peer comparisons.

In sum, we present three main empirical findings that demonstrate how pay policies of firms respond to concerns about internal equity:

- First, we find the largest increases in PRS after the 1992 SEC ruling in exactly those firms that were most affected by changes in disclosure of pay information: geographically-dispersed firms, and especially those with less pre-1992 disclosure of pay.
- Second, we find evidence consistent with a tradeoff between pay-performance sensitivity (PPS) and pay-referent sensitivity (PRS); that is, firms more affected by the SEC ruling increased pay-referent sensitivity after the 1992 SEC ruling and also appeared concurrently to (weakly) decrease pay-performance sensitivity relative to firms less affected by the SEC ruling.
- Third, in an analysis of the distance between pay of managers within firms, we find that the mean distance in pay residuals between division managers in different states increased *less* after 1992 relative to proximate (same state) managers. This finding provide evidence that, while pay disparity increased within firms after the 1992 disclosure rule, it increased less for non-proximate division managers for whom peer comparisons presumably increased after the 1992 ruling.

Taken together, our findings suggest that horizontal wage comparisons within firms and concerns for “pay harmony” affect firm policies in setting pay for executives.

IV.E. Alternative Explanations

We also consider three alternative explanations not related to peer comparisons that could explain our two main findings: the increase in PRS in geographically-dispersed firms in the post-1992 period, and the smaller increase in distance in pay residuals for different state managers in the post-1992 period. The first two explanations are examples of other developments after 1992 (unrelated to the disclosure law) that are correlated with unobserved firm characteristics (θ): the first is team-production and the second is selection or managerial skills.

In the first alternative explanation, IT productivity improved over the same period as the SEC rule implementation, facilitating greater team production (increase in θ), particularly in dispersed firms.¹⁹ Adoption, for example, of networking and telecommunications infrastructure, fax machines, email and common operating systems and software, enabled division managers to coordinate their activities during the 1990s to a greater degree than during earlier periods.²⁰ There are two findings that counter this explanation. First, and most importantly, results in table 6 show that the pay changes occur primarily in the period just after 1992, which is at odds with an explanation about IT productivity. However, since we have a firm-level measure of IT intensity, we look for evidence of this explanation directly. We create subsamples of geographically-dispersed firms by IT intensity (as measured by numbers of PCs per employee in the firm). If IT played a competing role, we would expect to find that firms with greater IT intensity show greater pay co-movement post-1992, as a result of the IT productivity improvements during this period. We do not find evidence for this.

The second alternative is that the practice of rotating division managers through multiple divisions increased during the 1990s, concurrent to the SEC rule change, and particularly in dispersed firms that used this as a method of grooming future leaders for roles as top managers. This increased rotation, in turn, may have led to increased co-movement in division manager pay, due not to peer comparison, but simply to unobservable characteristics of the specific managers (that would not be captured by our division fixed effects) and the stickiness of compensation plans that are challenging to change as individuals rotate through roles. Based on our interviews with Hewitt Associates, the practice of horizontal rotations for division managers was extremely uncommon during that timeframe.

¹⁹ IT may also improve communication about pay which is another related explanation for our results. This falls under the category of a technological change that affects the difference in information between geographically-dispersed and concentrated firms.

²⁰ Theoretically, this argument can be countered by an opposite impact of increased IT productivity, namely, greater monitoring of agents. Under this argument, IT enables principals (CEOs, group managers, directors) to monitor the activities of division managers more closely and therefore understand her individual contribution with greater accuracy, negating the free-riding aspects of team production (Holmstrom 1979) or the distortions from multitasking (Holmstrom 1982) that occur with less accurate monitoring. However, we do not consider this scenario as it would produce the opposite results from what we find.

Moreover, it is not clear how horizontal rotation explains stronger effects in firms with less pre-1992 pay disclosure.

The final competing explanation is that CEOs merely substitute tournament incentives for pay incentives in dispersed firms after 1992. That is, increased promise of vertical rewards from promotions offsets less differentiated within firms. This alternative does not dispute the introduction of PRS within firms, rather, it counters the existence of a tradeoff between PRS and PPS. Under this scenario, compensation and tournament incentives are substitutes, so as compensation becomes distorted by peer comparison, principals substitute vertical incentives – in the form of increased pay jumps between division and group manager levels -- to motivate and maintain high productivity of their agents.²¹ When we examine the relation between the steepness of the pay changes and horizontal co-movement of pay within firms, we find no evidence of this tradeoff. In fact, we find weak evidence that pay steepness decreased concurrent to horizontal pay co-movement, a result consistent with the interpretation that vertical wage compression also occurred from the 1992 SEC ruling, together with the horizontal co-movement that is the focus of this paper.

Altogether, while these three scenarios offer plausible alternative explanations, we do not find evidence that any of them are driving our results.

V. Conclusion

In this study, we find evidence consistent with the presence of peer effects in influencing pay policies for executives inside firms. Our underlying approach is to measure changes in pay co-movement and pay-performance sensitivity after a 1992 SEC ruling that mandated greater disclosure of top executive pay. We argue that this ruling led to greater awareness of pay and, hence, greater peer comparison throughout all managerial ranks, particularly in geographically-dispersed firms which had natural information barriers prior to the ruling, as well as in firms with less ex ante pay disclosure. The change in

²¹ Clearly, this, too, must come at a cost, otherwise these CEOs would have instituted higher tournament incentives prior to the change in compensation. However, delineating this alternative tradeoff is beyond the scope of this study.

pay co-movement after the ruling, therefore, reflects the effect of peer comparisons on pay rather than the effects of team production, selection or common shocks – other causes that could also plausibly drive co-movement of pay.

We present three main empirical findings that demonstrate how pay policies of firms respond to concerns about internal equity: First, we find the largest increases in PRS after the 1992 SEC ruling in exactly those firms that were most affected by changes in disclosure of pay information: geographically-dispersed firms, and especially those with less pre-1992 disclosure of pay. Second, we find evidence consistent with a tradeoff between pay-performance sensitivity (PPS) and pay-referent sensitivity (PRS); that is, firms more affected by the SEC ruling increased pay-referent sensitivity after the 1992 SEC ruling and also appeared concurrently to (weakly) decrease pay-performance sensitivity relative to firms less affected by the SEC ruling. Third, in an analysis of the distance between pay of managers within firms, we find that the mean distance in pay residuals between division managers in different states increased *less* after 1992 relative to proximate (same state) managers. This finding provide evidence that, while pay disparity increased within firms after the 1992 disclosure rule, it increased less for non-proximate division managers for whom peer comparisons presumably increased after the 1992 ruling. Taken together, our findings suggest that horizontal wage comparisons within firms and concerns for “pay harmony” affect firm policies in setting pay for executives.

The unique contribution of the paper is to demonstrate how the pay policies of firms respond to concerns about internal equity which, to our knowledge, has not been documented elsewhere. This research also raises questions for future research on the costs of pay disclosure and on labor markets more generally. What are the equilibrium consequences to the changes in wage contracts resulting from increased pay disclosure? From the perspective of the firm, these consequences may range from pay ratcheting to aggregate shifts in worker effort or firm-specific investments and turnover. Each of these changes, in turn, may have performance consequences for firms. From the perspective of the employee, increased pay disclosure may influence decisions to join firms and shift the relative importance of internal

and external benchmarks, thereby having larger labor market consequences. Aside from the contributions in this paper, these areas represent potentially fruitful avenues for further research as we broaden our understanding of peer effects within firms.

Table A: Empirical Implications for Peer Comparison

Panel 1: Wage Regressions: PRS and PPS

| <u>Pay Measures</u> | <u>Sample Split</u> | <u>Hypotheses</u> | | <u>Mechanism & Interpretation</u> |
|---------------------|----------------------------|--------------------|--------------------|--|
| | <u>Geography</u> | <u>PRS*Post 92</u> | <u>PPS*Post 92</u> | |
| All Measures | Dispersed | $\beta_2 > 0$ | $\beta_1 < 0$ | <ul style="list-style-type: none"> • Greater access to information facilitates peer comparisons • Trade-off between PRS & PPS • No Difference post-92 |
| | Concentrated | $\beta_2 = 0$ | $\beta_1 = 0$ | |
| | <u>Pre-1992 Disclosure</u> | | | |
| All Measures | Less Disclosure | $\beta_2 > 0$ | $\beta_1 < 0$ | <ul style="list-style-type: none"> • Greater access to information facilitates peer comparisons • Tradeoff between PRS & PPS • No Difference post-92 |
| | More Disclosure | $\beta_2 = 0$ | $\beta_1 = 0$ | |

Panel 2: Pairs Distance Analysis: Pay Disparity

| | <u>Same State</u> | <u>Different State</u> | <u>Peer Comparisons</u> | <u>Mechanism & Interpretation</u> |
|--|-----------------------|---|-------------------------|---|
| Pre 92 | δ_0 | $\delta_0 + \delta_2$ | $\delta_2 > 0$ | <ul style="list-style-type: none"> • Greater access to information facilitates peer comparisons <ul style="list-style-type: none"> ◦ Less distance btw same-state divisions pre 92 |
| Post 92 | $\delta_0 + \delta_1$ | $\delta_0 + \delta_1 + \delta_2 + \delta_3$ | n/a | <ul style="list-style-type: none"> • Performance-based pay increasing across all firms <ul style="list-style-type: none"> ◦ More distance for all pairs post 92 |
| Difference-in-Difference (post 92 – pre 92) | δ_1 | $\delta_1 + \delta_3$ | $\delta_3 < 0$ | <ul style="list-style-type: none"> • Difference between before and after 92 less for different-state divisions |

Table 1 Panel A: Summary Statistics: Firm and Division

| Variable | Obs | Mean | Std. Dev. |
|----------------------------------|--------|---------|-----------|
| Firm | | | |
| Sales (\$millions) | 2,315 | 8,508 | 13,548 |
| Market capitalization | 2,248 | 9,366 | 16,502 |
| Employees (000s) | 2,307 | 44.12 | 69.46 |
| Assets (\$millions) | 2,319 | 8,868 | 17,933 |
| Return on assets | 2,315 | 0.0512 | 0.0674 |
| Average no. divisions / firm | 2,362 | 4.55 | 4 |
| Proportion divisions in HQ state | 2,362 | 0.48 | 0.39 |
| Division | | | |
| Sales (\$millions) | 9,871 | 752 | 1,448 |
| Employees (000s) | 9,790 | 3.02 | 10.14 |
| Division manager | | | |
| Tenure (months) | 8,899 | 42.23 | 42 |
| Officer corp | 10,731 | 0.23 | 0.42 |
| Division depth | 10,706 | 1.42 | 0.81 |
| Base salary (\$) | 10,731 | 208,849 | 82,439 |
| Base plus bonus (\$) | 10,731 | 300,088 | 151,459 |
| Total compensation (\$) | 10,731 | 459,640 | 357,865 |

Table 1 Panel B: Concentrated v Dispersed firms (Means)

| Variable | Concentrated | Dispersed |
|----------------------------------|--------------|-----------|
| Firm | | |
| Obs | 1,003 | 865 |
| Firm sales (\$millions) | 8992.64 | 7607.12 |
| Market capitalization | 9349.69 | 7757.12 |
| Firm employees (000s) | 44.91 | 44.39 |
| Firm assets | 9764.51 | 7507.56 |
| Return on assets | 0.0554 | 0.0443 |
| Average no. divisions / firm | 3.83 | 5.1 |
| Proportion divisions in HQ state | 0.89 | 0.05 |
| Division | | |
| Obs | 3,837 | 4,346 |
| Sales (mean) (\$millions) | 919 | 562 |
| Sales (median) | 379 | 258 |
| Employees (mean) (000s) | 3.3 | 2.6 |
| Employees (median) | 0.9 | 1.1 |
| Division manager | | |
| Tenure (months) | 40.33 | 43.66 |
| Base salary (\$) | 216,397 | 197,225 |
| Base salary plus bonus (\$) | 312,907 | 280,139 |
| Total compensation (\$) | 498,911 | 415,225 |

Firm statistics are obtained from Compustat and Hewitt Associates for 296 firms and 2572 divisions between 1986 and 1999. Division and division manager statistics are from Hewitt. Concentrated firms are defined as firms in the top two quintiles of firms with the highest proportion of divisions in the same state as HQ, and dispersed firms are those firms in the bottom two quintiles. *Tenure* refers to the number of months a division manager has been in the position. *Officer corp* is equal to one if the division manager is also an officer of the firm. *Division depth* is the number of levels between the division and the CEO. *Base salary* refers to annual salary, *Base plus bonus* refers to salary plus annual bonus and *Total compensation* refers to salary plus bonus plus (ex ante valuation of) restricted stock grants, stock option grants, and other forms of long-term incentive pay (LTIP: performance units). Reported in 1996 dollars.

Table 2: Division Manager Pay-Performance Sensitivity (PPS) and Pay-Referent Sensitivity (PRS)

| Log pay type: | Base salary (1) | Base + bonus (2) | Total Compensation (3) | Base salary (4) | Base + bonus (5) | Total Compensation (6) |
|---------------------------------------|------------------------|------------------------|------------------------------|------------------------|------------------------|------------------------------|
| PRS and PPS | | | | | | |
| Log referent pay (PRS) | | | | 0.2838*** (0.0351) | 0.4413*** (0.0388) | 0.5511*** (0.0276) |
| Log division sales (PPS) | 0.0751*** (0.0071) | 0.0935*** (0.0102) | 0.1106*** (0.0121) | 0.0715*** (0.0068) | 0.0873*** (0.0091) | 0.1022*** (0.0106) |
| Firm Performance | | | | | | |
| Return on assets | -0.0211 (0.0607) | 0.5472*** (0.1285) | 0.6307*** (0.1513) | -0.0065 (0.0479) | 0.3059*** (0.0766) | 0.2853*** (0.0746) |
| Log firm revenues | 0.0377** (0.0150) | 0.0820*** (0.0250) | 0.1446*** (0.0351) | 0.0236** (0.0116) | 0.0391*** (0.0150) | 0.0564*** (0.0181) |
| Other Controls | | | | | | |
| Tenure | 0.0009*** (0.0001) | 0.0011*** (0.0001) | 0.0011*** (0.0001) | 0.0009*** (0.0001) | 0.0011*** (0.0001) | 0.0010*** (0.0001) |
| Officer corp | 0.0879*** (0.0134) | 0.1052*** (0.0204) | 0.1525*** (0.0250) | 0.0792*** (0.0118) | 0.0937*** (0.0155) | 0.1253*** (0.0178) |
| Division depth | -0.0501*** (0.0065) | -0.0597*** (0.0091) | -0.0895*** (0.0117) | -0.0436*** (0.0057) | -0.0474*** (0.0072) | -0.0639*** (0.0085) |
| Number of non-focal divisions in firm | -0.0014 (0.0011) | -0.0006 (0.0015) | -0.0006 (0.0021) | 0.0010 (0.0009) | 0.0035*** (0.0012) | 0.0056*** (0.0016) |
| Log industry pay | | | | 0.0384* (0.0196) | 0.0045 (0.0201) | -0.0083 (0.0195) |
| Constant | 12.0891*** (0.1059) | 12.3131*** (0.1433) | 12.6738*** (0.3616) | 8.6564*** (0.4310) | 6.8895*** (0.4995) | 5.6629*** (0.4111) |
| Division and year FE | Y | Y | Y | Y | Y | Y |
| Observations | 10312 | 10312 | 10312 | 10312 | 10312 | 10312 |
| Adjusted R-squared | 0.274 | 0.252 | 0.364 | 0.315 | 0.352 | 0.511 |

Standard errors clustered by firm. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. *Log referent pay* refers to the log mean pay of division managers, excluding the focal division, within a given firm and year. Referent pay is calculated using base salary in column (4), base+bonus in (5) and total compensation in (6). *Number of non-focal divisions* refers to the number of divisions in a firm-year, excluding the focal division. *Log industry pay* refers to the log mean pay of all division managers outside the firm in the focal manager's Fama-French industry. Refer to footnote in table 1 for additional definitions.

Table 3: Firm Geographic Concentration and Pay-Performance Sensitivity (PPS) and Pay-Referent Sensitivity (PRS)

| Log pay type: | Base salary | | Base salary+bonus | | Total compensation | |
|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| PRS and PPS | | | | | | |
| Log referent pay (PRS) | 0.3132*** (0.0604) | 0.1313*** (0.0506) | 0.3523*** (0.0504) | 0.2379*** (0.0550) | 0.4753*** (0.0442) | 0.4122*** (0.0504) |
| Log division sales (PPS) | 0.1176*** (0.0124) | 0.1134*** (0.0150) | 0.1498*** (0.0157) | 0.1432*** (0.0196) | 0.1738*** (0.0183) | 0.1693*** (0.0216) |
| Geography interactions | | | | | | |
| Log referent pay (PRS)*Concentration | 0.0281** (0.0142) | 0.0376*** (0.0135) | 0.0378*** (0.0126) | 0.0465*** (0.0145) | 0.0301*** (0.0098) | 0.0307*** (0.0113) |
| Log division sales (PPS)*Concentration | -0.0087*** (0.0029) | -0.0103*** (0.0033) | -0.0119*** (0.0037) | -0.0122*** (0.0043) | -0.0135*** (0.0045) | -0.0139*** (0.0050) |
| Firm and division controls, Year FE | Y | Y | Y | Y | Y | Y |
| Firm Performance*Concentration | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |
| Observations | 10312 | 10312 | 10312 | 10312 | 10312 | 10312 |
| Adjusted R-squared | 0.686 | 0.324 | 0.691 | 0.364 | 0.758 | 0.517 |

Standard errors clustered by firm. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. *Log referent pay* refers to the log mean pay of division managers, excluding the focal division, within a given firm and year. Referent pay is calculated using base salary in column (1, 2), base+bonus in (3, 4) and total compensation in (5, 6). *Concentration* is defined as quintiles of geographic concentration measured by the proportion of divisions in the same state as headquarters. All pair-wise interactions and direct effects included in specification. Firm and division controls are the same as those in Table 2. Refer to footnote in table 1 for additional definitions.

Table 4: Effect of 1992 SEC Proxy Rule on PRS and PPS in Concentrated and Dispersed Firms

Table 4 Panel A: PRS and PPS Before and After 1992 by Geography Sub-Samples

| Log pay type: | Base salary | | Base + bonus | | Total Compensation | |
|-------------------------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Concentrated firms (N=3620) | | | | | | |
| Log referent pay (PRS) | 0.5416*** (0.0447) | 0.4142*** (0.0601) | 0.6294*** (0.0430) | 0.5683*** (0.0602) | 0.6939*** (0.0305) | 0.6426*** (0.0374) |
| Log division sales (PPS) | 0.0643*** (0.0087) | 0.0545*** (0.0100) | 0.0759*** (0.0108) | 0.0659*** (0.0129) | 0.0836*** (0.0121) | 0.0671*** (0.0150) |
| <i>Post 1992 Interactions</i> | | | | | | |
| Log referent pay (PRS)*post 1992 | -0.0260 (0.0421) | -0.0397 (0.0419) | -0.0393 (0.0415) | -0.0441 (0.0429) | -0.0145 (0.0332) | -0.0255 (0.0328) |
| Log division sales (PPS)*post 1992 | 0.0055 (0.0100) | 0.0023 (0.0103) | 0.0106 (0.0123) | 0.0068 (0.0130) | 0.0194 (0.0133) | 0.0186 (0.0138) |
| R-squared | 0.6489 | 0.331 | 0.676 | 0.423 | 0.753 | 0.521 |
| Dispersed firms (N=4225) | | | | | | |
| Log referent pay (PRS) | 0.4292*** (0.0525) | 0.1096* (0.0600) | 0.4889*** (0.0410) | 0.2814*** (0.0591) | 0.5609*** (0.0339) | 0.4332*** (0.0360) |
| Log division sales (PPS) | 0.0982*** (0.0089) | 0.0911*** (0.0104) | 0.1250*** (0.0106) | 0.1090*** (0.0131) | 0.1396*** (0.0112) | 0.1224*** (0.0140) |
| <i>Post 1992 Interactions</i> | | | | | | |
| Log referent pay (PRS)*post 1992 | 0.1534*** (0.0406) | 0.1251** (0.0561) | 0.1386*** (0.0404) | 0.1008* (0.0541) | 0.1147*** (0.0361) | 0.0997** (0.0417) |
| Log division sales (PPS)*post 1992 | -0.0236*** (0.0078) | -0.0181** (0.0075) | -0.0323*** (0.0108) | -0.0192* (0.0110) | -0.0256** (0.0122) | -0.0123 (0.0133) |
| R-squared | 0.695 | 0.295 | 0.69 | 0.296 | 0.757 | 0.503 |
| Firm and division controls, year FE | Y | Y | Y | Y | Y | Y |
| Firm performance * post 1992 | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |

Table 4 Panel B: PRS and PPS After 1992 by Geography: Triple Interactions

| Log pay type: <i>N</i> = 7845 | Base salary | | Base salary+bonus | | Total compensation | |
|---|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log referent pay (PRS)*post92*dispersed | 0.1716*** (0.0589) | 0.1547** (0.0680) | 0.1674*** (0.0591) | 0.1394** (0.0683) | 0.1224** (0.0492) | 0.1255** (0.0518) |
| Log division sales (PPS)*post92*dispersed | -0.0271** (0.0126) | -0.0172 (0.0128) | -0.0403** (0.0165) | -0.0210 (0.0169) | -0.0427** (0.0181) | -0.0253 (0.0189) |
| Firm and other controls, Year FE | Y | Y | Y | Y | Y | Y |
| Firm performance*post92*dispersed | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |
| R-squared | 0.68 | 0.316 | 0.686 | 0.359 | 0.759 | 0.516 |

Standard errors clustered by firm. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. *Log referent pay* refers to the log mean pay of division managers, excluding the focal division, within a given firm and year. Referent pay is calculated using base salary in column (1, 2), base+bonus in (3,4) and total compensation in (5, 6). Concentrated (dispersed) firms are those in the highest (lowest) two quintiles of the proportion of divisions in the same state as headquarters. All pair-wise interactions and direct effects included in specification. Firm and division controls are the same as those in Table 2. Refer to footnote in table 1 for additional definitions.

Table 5: Effect of 1992 SEC Proxy Rule on PRS and PPS in Geographically-Dispersed Firms: Less vs. More Disclosed Pay Pre-1992

Table 5 Panel A: PRS and PPS Before and After 1992 by Disclosed Pay Sub-Samples of Dispersed Firms

| Log pay type: | Base salary | | Base + bonus | | Total Compensation | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Less disclosed pay pre-1992 (N=2085) | | | | | | |
| Log referent pay (PRS) | 0.3672*** (0.0575) | 0.1345** (0.0634) | 0.4222*** (0.0498) | 0.2455*** (0.0719) | 0.5732*** (0.0378) | 0.4996*** (0.0396) |
| Log division sales (PPS) | 0.0897*** (0.0080) | 0.0815*** (0.0100) | 0.1148*** (0.0099) | 0.1009*** (0.0126) | 0.1330*** (0.0122) | 0.1204*** (0.0162) |
| <i>Post 1992 Interactions</i> | | | | | | |
| Log referent pay (PRS)*post 1992 | 0.0494 (0.0451) | 0.0997* (0.0517) | 0.0918** (0.0463) | 0.1422*** (0.0512) | 0.1190** (0.0481) | 0.1593*** (0.0470) |
| Log division sales (PPS)*post 1992 | -0.0231** (0.0090) | -0.0192* (0.0102) | -0.0261* (0.0148) | -0.0197 (0.0164) | -0.0304* (0.0180) | -0.0271 (0.0192) |
| R-squared | 0.572 | 0.262 | 0.564 | 0.261 | 0.667 | 0.523 |
| More disclosed pay pre-1992 (N=1527) | | | | | | |
| Log referent pay (PRS) | 0.4236*** (0.1112) | 0.0715 (0.0996) | 0.4878*** (0.0889) | 0.3017*** (0.0947) | 0.4632*** (0.0871) | 0.3345*** (0.0722) |
| Log division sales (PPS) | 0.1017*** (0.0151) | 0.0942*** (0.0188) | 0.1241*** (0.0203) | 0.1088*** (0.0261) | 0.1365*** (0.0192) | 0.1167*** (0.0236) |
| <i>Post 1992 Interactions</i> | | | | | | |
| Log referent pay (PRS)*post 1992 | -0.0045 (0.0700) | -0.0208 (0.0749) | 0.0208 (0.0773) | -0.0157 (0.0893) | 0.0802 (0.0727) | 0.0255 (0.0931) |
| Log division sales (PPS)*post 1992 | -0.0057 (0.0128) | 0.0020 (0.0122) | -0.0062 (0.0213) | 0.0086 (0.0187) | 0.0097 (0.0208) | 0.0361** (0.0171) |
| R-squared | 0.718 | 0.370 | 0.696 | 0.374 | 0.734 | 0.535 |
| Firm and division controls, year FE | Y | Y | Y | Y | Y | Y |
| Firm performance*post 1992 | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |

Table 5 Panel B: PRS and PPS After 1992 by Less vs. More Disclosure of Dispersed Firms: Triple Interactions

| Log pay type: <i>N</i> = 3612 | Base salary | | Base salary+bonus | | Total compensation | |
|---|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log referent pay (PRS)*post92*less disclosure | 0.0743 (0.0791) | 0.1652* (0.0933) | 0.0921 (0.0935) | 0.2139** (0.1032) | 0.0592 (0.0912) | 0.1711 (0.1054) |
| Log division sales (PPS)*post92*less disclosure | -0.0161 (0.0167) | -0.0072 (0.0174) | -0.0206 (0.0263) | -0.0089 (0.0256) | -0.0437 (0.0286) | -0.0423 (0.0283) |
| Firm and other controls, Year FE | Y | Y | Y | Y | Y | Y |
| Firm performance*post 1992*less disclosure | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |
| R-squared | 0.660 | 0.305 | 0.682 | 0.306 | 0.759 | 0.527 |

Standard errors clustered by firm. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. *Log referent pay* refers to the log mean pay of division managers, excluding the focal division, within a given firm and year. Referent pay is calculated using base salary in column (1, 2), base+bonus in (3, 4) and total compensation in (5, 6). Sample includes only geographically-dispersed firms defined as those in the lowest two quintiles of the proportion of divisions in the same state as headquarters. Less disclosure (more disclosure) firms are those in the highest three (lowest two) quintiles of the ratio of performance-based pay [3 year average (1990-92) ratio of bonus plus long-term incentives/ total compensation]. All pair-wise interactions and direct effects included in specification. Firm and division controls are the same as those in Table 2. Refer to footnote in table 1 for additional definitions.

Table 6: Timing of Effect of 1992 SEC Proxy Rule on PRS and PPS in Geographically-Dispersed Firms

| Log pay type: <i>N</i> = 4225 | Base salary | | Base salary+bonus | | Total compensation | |
|--------------------------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| PRS | | | | | | |
| Log referent pay (PRS) | 0.4075*** (0.0530) | 0.0927 (0.0686) | 0.4723*** (0.0421) | 0.2859*** (0.0646) | 0.6283*** (0.0350) | 0.4239*** (0.0423) |
| Log referent pay (PRS)*(1990-1992) | 0.0469 (0.0381) | 0.0217 (0.0409) | 0.0465 (0.0398) | 0.0215 (0.0452) | 0.0600* (0.0323) | 0.0411 (0.0348) |
| Log referent pay (PRS)*(1993-1995) | 0.1781*** (0.0485) | 0.1421** (0.0633) | 0.1793*** (0.0486) | 0.1196** (0.0595) | 0.1226*** (0.0369) | 0.1165** (0.0483) |
| Log referent pay (PRS)*(1996-1999) | 0.1845*** (0.0592) | 0.1680** (0.0739) | 0.1523*** (0.0575) | 0.1416** (0.0675) | 0.0706** (0.0358) | 0.1552*** (0.0543) |
| PPS | | | | | | |
| Log division sales (PPS) | 0.1008*** (0.0105) | 0.0924*** (0.0108) | 0.1324*** (0.0132) | 0.1129*** (0.0143) | 0.1258*** (0.0122) | 0.1266*** (0.0149) |
| Log division sales (PPS)*(1990-1992) | -0.0058 (0.0100) | -0.0043 (0.0098) | -0.0172 (0.0129) | -0.0155 (0.0126) | -0.0174 (0.0142) | -0.0164 (0.0146) |
| Log division sales (PPS)*(1993-1995) | -0.0267*** (0.0101) | -0.0181* (0.0094) | -0.0388*** (0.0139) | -0.0257* (0.0141) | -0.0254** (0.0126) | -0.0208 (0.0156) |
| Log division sales (PPS)*(1996-1999) | -0.0267** (0.0114) | -0.0238* (0.0121) | -0.0422** (0.0165) | -0.0284 (0.0184) | -0.0175 (0.0168) | -0.0168 (0.0228) |
| Firm and other controls, Year FE | Y | Y | Y | Y | Y | Y |
| Firm performance* year groups | Y | Y | Y | Y | Y | Y |
| Division FE | N | Y | N | Y | N | Y |
| R-squared | 0.697 | 0.294 | 0.692 | 0.289 | 0.758 | 0.500 |

Standard errors clustered by firm. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. *Log referent pay* refers to the log mean pay of division managers, excluding the focal division, within a given firm and year. Referent pay is calculated using base salary in column (1, 2), base+bonus in (3, 4) and total compensation in (5, 6). Sample includes only geographically-dispersed firms defined as those in the lowest two quintiles of the proportion of divisions in the same state as headquarters. All pair-wise interactions and direct effects included in specification. Firm and division controls are the same as those in Table 2. Refer to footnote in table 1 for additional definitions.

Table 7: Pay Disparity between Managers in Same State versus Different States within Firms

| Pairs distance between pay residuals by log pay type: | Base | | Salary+Bonus | | Total Compensation | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|
| | Min | Max | Min | Max | Min | Max |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Different State | 0.0106 (0.0147) | 0.0109 (0.0130) | 0.0128 (0.0070) | 0.0172** (0.0079) | 0.0109*** (0.0034) | 0.0162*** (0.0000) |
| Post92 | 0.0287*** (0.0000) | 0.0263*** (0.0000) | 0.0470*** (0.0000) | 0.0449*** (0.0000) | 0.0674*** (0.0000) | 0.0674*** (0.0000) |
| Different State*Post92 | -0.0050 (0.0038) | -0.0059 (0.0039) | -0.0075 (0.0061) | -0.0132** (0.0065) | -0.0300*** (0.0081) | -0.0380*** (0.0102) |
| Cons | 0.1760*** (0.0473) | 0.1780*** (0.0576) | 0.2107*** (0.0567) | 0.2111*** (0.0568) | 0.2352*** (0.0632) | 0.2337*** (0.0628) |
| First stage controls & year FE | Y | Y | Y | Y | Y | Y |
| First stage firm FE | N | Y | N | Y | N | Y |
| First stage division state FE | N | Y | N | Y | N | Y |
| Observations (DM-DM pair within firm) | 29,007 | 29,007 | 29,007 | 29,007 | 29,007 | 29,007 |

Each observation represents manager-manager pairs within a given firm and year. Significance is represented by: *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. Standard errors calculated by non-parametric permutation tests implemented by Monte Carlo simulation (10,000 runs per model). Details about the permutation tests are described in more detail in Footnote 10. *Different state* represents whether the division managers in the same firm are located in different states from each other. The dependent variable, *Pairs distance between pay residuals* is calculated according to equation 6 as the absolute value difference between pay residuals calculated from a first stage model described in equation 5. Columns (1), (3), (5) show results for residuals calculated using the minimum specification in the first stage (without firm and division state FE) and Columns (2), (4), and (6) show results for residuals calculated with the full first stage specification.

Figure 1: SEC 1992 Proxy Disclosure Rule and Differential Effects Across Firms: Geography of Divisions and Extent of Pre-1992 Pay Disclosure

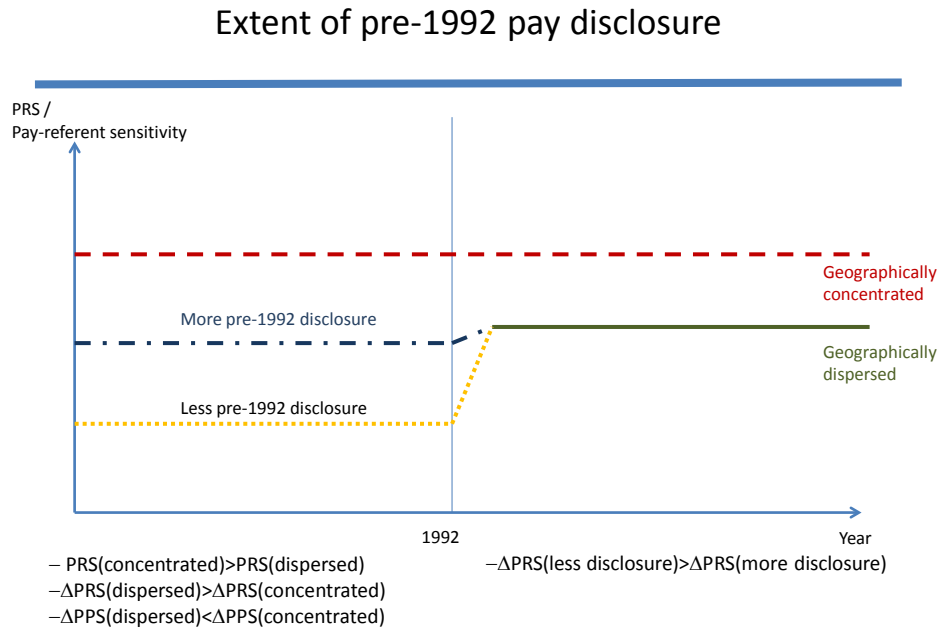
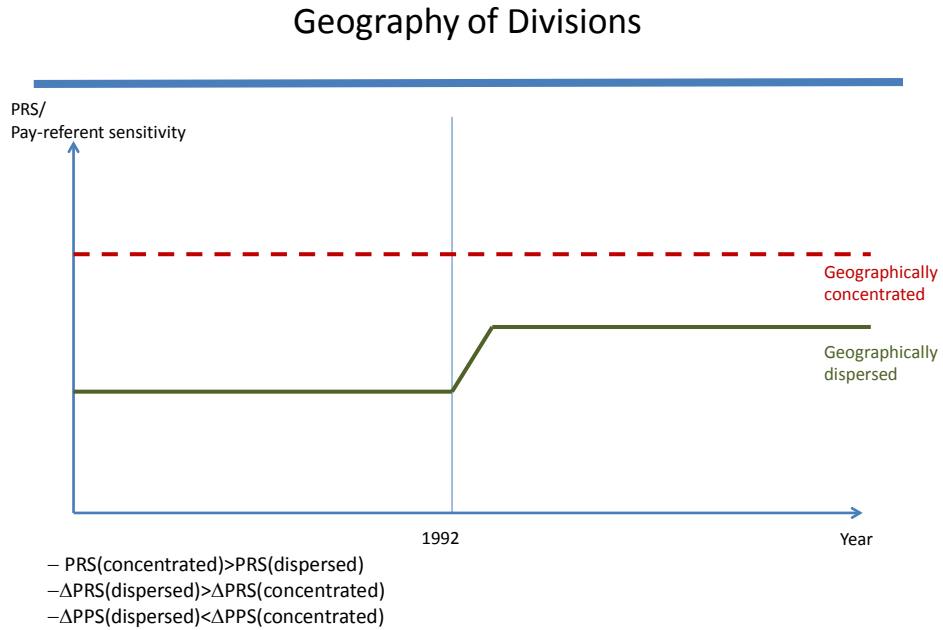
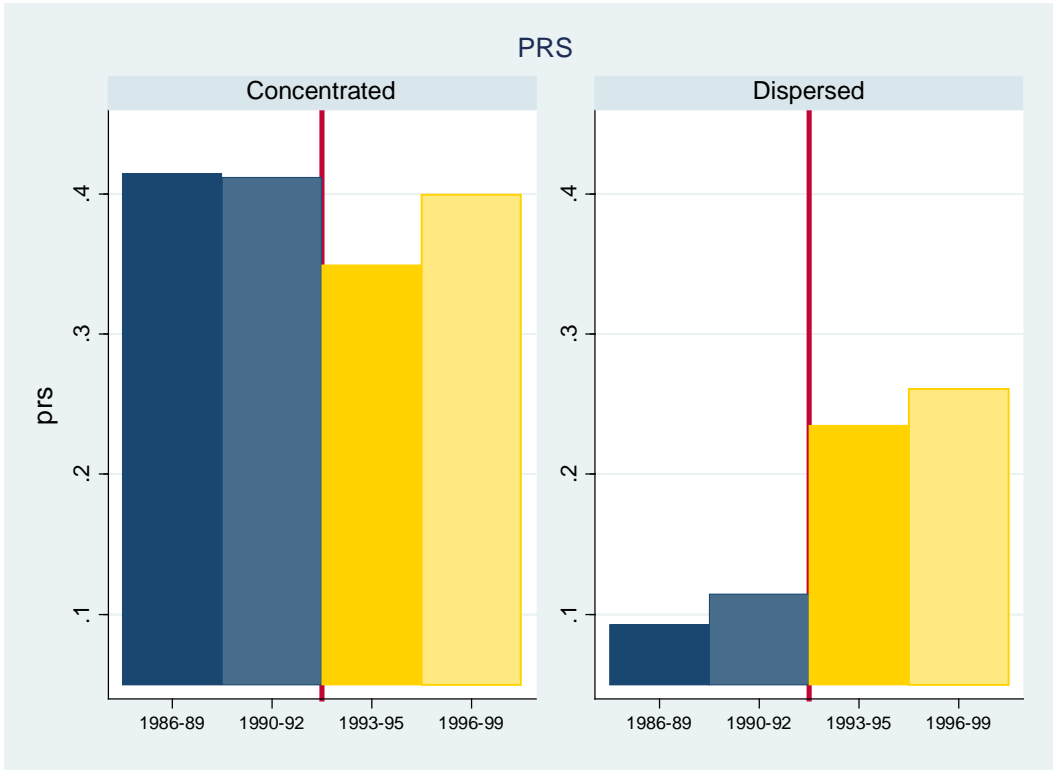
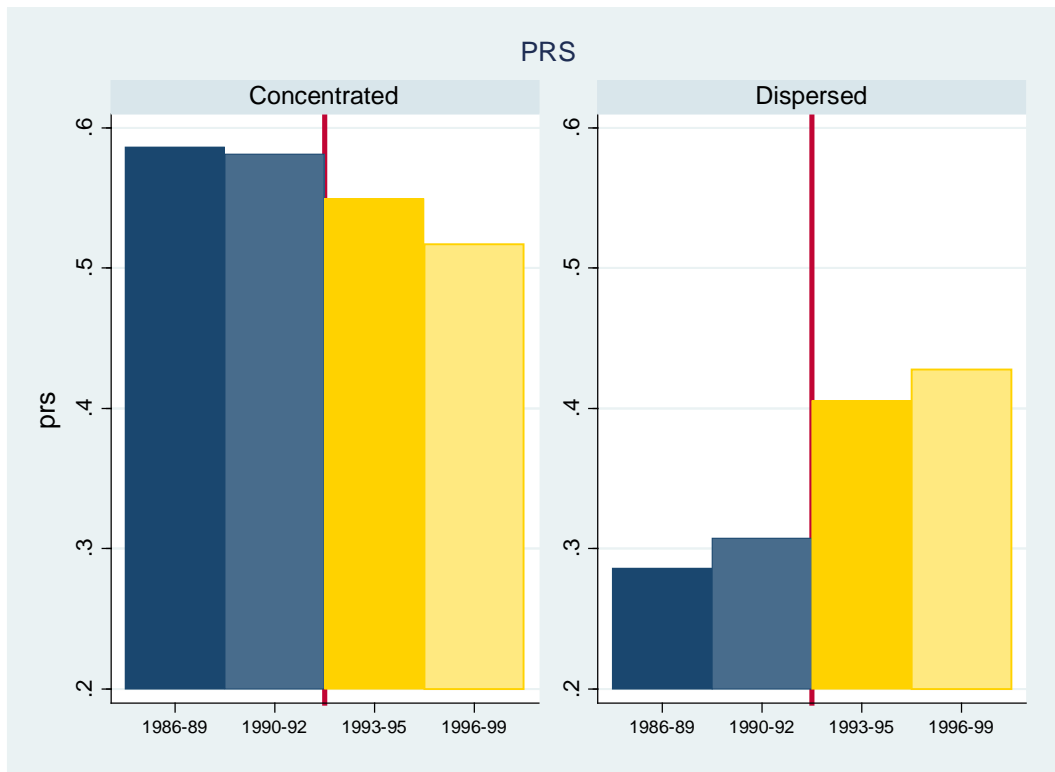


Figure 2: Pay-Referent Sensitivity (PRS) Over Time in Concentrated vs. Dispersed Firms

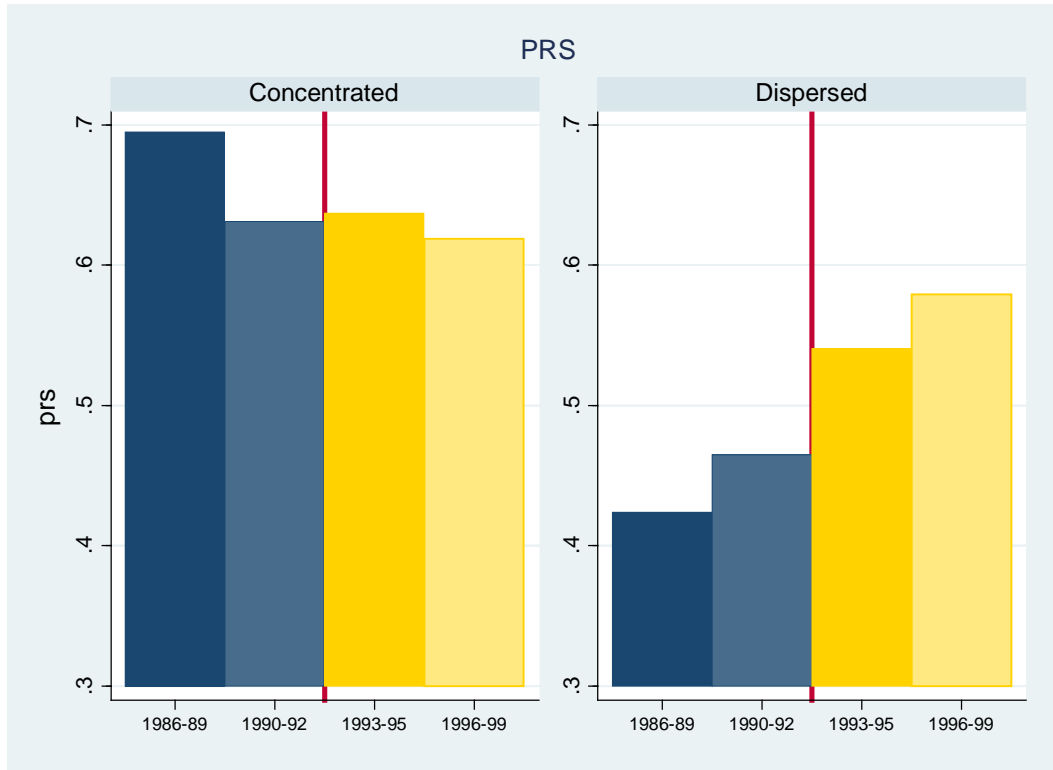
2a. PRS of base salary



2b. PRS of base salary + bonus

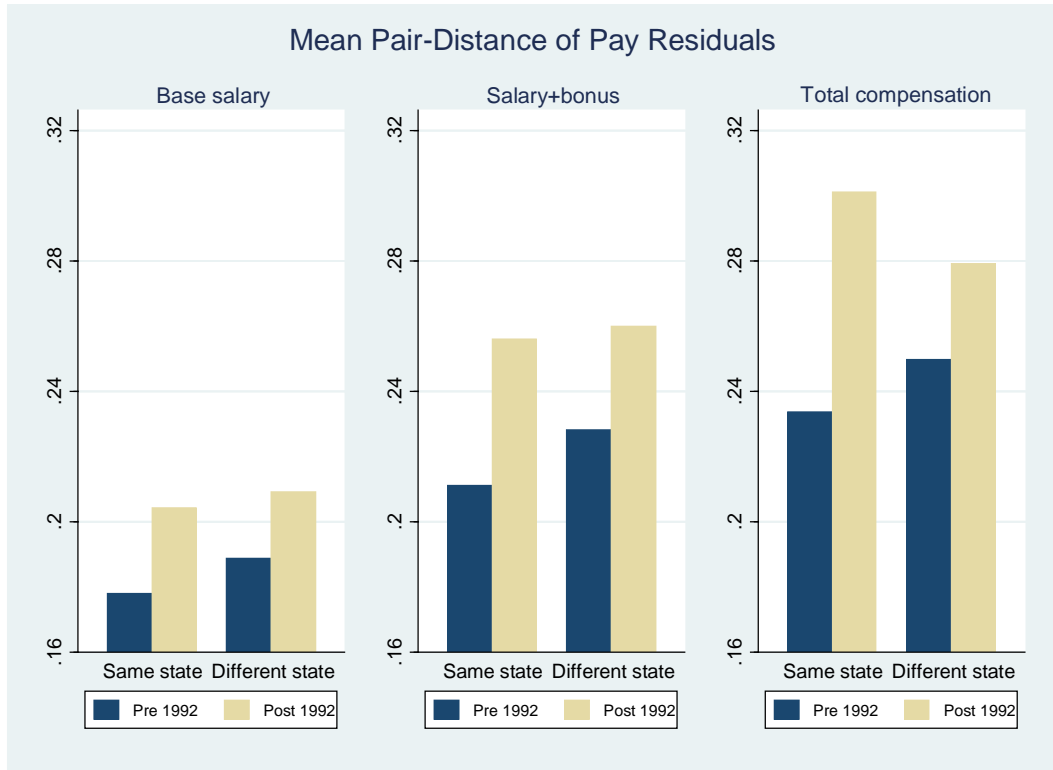


2c. PRS of Total Compensation



The bars represent Pay-Referent Sensitivity (PRS, or pay co-movement) over time for base salary, salary plus bonus, and total compensation for geographically-concentrated and dispersed firms. Concentrated (dispersed) firms are those in the highest (lowest) two quintiles of the proportion of divisions in the same state as headquarters. The plotted numbers come from linear combinations of the appropriate regression estimates in Table 6 columns 2, 4, and 6 for dispersed firms based on regressions that include division fixed effects. Please refer to Table 6 for statistical significance of coefficients. (Analogous PRS estimates are calculated for concentrated firms, unreported). The vertical line represents the timing of the SEC Proxy Disclosure Law (October, 1992).

Figure 3: Pay Disparity between Managers in Same States versus Different States within Firms: Pre vs. Post 1992



The bars represent mean pairs distance between pay residuals for three pay measures: base salary, salary plus bonus, and total compensation. *Pairs distance between pay residuals* is calculated according to equation 6 as the absolute value difference between pay residuals calculated from a first stage wage regression model described in equation 5. The plotted numbers come from linear combinations of the appropriate regression estimates in Table 7, columns 2, 4 and 6 which are based on residuals calculated using the full first stage specification. Please refer to Table 7 for statistical significance of coefficients. We compare differences between same-state and different-state managers within a firm over time. The blue bars represent 1986-1992 averages, while the yellow bars represent 1993-1999 averages.

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Appendix A: SEC 1992 Proxy Disclosure Rules on Executive Pay

In October, 1992, the Securities and Exchange Commission (SEC) “announced sweeping new rules affecting the disclosure of top executive compensation in the annual proxy statement” of publicly-traded firms (Murphy, 1999, pg. 50). The regulation was partially in response to heightened visibility on CEO pay via a variety of media outlets just prior to the 1992 presidential election.²² One primary objective of the new rules was to improve disclosure of pay information to enable shareholders to evaluate the link between executive pay and performance. However, the new rules were expected to have many potential, far-reaching effects. As noted by Murphy (1999, pg. 49) “The public disclosure of executive pay required by the Securities and Exchange Commission (SEC) virtually guarantees that third parties such as rank-and-file employees, labor unions, consumer groups, Congress, and the media affect the type of contracts written between management and shareholders.”²³

The new rules led to better disclosure of pay, especially performance-based pay. The most important changes for this paper are three-fold²⁴:

- Replace narrative descriptions of compensation plans with five tables based on a standardized format that allow more direct comparisons across firms (and across positions within firms). For example, the required Summary Compensation Table discloses annual salary, bonus and all other compensation of the CEO and the four other most highly-paid senior executive officers over a three-year period. Much

²² From Murphy (1999), pg 50: “Although the business press had followed CEO pay for decades, CEO pay did not really become a public “issue” until 1991. Feature stories on CEO pay aired on the nightly news broadcasts of the three major networks in the Spring of 1991, and CNN, *60 Minutes* and *Nightline* devoted segments to CEO pay. The controversy heightened with the November 1991 introduction of Graef Crystal’s (1991) expose on CEO pay, *In Search of Excess*, and exploded following President George Bush’s ill-timed pilgrimage to Japan in January 1992, accompanied by an entourage of highly paid US executives. What was meant to be a plea for Japanese trade concessions dissolved into accusations that US competitiveness was hindered by its excessive executive compensation practices as attention focused on the “huge pay disparities between top executives in the two countries.”

²³ Hall and Murphy (2003) refer to ratchet effect of 1992 on stock options as stated in Camerer and Malmendier (2007).

²⁴ From Murphy (2011) pg 5 “The new rules required a Summary Compensation Table summarizing the major components of compensation received by the CEO and other highly paid executives over the past three years, and additional tables describing option grants, option holdings, and option exercises in much greater detail than under previous rules.”

of the prior narrative was “short on numbers but long on legalistic descriptions of complicated benefit plans” (Stone, 1992, Lissy 1993).²⁵

- Report salary and bonus separately, instead of reporting cash compensation, which combined salary and bonus.
- Report all forms of long-term incentives separately in a set of detailed tables (i.e., restricted stock, stock options, other forms of LTIP, e.g., performance units).

Around the time of the new SEC disclosure rule, there was extensive media and political attention on disparity between CEO pay and average worker pay.²⁶ We argue that the importance of vertical comparisons Wade, O’Reilly and Pollock (2006), combined with attention on pay disparities led to more horizontal pay comparisons between division managers.²⁷

For an example of changes in pay disclosure from the new rule, see Exhibits A1-A3 which compares compensation that is reported in proxy statements for Campbell Soup, before and after the rule change.

²⁵ Edward Stone, “New Executive Compensation Disclosures Proposed by the SEC,” *Journal of Corporate Accounting and Finance* (Autumn, 1992). William Lissy, “Currents in Compensation and Benefits,” *Compensation and Benefits Review*, May/June 1993. “old disclosure requirements were short on numbers but long on legalistic descriptions of complicated benefit plans.” Pg. 91

²⁶ From Murphy 1999: “Legislation had been introduced in the House of Representatives disallowing deductions for compensation exceeding 25 times the lowest-paid worker.” (pg 50) In 1997, the AFL-CIO launched a website focusing exclusively on “exorbitant pay schemes that have created unprecedented inequities in the American workplace” and described as a “working families’ guide to monitoring and curbing the excessive salaries, bonuses and perks in CEO compensation packages.” (pg 51/76).

²⁷ Another regulation affecting CEO pay around this time period was the 162m ruling that imposed a cap on CEO cash compensation that was tax-deductible for corporations. The cap was \$1 million. It is not obvious how this regulation affected division manager pay.

Exhibit A1: Campbell Soup 1991 Proxy (Prior to new SEC Disclosure Rule)

EXECUTIVE COMPENSATION

The following table shows cash compensation paid or accrued during fiscal 1991 for the five most highly compensated executive officers and for all executive officers as a group (24 persons), for services rendered in all capacities to the Company and its subsidiaries.

| Name of Individual or Number in Group | Capacities in Which Served | Cash Compensation (Salary and Bonus)* |
|---|--|---------------------------------------|
| David W. Johnson (1) | President and Chief Executive Officer | \$1,444,338 |
| Herbert M. Baum | Executive Vice President of Campbell Soup Company and President of Campbell North America Division | \$ 803,503 |
| Edwin L. Harper (2) | Executive Vice President and Chief Financial Officer | \$ 772,027 |
| R. Edward Glover (3) | Vice President of Campbell Soup Company and President of Campbell Europe | \$ 570,750 |
| John M. Coleman | Senior Vice President - Law and Public Affairs and Corporate Secretary | \$ 448,049 |
| All executive officers as a group (24 persons), including those named above | | \$9,322,154 |

* The amounts shown include short-term incentive compensation for fiscal 1991 (both cash and deferred awards) and dividends on restricted performance stock.

- (1) The Company has an agreement with Mr. Johnson providing for his employment as the Company's Chief Executive Officer through January 15, 1995. Provisions of the agreement relating to retirement and termination benefits are outlined below. See "Pension Plans" and "Termination Benefits".
- (2) Mr. Harper resigned on July 26, 1991.
- (3) Includes various cash allowances relating to overseas assignment.

Exhibit A2: Campbell Soup 1993 Proxy (After new SEC Disclosure Rule): Compensation Table

| Name and Principal Position | Fiscal Year | Annual Compensation | | Long Term Compensation | | All Other Compensation(2) |
|---|-------------|---------------------|-----------|-------------------------------|-----------------------|---------------------------|
| | | Salary | Bonus | Awards Restricted Stock(1) | Number of Options (#) | |
| David W. Johnson Chief Executive Officer | 1993 | \$806,700 | \$912,722 | \$5,585,850 | 40,000 | \$ 41,180 |
| | 1992 | \$757,500 | \$548,400 | 0 | 40,000 | \$ 43,812 |
| | 1991 | \$712,500 | \$702,000 | \$3,678,703 | 130,800 | \$ 10,499 |
| Frank E. Weise, III (3) Senior Vice President- Finance and Chief Financial Officer | 1993 | \$291,667 | \$336,897 | \$ 400,350 | 13,400 | \$ 4,302 |
| | 1992 | \$147,020 | \$ 86,900 | \$ 873,250 | 23,400 | \$184,720 |
| | 1991 | - | - | - | - | - |
| John M. Coleman Senior Vice President- Law and Public Affairs | 1993 | \$281,667 | \$266,603 | \$ 321,850 | 10,600 | \$ 8,517 |
| | 1992 | \$260,000 | \$164,308 | 0 | 10,600 | \$ 9,509 |
| | 1991 | \$235,000 | \$205,500 | \$ 637,250 | 34,250 | \$ 7,460 |
| James R. Kirk Senior Vice President- Research and Develop- ment and Quality Assur- ance | 1993 | \$262,083 | \$232,470 | \$ 251,200 | 8,400 | \$ 11,462 |
| | 1992 | \$244,750 | \$140,308 | 0 | 8,400 | \$ 10,460 |
| | 1991 | \$229,167 | \$115,400 | \$ 457,375 | 16,800 | \$ 6,979 |
| Robert Subin Vice President President- International Specialty Foods Group | 1993 | \$260,000 | \$192,024 | \$ 251,200 | 8,400 | \$ 8,053 |
| | 1992 | \$238,333 | \$ 28,810 | \$ 63,500 | 8,400 | \$ 7,157 |
| | 1991 | \$214,333 | \$132,300 | \$ 400,250 | 18,000 | \$ 5,359 |

Exhibit A3: Campbell Soup 1993 Proxy (After new SEC Disclosure Rule): Stock Option Grants

| OPTION GRANTS IN LAST FISCAL YEAR | | | | | |
|-----------------------------------|---------------------|--|--------------------------------|-----------------|-------------------------------|
| Individual Grants | | | | | Grant Date Value(1) |
| Name | Options Granted (#) | % of Total Options Granted to Employees in Fiscal Year | Exercise or Base Price (\$/Sh) | Expiration Date | Grant Date Present Value (\$) |
| David W. Johnson | 40,000 | 3.26% | \$43.8125 | 3/24/03 | \$504,400 |
| Frank E. Weise, III | 13,400 | 1.09% | \$43.8125 | 3/24/03 | \$168,974 |
| John M. Coleman | 10,600 | 0.86% | \$43.8125 | 3/24/03 | \$133,666 |
| James R. Kirk | 8,400 | 0.68% | \$43.8125 | 3/24/03 | \$105,924 |
| Robert Subin | 8,400 | 0.68% | \$43.8125 | 3/24/03 | \$105,924 |

- (1) In accordance with Securities and Exchange Commission rules, the Black-Scholes option pricing model was chosen to estimate the grant date present value of the options set forth in this table. The real value of options depends upon the actual performance of the Company's stock during the applicable period and upon when they are exercised.
- (2) Options have a ten-year term and vest over three years cumulating at 30%, 60%, 100% on the first three anniversaries following the date of grant. All options vest immediately in the event of a Change in Control.

| AGGREGATED OPTION EXERCISES IN LAST FISCAL YEAR AND FISCAL YEAR-END OPTION VALUES | | | | | | |
|---|---------------------------------|----------------------|---|---------------|---|---------------|
| Name | Shares Acquired on Exercise (#) | Value Realized \$(1) | Number of Unexercised Options at FY-End (#) | | Value of Unexercised In-the-Money Options at FY-End \$(2) | |
| | | | Exercisable | Unexercisable | Exercisable | Unexercisable |
| David W. Johnson | 20,000(3) | \$ 386,374 | 170,480 | 120,320 | \$1,180,046 | \$183,033 |
| Frank E. Weise, III | 0 | 0 | 7,020 | 29,780 | \$ 2,010 | \$ 4,690 |
| John M. Coleman | 0 | 0 | 34,530 | 31,720 | \$ 210,175 | \$ 53,847 |
| James R. Kirk | 43,400(4) | \$1,390,550 | 68,320 | 23,280 | \$1,110,538 | \$ 70,161 |
| Robert Subin | 12,658(4) | \$ 360,116 | 27,782 | 23,760 | \$ 259,297 | \$ 77,324 |

Appendix B—Sample Representativeness

Clearly, an important issue in datasets such as this one is the question of sample selection and whether the firms in the dataset are distinct from, or representative of, employers of similar size in their industry. The survey participants are typically the leaders in their sectors and, in fact, more than 75% percent of the firms in the dataset are listed as Fortune 500 firms in at least one year. We evaluate the representativeness of the broader sample by comparing key financial measures of our survey participants to a matched sample from Compustat. We begin by matching each firm in the Hewitt dataset to the Compustat firm that is closest in sales within its two-digit SIC industry in the year the firm joins the sample. We then perform Wilcoxon signed rank tests to compare the Hewitt firms with the matched firms. While the firms in the Hewitt dataset are, on average, slightly larger in sales than the matched sample, we found no statistically significant difference in employment and profitability (return on sales). We also found no statistically significant difference in sales growth, employment growth, or annual changes in profitability for all sample years. We also calculate financial measures for the sample of Compustat firms with 10,000 employees or greater over the period from 1986 to 1999 (excluding firms operating in financial services). On average, survey participants are more profitable, but growing at a slower rate relative to the sample of large Compustat firms. This is consistent with our observation that the firms in our sample are likely to be industry leaders (hence slightly more profitable) and also large (hence the slightly slower growth). In sum, the survey sample is most representative of Fortune 500 firms (for more details, see Rajan and Wulf, 2006).