Spillovers Inside Conglomerates: Incentives and Capital

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Using hand-collected data on divisional managers at conglomerates, we find that a change in industry pay in one division generates spillovers on managerial pay in other divisions of the same firm. These spillovers arise only within the boundaries of a conglomerate. The intra-firm spillovers increase when conglomerates have excess cash and when managers have more influence over its distribution, but decline in the presence of strong governance. These spillovers are associated with weaker performance and lower firm value. Our evidence is consistent with simultaneous cross-subsidization via managerial compensation and capital budgets and suggests that these practices arise in similar firms. (*JEL* G30, G31, G32)

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The majority of large firms operate in multiple divisions. Such multidivisional firms, or conglomerates, account for over 70% of book assets and market equity of S&P 500 firms. Because most large firms have several divisions, corporate outcomes depend on how firms allocate resources across divisional managers at similar levels of hierarchy. Theory demonstrates that this intra-firm resource allocation determines a firm's investment efficiency and value (e.g., Stein 1997; Rajan, Servaes, and Zingales 2000).

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In theory, the value of conglomerates depends on the allocation of two resources across divisional managers: monetary compensation and investment capital (Scharfstein and Stein 2000). While the allocation of capital has been extensively studied, less is known about divisional managers' pay. Furthermore, while analytical frameworks model these resources jointly, there is little evidence on their combined allocation inside a firm. Our paper provides evidence on both issues: the allocation of managerial pay and its relation to the allocation of capital.

So far, empirical research has focused mostly on the allocation of capital. Prior work finds that cash flows in one division subsidize investment in other divisions (Lamont 1997; Billett and Mauer 2003). This cross-subsidization has been one of the key wedges between the bright- and dark-side views of internal capital markets.[1] The bright-side view posits that cross-subsidization relaxes financing constraints and improves investment efficiency (e.g., Fee, Hadlock, and Pierce 2009; Masulis, Pham, and Zein 2011, 2015; Almeida, Kim, and Kim 2015). The dark-side view states that cross-subsidization reflects divisional managers' pressure for a more even distribution of resources (Shin and Stulz 1998) and shows that such frictions erode value (Servaes 1996; Denis, Denis, and Yost 2002).

Which of these views prevails depends on the incentives of the agents involved in resource allocation. For example, the strength of CEO incentives is positively related to conglomerates' investment efficiency (Ozbas and Scharfstein 2010) and value (Lins and Servaes 2002), and the quality of internal governance enhances the value of conglomerates (Hoechle et al. 2012). In contrast, CEOs with weaker incentives spread capital more evenly across divisions (Graham, Harvey, and Puri 2015) and use capital allocation to elicit support from divisional managers (Xuan 2009).

While the CEO allocates resources to divisions, their efficient use depends on the incentives of divisional managers. So far, research has studied capital allocations as a measure of indirect, non-pecuniary managerial rewards. Yet, the main source of managerial incentives is monetary pay. Therefore, an analysis of divisional managers' pay is important for understanding resource allocation in conglomerates.

We study how conglomerates allocate executive pay across divisional managers and how it responds to changes in the productivity of their divisions. Our empirical analysis seeks to answer three questions. First, how does a change in industry pay in one division affect the pay of the manager of the treated division and the pay of other divisional managers inside the firm? Second, what are the mechanisms? Third, how is the redistribution of managerial pay related to the allocation of capital?

[1] For an overview of theories of internal capital markets, see Maksimovic and Phillips (2007).

To study these questions, we construct a hand-collected dataset of divisional managers at S&P 1500 firms and exploit industry-level pay shocks as a source of variation exogenous to the firm. In particular, we study how industry-level changes in pay influence divisional managers' pay in the affected division and in other divisions of the firm. By focusing on changes in pay, our design differences out the effect of all manager-, division-, and firm-level characteristics that remain invariant over one year.

We find that when one of a firm's divisions experiences an industry-wide increase in pay, other divisional managers of the firm get large pay raises, even if they oversee divisions in unrelated industries (e.g., telecom vs. paper). For every percentage point increase in industry pay in one division, other divisional managers in the same firm get a pay raise of 32–41 basis points (bps). These estimates control for firm-level attributes, such as changes in a firm's profitability, valuation ratios, earnings per share, and stock returns.

Firm boundaries play an important role in promulgating the spillovers. The spillovers arise only when managers work for the same conglomerate. In contrast, we find no evidence of spillovers between managers of standalone firms that match the industries of the conglomerates' divisions or in a subsample of synthetic conglomerates—replicas of each conglomerate constructed from standalone firms similar to each of the divisions. This suggests that these spillovers are unlikely to be explained by cross-industry synergies alone, such as the flow of technological innovations from one industry to another.

We consider three mechanisms through which the spillovers may operate: (i) distribution of cash, (ii) benchmarking of pay, and (iii) internal transfers across divisions. By studying the factors that amplify or attenuate spillovers, we make a first step to understanding their relation with governance and efficiency.

The first channel, which we label the cash surplus effect, states that a positive industry change in one division affects the pay of other divisional managers via the distribution of excess cash. For example, excess cash may provide CEOs with the flexibility to spend part of the surplus on pay raises to all managers, even those whose marginal product was unaffected (Bertrand and Mullainathan 2003). Consistent with this view, we find that the spillovers are stronger in the presence of excess cash. A one- standard-deviation increase in excess cash (16.8% of assets) raises managerial pay in unaffected divisions by 7 bps for each percentage point of an industry pay increase in another division of the same firm.

The second channel, which we label the benchmarking effect, posits that a pay change in one industry inside a conglomerate affects the pay of other divisional managers via intra-firm compensation benchmarking. For example, when determining annual pay raises, the compensation committee may take into account considerations of equity in addition to considerations of merit (e.g., Hart and Moore 2008). Alternatively, an increase in one manager's pay may provide his peers with a credible reason to lobby for a pay raise, and firms may anticipate or respond to managerial lobbying.

The evidence supports the benchmarking channel. First, the intensity of spillovers is magnified in the presence of intra-firm social ties, which facilitate the comparison of wages, increase the pressure for conformity (McPherson, Smith-Lovin, and Cook 2001), and foster coordination (Attanasi et al. 2014). Second, the effect of spillovers is asymmetric: it is driven almost entirely by pay raises rather than by pay cuts, consistent with managerial lobbying for pay raises and against pay cuts.

The third channel—internal transfers—posits that conglomerates' divisions are linked via intra-firm transfers, such as transfers of materials and managerial talent. Therefore, an industry change in one division affects the marginal product of managers in other divisions by changing the cost of internally sourced inputs, even if this effect is not observed at standalone firms in the same industry. Under this scenario, internal spillovers reflect an increase in managers' marginal products across all divisions.

We do not find that the spillovers are driven by internal transfers. The spillovers in pay are equally strong across divisions whose industries have no overlap in their input-output matrix and across divisional managers who have no experience in any other industry. We reach similar conclusions when we use changes in industry wages at standalone firms as a proxy for changes in managers' marginal products. The magnitude and significance of compensation spillovers remain unchanged when we remove the common component of the variation in pay across industries and focus only on its idiosyncratic part.

In summary, among the three channels, we find evidence in support of the distribution of excess cash and intra-firm benchmarking. If these attributes reflect agency frictions, such as the free cash flow problem and rent-seeking, spillovers should be associated with weak governance. However, if the excess cash and social ties enhance managers' marginal products, spillovers should reflect strong governance.

To distinguish between these interpretations, we examine three dimensions of governance: (i) firm-level governance, (ii) composition of the compensation committee, and (iii) quality of compensation advisers. Across all three dimensions, spillovers in pay are amplified under weaker governance. For example, the spillovers are stronger when managers have more influence on the pay-setting process, such as when the compensation committee includes insiders. In contrast, they are sharply reduced when a firm's pay is reviewed by an external advisory firm, particularly if this firm is large and reputable.

Next, we study the relation between the internal redistributions of capital and pay—the two main drivers of divisional managers' incentives in theoretical work. First, we document that the redistributions of investment funds and managerial pay are positively correlated ($\rho = 0.22$–0.32) and arise in similar firms, consistent with our evidence on the importance of firm boundaries. At the same time, these correlation magnitudes imply that firms often choose to redistribute one type of resources rather than the other. When we investigate this decision, we find that a firm's choice between the redistribution of capital and pay depends on the balance between managers' control rights over the respective resource and the disciplining influence of shareholders and markets. For example, when a firm's compensation practices are under scrutiny (e.g., shareholder proposals on pay), firms are more likely to redistribute capital rather than pay. In contrast, when product market competition increases the costs of redistributing capital from strong to weak divisions, conglomerates are more likely to redistribute managerial pay.

We continue the joint analysis of the redistributions of capital and pay by examining how they affect the link between each resource's marginal product and its allocation in the firm. We find that the redistributions of managerial pay weaken the sensitivity of a divisional manager's pay to performance, measured by the divisional return on assets (ROA), the main evaluation criterion of divisional managers (Cichello et al. 2009). Similarly, the redistributions of investment capital across divisions weaken the link between the allocation of capital and its marginal product (measured by the investment-to-q sensitivity, as in Ozbas and Scharfstein 2010). Overall, both types of redistributions appear to loosen the link between a resource's marginal product and its allocation inside conglomerates.

In our final analysis, we provide suggestive evidence on how the redistributions of capital and pay are related to firm outcomes. We find that both types of redistributions are negatively associated with operating performance and firm value. Yet, these outcomes may also reflect the effect of other value-eroding practices that give rise to the redistributions in the first place. Our findings complement prior evidence from internal capital markets that a positive shock to one division creates redistributions to other divisions, which do not appear to be value-enhancing (Lamont 1997; Shin and Stulz 1998).

Our findings have several implications. First, positive changes in industry pay generate spillovers on the pay of managers in other industries spanned by the firm. Second, internal redistributions affect both human capital and investment capital, arise in similar firms, and loosen the link between resource allocation and marginal products. Third, the choice of rewarding divisional managers with extra pay or capital depends on investment opportunities and the governance of the pay-setting process.

Our evidence connects the literatures on executive pay and internal capital markets. In research on executive pay, we document internal spillovers in managerial pay and uncover the mechanisms that give rise to within-firm correlation in wages documented in prior work (Schoar 2002; Silva 2015). In internal capital markets, we extend the view of resource distribution beyond investment capital and provide the first evidence on a firm's choice between the redistribution of capital and pay.

1. Related Literature

Our paper is part of the literature on corporate governance in conglomerates. Prior work documents agency frictions in conglomerates. Denis, Denis, and Sarin (1997) find that firms with high managerial ownership and high block ownership are less likely to be diversified. Lins and Servaes (2002) show that conglomerates trade at lower valuations when managers' control rights exceed their cash flow rights. Xuan (2009) finds that CEOs use capital allocation to build rapport with divisional managers. Ozbas and Scharfstein (2010) show that conglomerates with lower managerial ownership have a lower sensitivity of investment to q and conclude that agency issues inhibit investment. Hoechle et al. (2012) find that proxies for weak governance help explain the diversification discount. Graham, Harvey, and Puri (2015) provide survey evidence that one in four CFOs admits that corporate politics affects capital allocation in conglomerates. Our paper extends this research by providing the first evidence on the joint allocation of two fundamental resources inside the firm: capital and pay. Our findings suggest that the allocation of both resources is affected by considerations of internal equity.

We also extend recent work on internal labor markets in conglomerates, which have been studied mostly in the context of factory workers. Tate and Yang (2015) show that workers in conglomerates benefit from greater intra-firm mobility, which provides displaced workers with options for redeployment. Silva (2015) shows that workers in unskilled industries earn higher wages in conglomerates when these firms also operate in high-wage industries, a pattern he attributes to frictions in internal labor markets. We add to this literature by providing evidence on the pay of executives with control rights over divisional cash flows and by identifying the mechanisms that give rise to correlated changes in pay inside a firm.

We also add to the literature on executive pay by studying the incentives of divisional managers. This category of managers, responsible for key decisions in large diversified firms, has received less attention in recent work, compared with CEOs (Fahlenbrach and Stulz 2011), top executives (Graham, Li, and Qiu 2012), and directors (Yermack 2004). We extend this research by providing evidence on senior managers outside the executive suite. In prior work, Fee and Hadlock (2004) study turnover-performance sensitivity for the top five executives and find that it is smaller for non-CEO managers than for CEOs. Cichello et al. (2009) study career trajectories of divisional managers and find that divisional ROA explains managerial promotions. Alok and Gopalan (2015) examine pay-performance sensitivity in conglomerates and find that it is lower when accounting earnings are less informative Gartenberg and Wulf (2015) exploit a 1992 change in SEC proxy rules to study the effect of disclosure on wages and find that disclosure compresses the internal distribution of pay. We contribute to this literature by providing evidence on pay spillovers inside conglomerates and identifying their mechanisms.

Finally, we add to the literature on benchmarking in managerial pay. So far, this research has focused on benchmarking in managerial pay across different firms (Bizjak, Lemmon, and Naveen 2008; Bizjak, Lemmon, and Nguyen 2011; Faulkender and Yang 2010, 2013). In complement to this work, we study a less explored type of benchmarking—namely, the internal benchmarking of pay within the firm.

2. Sample and Data

2.1 Firms and divisions

We start our sample construction by identifying industrial conglomerates included in the S&P 1500 index from January 2000 to December 2008. Our sample begins in 2000 because data coverage in BoardEx and Equilar, our sources of governance data, is sparse before 2000. Industrial conglomerates comprise firms that report at least two operating segments on Compustat and operate in industries other than financial services and utilities (one-digit SIC codes 6 and 4, respectively).[2] The universe of conglomerates that meet these criteria comprises 806 firms.

Next, we manually go through each firm's organization structure, as reported in quarterly and annual reports, proxy statements, and information prospectuses, to identify the sample of firms with divisional organization structures—those where managers oversee specific operating segments. This filter ensures a clean one-to-one match between managers and divisions. Given this sample criterion, we alert the reader that our analysis applies only to firms with such organization structures.

We exclude firms with organization structures that lack a clear correspondence between managers and divisions (396 firms). The excluded firms usually use a functional organization structure where managers are assigned on the basis of their functional roles (e.g., vice president of manufacturing), so that each manager supervises an entire functional area across all divisions. Some of the excluded firms have a geographic organization structure where managers are assigned on the basis of regional markets (e.g., vice president, Northwest), so that each manager oversees a target market across all divisions.

To identify the divisional manager responsible for each business segment, we read biographical sketches of the firms' executives in annual reports, proxy statements, and management directories. We consider a manager to be in charge of a division if he or she is the highest-level executive directly responsible for the business segment during a given time period. Divisional managers typically hold the title of divisional president, executive vice president, or senior vice president.

Next, we collect the starting and ending dates of each manager's tenure. To obtain them, we supplement corporate disclosure with executive biographies

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[2] Operating segments exclude corporate accounts, allocation adjustments, and divisions with zero or negative sales.

from the Forbes Executive Directory, Reuters, Marquis's Who's Who, and Notable Names Database, as well as firms' press releases that provide managers' appointment dates. We are able to identify divisional managers for 91.5% of the firms that meet our sample criteria, and we exclude the remaining 35 firms with missing data on divisional managers.

In the final step, we collect data on divisional managers' pay, following the procedure discussed in the next subsection. After imposing the filter that requires available compensation data for all of the firm's divisional managers, we arrive at our main sample of 162 firms and 535 divisions. Panel A in Appendix Table B1 depicts the sequence of sample selection criteria and, at each step, provides the number of firms, divisions, and observations retained after each filter.

Panel A in Table 1 shows summary statistics for our sample firms. The average (median) conglomerate operates in 3.5 (3) business segments, generates an annual return on assets of 4.8% (5.7%), and delivers an annual stock return of 6.7% (3.2%) during our sample. The average division produces $4.4 billion in sales, generates an ROA of 6.5%, and has an industry market-to-book ratio of 1.8.

Panel B in Appendix Table B1 compares our final sample to the rest of the industrial conglomerates in the S&P 1500 index across the main firm characteristics examined in our study, including earnings per share, stock return, free cash flow, profitability, capital investment, market-to-book ratio, and firm size. This comparison reveals that our sample is statistically indistinguishable from the rest of the universe of industrial conglomerates in the S&P 1500 across all characteristics examined, except for firm size. In particular, the average firm in our sample is significantly larger. This distinction is explained by the fact that larger firms provide more disclosure about their divisional managers, and they are less likely to be dropped due to data limitations. Our sample firms are economically important. They account for 60.2% of book assets and 63.9% of market equity of all industrial conglomerates in the S&P 1500.

2.2 Managerial characteristics

After linking firms and divisions to managers, we collect data on managerial characteristics. First, we hand-match divisional managers to BoardEx, which provides data on top executives and directors at over 10,000 public, private, and nonprofit firms. We obtain three sets of managerial attributes from BoardEx: (i) personal attributes, education, and affiliation with nonprofit organizations; (ii) professional attributes, such as employment history; and (iii) governance attributes, such as service on the board of directors and its committees. We cross-check and supplement BoardEx data with managerial biographies obtained from firms' disclosures (biographical sketches in press releases, annual reports, and proxy statements) and the executive databases discussed above. Next, we collect the same information for the top executives (CEO, CFO, and COO) and directors who served at our sample firms at any time in 2000–2008.

Table 1
Summary statistics

Panel A: Firms and divisions

Variable	Mean	25th percentile	Median	75th percentile	Standard deviation
Firm level					
Earnings per share (EPS)	1.659	0.830	1.620	2.810	4.972
Stock return	0.067	−0.215	0.032	0.240	0.724
Free cash flow	0.066	0.024	0.052	0.086	0.088
Profitability	0.048	0.023	0.057	0.087	0.086
Size (log assets)	8.636	7.718	8.394	9.619	1.442
Number of divisions	3.464	2.000	3.000	4.000	1.399
Division level					
Return on assets (ROA)	0.065	0.008	0.044	0.079	0.056
Cash flow	0.184	0.072	0.133	0.224	0.895
Sales ($ mil.)	4,379	539	1,363	4,115	7,371
Size (log assets)	7.096	6.104	7.002	8.103	1.597
Industry market-to-book	1.766	1.369	1.652	2.120	0.575
Panel B: Divisional managers					
Tenure with the company (years)	12.89	9.00	13.00	16.00	5.08
Age (years)	51.68	47.00	52.00	56.00	5.89
Male indicator	0.914	1.000	1.000	1.000	0.273
Board member indicator	0.138	0.000	0.000	0.000	0.343
Compensation committee member	0.016	0.000	0.000	0.000	0.126
Bachelor's degree indicator	0.980	1.000	1.000	1.000	0.133
Master's degree indicator	0.618	0.000	1.000	1.000	0.491
Panel C: Pay and governance					
Pay					
Pay1 ($ mil.)	0.712	0.370	0.621	0.908	0.518
Pay2 ($ mil.)	2.061	0.657	1.283	2.277	2.902
Pay3 ($ mil.)	2.453	0.856	1.308	2.891	2.570
ΔPay1	0.056	−0.030	0.035	0.153	0.212
ΔPay2	0.135	−0.142	0.049	0.315	0.442
ΔPay3	0.149	−0.143	0.063	0.351	0.438
Coefficient of variation, Pay1	0.192	0.055	0.136	0.263	0.197
Coefficient of variation, Pay2	0.206	0.042	0.127	0.294	0.227
Coefficient of variation, Pay3	0.208	0.049	0.137	0.293	0.219
Compensation gap, Pay1	0.138	0.012	0.033	0.162	0.311
Compensation gap, Pay2	0.405	0.024	0.060	0.274	1.399
Compensation gap, Pay3	0.491	0.029	0.077	0.353	1.611
Idiosyncratic ΔIndustry Pay1	0.012	−0.058	−0.003	0.057	0.123
Idiosyncratic ΔIndustry Pay2	0.044	−0.124	−0.009	0.138	0.235
Idiosyncratic ΔIndustry Pay3	0.048	−0.121	0.005	0.149	0.274
Governance					
Size of compensation committee (no. of members)	3.531	3.000	3.000	4.000	1.240
Independent compensation committee	0.864	1.000	1.000	1.000	0.347
Socially independent compensation committee	0.768	1.000	1.000	1.000	0.421
Compensation committee appointed under a prior CEO	0.441	0.000	0.000	1.000	0.499
Review by a compensation adviser	0.933	1.000	1.000	1.000	0.261

This table reports summary statistics. The sample consists of multi-divisional firms in the S&P 1500 index, excluding financials and utilities, firms with functional organizational structure, and firms with missing data on divisional managers' pay. The values reported are time-series averages over the sample period. The sample period is from January 2000 to December 2008. All variable definitions appear in Appendix A.

Our sample comprises 2,557 managers at various levels of hierarchy: 723 divisional managers, 206 CEOs, and 1,628 other executives and directors. Table 1, Panel B, shows summary statistics for divisional managers. The median divisional manager is 52 years old and has a firm tenure of 13 years. In our sample, 62% of divisional managers hold advanced degrees, and 14% serve as insiders on the firm's board.

2.3 Pay and governance

We combine and cross-verify four sources of compensation data, both public and private, to mitigate sample selection concerns. First, we obtain data from Execucomp, which is compiled from mandatory disclosures. Second, we supplement these data with BoardEx Compensation, a database compiled by the data provider's compensation analysts. Third, we obtain compensation data from the Standard & Poor's Capital IQ database, which covers a wider range of firms and executives than Execucomp and also provides information on executives' employment histories, education, and professional biographies.

We cross-check the data for overlapping observations between Execucomp, BoardEx, and Capital IQ and find that they provide very close compensation estimates (usually within 5% of one another). The small differences are explained by the methodological choices in the valuation of stock option grants, as discussed below. Execucomp computes the value of option grants using a modified version of the Black-Scholes model under a unified set of assumptions. Capital IQ reports the fair value estimate of the option grant provided by the issuing firm. BoardEx computes the value of the option grant using the closing stock price as of the calendar year-end instead of the closing stock price on the date of the option grant. Our results are unaffected by these methodological choices.

Our fourth data source is Equilar, Inc., a California-based compensation research and consulting firm. As part of its compensation analysis for corporate clients, Equilar obtains additional compensation data directly from firms. These data are standardized and provided in the same format as the mandatory disclosure data, but they cover a broader range of managers. We cross-check Execucomp and Equilar and find that the two databases yield largely identical compensation estimates for overlapping observations. In addition, Equilar provides unique data on the use of compensation consultants for Russell 3000 firms, a dataset we use in the analysis of the compensation-setting process. Finally, we obtain annual data on the composition of compensation committees for each sample firm from BoardEx and Equilar.

Panel C of Table 1 reports summary statistics on managerial pay and corporate governance. The top rows of the panel report three measures of pay: (i) salary and bonus (*Pay1*); (ii) salary, bonus, stock grants, and stock option grants (*Pay2*); and (iii) total pay (*Pay3*). Their definitions appear in Appendix A.

The average (median) divisional manager earns \$0.7 (\$0.6) million per year in salary and bonus, as shown by the values of *Pay1*. Our second measure of pay, *Pay2*, augments the previous measure with stock and stock option grants. The average (median) value of a divisional manager's annual salary, bonus, stock, and option grants is \$2.1 (\$1.3) million. The third measure, *Pay3*, captures total compensation by augmenting *Pay2* with other annual compensation, long-term incentive payouts, and other cash payouts. The average (median) value of a divisional manager's total annual pay is \$2.5 (\$1.3) million. In comparison, the mean (median) total pay of a conglomerate's CEO is \$7.6 (\$5.2) million per year.

Panel C shows that divisional managers at the same firm earn comparable pay. This can be seen from the distribution of the within-firm coefficient of variation, measured as the intra-firm standard deviation of divisional managers' pay scaled by the intra-firm mean. The coefficient of variation for the median firm ranges from 0.13 to 0.14 across the three components of pay, indicating its tight within-firm distribution. A similar conclusion emerges from another measure of intra-firm variation—the compensation gap, defined as the within-firm range of divisional managers' pay scaled by its mean. For the median firm, the compensation gap is 8% (when measured for total pay), indicating comparable levels of pay for peer managers at the same firm, consistent with internal benchmarking. Panel C also shows the distribution of the annual percentage changes in pay at the level of each divisional manager. The median manager receives a 3.5% annual pay raise in his salary and bonus and a 6.3% annual increase in total pay.

The bottom rows of Panel C focus on compensation committees and compensation consultants. The average (median) compensation committee includes 3.5 (3) members, and 86% of committees have no insiders. Over 93% of conglomerates in our sample employ compensation consultants. The most frequently used compensation consultants are Frederic W. Cook & Co., Towers Perrin, Mercer, and Hewitt Associates, which account for 47% of consulting engagements in our sample.

3. Empirical Results

3.1 Empirical design

In this section, we test for compensation spillovers in conglomerates by studying how a compensation shock to one of the divisions affects managerial pay in the treated division and in other divisions of the same firm. To identify compensation shocks to select divisions, we exploit industry-level changes in pay. By relying on a source of variation external to the firm, this approach mitigates the possibility of an omitted firm-level variable that could affect managerial pay across all divisions and confound the interpretation. Our first test studies how a divisional manager's pay is associated with (i) pay changes in his own industry and (ii) pay changes in the industries of other divisions in the same firm.

This empirical approach has several advantages for identification. First, it provides an external treatment effect on the managerial pay of select divisions, where the intensity of treatment is specified according to a pre-determined factor—namely, industry. This approach allows us to compare pay changes in treated divisions (those in the same industry) against the benchmark of untreated divisions (those in other industries) of the same firm. Second, the identifying source of variation originates outside the firm, mitigating concerns about an unobservable firm-specific shock that could affect compensation in all divisions, while being unrelated to spillovers. Third, our focus on changes in pay seeks to provide a clean estimate of the treatment effect, while differencing out all drivers of pay that stay constant over a year at the level of a manager (e.g., education, ability, network), division (e.g., industry, complexity, core segment), and firm (e.g., prestige, visibility, diversification).

Our research design also accounts for a number of dynamic drivers of pay. Because an industry change in pay may reflect a change in divisional managers' marginal products, we control for financial performance (profitability and cash flow) at the level of the division and firm. While these controls capture productivity gains in the bottom line, some of the gains may be intangible. To the extent that stock prices reflect such information, we account for intangible or expected productivity gains at the level of a firm and division's industry by controlling for changes in their market valuations: stock returns and market-to-book ratios. Finally, because industry changes may affect a firm's investment and asset growth, we control for changes in division size and firm size. To capture time trends in compensation, we include year fixed effects. To account for time-series correlation in residuals, we cluster standard errors by firm.

All independent variables are measured in the same year. This choice of timing reflects several considerations. First, managerial pay contains a significant incentive component determined by the same-year outcomes. As a result, a contemporaneous system of controls aligns the timing of compensation measures with the timing of performance outcomes that affect these measures, as well as with other contemporaneous pay drivers, such as changes in division size and firm size. Second, firms typically benchmark their compensation contemporaneously to avoid management attrition. Some firms explicitly disclose in their financial statements that they make intra-year adjustments to managerial pay to "align salaries with those of individuals in peer companies in a step-wise fashion."[3] Prior research also finds evidence of contemporaneous benchmarking to industry pay (Faulkender and Yang 2010, 2013).

Contemporaneous updates on industry pay are available from several sources. The first is the mandatory reporting of executive pay. Over 97% of industries in our sample include firms with fiscal year ends in every calendar quarter, and their reporting throughout the year provides continuous updates on the dynamics of pay. Second, competitive intelligence firms gather up-to-date information from proprietary surveys, recruiting, and consulting (93% of

[3] For example, Rigel Pharmaceuticals notes in its proxy statement that its "Compensation Committee engages a well-established consulting firm to analyze our executives' compensation packages against the compensation packages of executives at comparable companies... Mid-year adjustments to salaries are made under special circumstances, such as promotions or increased responsibilities, or in order to align certain salaries with those of individuals in peer companies in a step-wise fashion" (Rigel Pharmaceuticals form DEF 14A, April 8, 2008).

Table 2
Compensation spillovers inside conglomerates

Dependent variable	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)
ΔIndustry pay	0.690***	0.719***	0.804***
	[0.137]	[0.154]	[0.166]
ΔIndustry pay in other divisions	0.321***	0.355***	0.411***
	[0.095]	[0.101]	[0.113]
ΔDivision cash flow	0.026	0.015	0.070***
	[0.033]	[0.023]	[0.021]
ΔDivision return on assets (ROA)	0.033	0.045**	0.061***
	[0.022]	[0.018]	[0.021]
ΔDivision size	0.128***	0.186***	0.172***
	[0.017]	[0.062]	[0.055]
ΔIndustry market-to-book	0.016	0.136*	0.197**
	[0.014]	[0.071]	[0.091]
ΔFirm earnings per share (EPS)	0.007***	0.082*	0.073
	[0.002]	[0.043]	[0.048]
Firm stock return	0.016***	0.035***	0.029***
	[0.000]	[0.005]	[0.005]
ΔFirm free cash flow	0.071***	0.032	0.043*
	[0.027]	[0.029]	[0.024]
ΔFirm profitability	0.043	0.065***	0.042*
	[0.027]	[0.019]	[0.022]
ΔFirm size	0.125***	0.171***	0.181***
	[0.017]	[0.057]	[0.056]
Year fixed effects	Yes	Yes	Yes
Adjusted R^2	0.263	0.241	0.255
N_obs	2,131	2,051	2,070

This table presents evidence on the relation between a divisional manager's pay and pay changes in: (i) his division's industry and (ii) the industries of other divisions inside the same conglomerate. Each column reports estimates from a single regression, where the dependent variable is the annual percentage change in a divisional manager's pay measured by several components of pay, Δ*Pay1*, Δ*Pay2*, and Δ*Pay3*, which are defined in the Appendix. The variables Δ*Industry pay* and Δ*Industry pay in other divisions* are defined as the average percentage change in CEO pay of standalone firms that operate in the division's industry and in the industries of the other divisions in the conglomerate, respectively. Industry definitions are based on the three-digit SIC codes. Variable definitions appear in Appendix A. All regressions include year fixed effects. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

our firms employ compensation consultants). Such firms monitor aggregate industry dynamics and inform their clients of significant changes. Third, managers may obtain contemporaneous information on industry pay from informal channels, such as connections to executives at other firms in their industry, as shown in Shue (2013).

Table 2 shows our baseline specification. The dependent variable is the annual percentage change in a divisional manager's pay, captured by one of the three measures: *Pay1, Pay2*, and *Pay3*. To limit the effect of outliers, all variables are winsorized at 1% and 99% in all of the analyses in the paper. The variables Δ*Industry pay* and Δ*Industry pay in other divisions* are defined as the average percentage change in the annual CEO pay of standalone firms that operate in the division's industry and in the industries of the other divisions of the conglomerate, respectively. Industry definitions follow the three-digit SIC classification. To avoid a look-ahead bias, changes in industry pay are computed using only pay changes in firms whose fiscal year-end has ended by the date of the firm's fiscal year end. Formally, Δ*Industry pay in other divisions* is defined as follows:

$$\Delta \textit{Industry pay in other divisions}_i = \frac{\sum_{j \neq i} \Delta \textit{Industry Pay}_j}{n-1} \tag{1}$$

where the subscript i corresponds to division i and the subscript j corresponds to the industries of all other divisions in the conglomerate, with a total of n divisions.

3.2 Sensitivity to industry pay in conglomerates

This subsection presents our first empirical results on the relation between changes in industry pay and the compensation of divisional managers in conglomerates.

Table 2 shows that a divisional manager's pay is positively related to industry pay changes in other divisions of the conglomerate. The coefficients on Δ*Industry pay in other divisions* are positive, significant at the 1% level, and similar in magnitude across all measures of pay. Based on the estimates in columns 1–3, a divisional manager's pay increases by 32 to 41 bps in response to a one-percentage-point increase in the average industry pay in other divisions. This suggests that a change in industry pay in one division generates positive spillovers on managerial pay in other divisions of the same firm.

A divisional manager's pay responds positively and more strongly to pay changes in his own industry, as shown by the positive and significant coefficients on Δ*Industry pay*. However, the elasticity of such a response is below one: a divisional manager's pay increases by 69 to 80 bps for every percentage point increase in managerial pay in the division's own industry.

Control variables show expected results. A divisional manager's pay is positively related to his division's ROA, and this effect is stronger in columns 2–3, which correspond to compensation proxies with a higher share of incentive pay. A divisional manager's pay is positively related to asset growth in the division. Finally, a divisional manager's pay is strongly positively related to the firm's financial performance, particularly earnings per share, stock returns, and profitability, and this effect is stronger for measures with a higher share of incentive pay.

In summary, a change in industry pay in one of the conglomerate's divisions produces spillovers on the pay of other divisional managers at the same firm. The magnitude of these spillovers is about one-third of the industry change in pay.

3.3 Boundaries of the firm

The evidence so far suggests that a change in managerial pay in one industry produces spillovers on the pay of managers in other industries inside the same firm. In this subsection, we test whether these spillovers promulgate beyond firm boundaries. This analysis seeks to distinguish between two possible interpretations. If the spillovers are driven by cross-industry links, such as innovations that improve productivity or reduce costs, they should operate across firm boundaries. However, if the spillovers are driven by intra-firm factors, they should operate only within firm boundaries.

In our first test, we distinguish between these interpretations by studying how a divisional manager's pay responds to pay changes in industries that are not spanned by the conglomerate. In Table 3, Panel A, we augment our baseline specification from Table 2 with the variable Δ*Industry pay in industries outside the conglomerate*, defined as the average percentage change in CEO pay in standalone firms that operate in industries that are not represented in the conglomerate.

The evidence shows a stark contrast: a divisional manager's pay responds strongly to pay changes in the industries of other divisions of the firm, but does not respond to pay changes in industries unrepresented in the conglomerate. The coefficients on the variable Δ*Industry pay in other divisions* are significant at 1% and have nearly the same point estimates as in Table 2. In contrast, the coefficients on the new variable, Δ*Industry pay in industries outside the conglomerate*, are not statistically significant across all columns, have near-zero point estimates, and flip signs. This evidence indicates that the spillovers in pay are specific to the subset of industries within the boundaries of the firm.

In the second test, we study how pay changes in one industry affect managerial pay in other industries when these industries are separated by firm boundaries—namely, when the firms in these industries operate as standalones. To implement this test, we construct a sample of standalone firms that appear in the Compustat segment files and report a single business segment. Using the same data sources as before, we construct a panel dataset that includes information on CEO pay and financial characteristics for these firms in 2000–2008. This panel includes 6,747 firm-year observations.

Table 3, Panel B, tests the sensitivity of managerial pay in standalone firms to changes in managerial pay in the same industry and in other industries, as defined by three-digit SIC codes. The dependent variable is the annual percentage change in CEO pay in standalone firms, computed for the same three measures of pay. The first independent variable of interest is the average percentage change in CEO pay across all standalone firms that operate in the firm's core industry (Δ*Industry pay*). The second variable of interest is the average annual percentage change in CEO pay in standalone firms that operate outside of the firm's core industry (Δ*Industry pay in other industries*). As before, the analysis controls for dynamic determinants of managerial pay and year fixed effects.

Panel B shows that changes in managerial pay in standalone firms are strongly positively related to the average changes in managerial pay in the same industry, as indicated by the positive and significant coefficients on Δ*Industry pay* across all specifications. As expected, the coefficient estimates on this variable are narrowly clustered around one, ranging from 1.01 to 1.09 across columns. In contrast, the coefficients on Δ*Industry pay in other industries* are

Table 3
Boundaries of the firm

Panel A: Pay changes in industries outside the conglomerate

Dependent variable	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)
ΔIndustry pay	0.698***	0.749***	0.810***
	[0.138]	[0.162]	[0.163]
ΔIndustry pay in other divisions	0.307***	0.338***	0.405***
	[0.092]	[0.099]	[0.117]
ΔIndustry pay in industries outside the conglomerate	0.004	−0.019	0.028
	[0.035]	[0.022]	[0.067]
ΔDivision cash flow	0.028	0.055**	0.047**
	[0.027]	[0.022]	[0.019]
ΔDivision return on assets (ROA)	0.057*	0.038***	0.051***
	[0.031]	[0.011]	[0.019]
ΔDivision size	0.103***	0.178***	0.144***
	[0.016]	[0.063]	[0.053]
ΔIndustry market-to-book	0.025*	0.159**	0.204**
	[0.013]	[0.072]	[0.094]
ΔFirm earnings per share (EPS)	0.005**	0.080**	0.119**
	[0.002]	[0.035]	[0.052]
Firm stock return	0.011***	0.038***	0.048***
	[0.000]	[0.009]	[0.006]
ΔFirm free cash flow	0.036	0.052**	0.047***
	[0.027]	[0.021]	[0.016]
ΔFirm profitability	0.033	0.055***	0.077***
	[0.031]	[0.016]	[0.025]
ΔFirm size	0.121***	0.180***	0.178***
	[0.019]	[0.057]	[0.058]
Year fixed effects	Yes	Yes	Yes
Adjusted R^2	0.243	0.225	0.233
N_obs	2,131	2,051	2,070
Panel B: Standalone firms			
ΔIndustry pay	1.013***	1.066***	1.086***
	[0.295]	[0.322]	[0.374]
ΔIndustry pay in other industries	0.059	0.266	−0.106
	[3.048]	[6.521]	[8.710]
ΔEarnings per share (EPS)	0.022***	0.107**	0.105**
	[0.002]	[0.045]	[0.044]
Stock return	0.018***	0.018***	0.034***
	[0.003]	[0.002]	[0.003]
ΔMarket-to-book	0.027***	0.151*	0.196**
	[0.010]	[0.077]	[0.091]
ΔFree cash flow	0.044	0.059**	0.060***
	[0.031]	[0.023]	[0.022]
ΔProfitability	0.020	0.063***	0.050**
	[0.019]	[0.020]	[0.020]
ΔSize	0.107***	0.158***	0.145**
	[0.018]	[0.059]	[0.061]
Year fixed effects	Yes	Yes	Yes
Adjusted R^2	0.246	0.261	0.257
N_obs	6,747	6,678	6,669

(*continued*)

economically small, flip signs, and fall far short of statistical significance. The coefficient estimates on Δ*Industry pay* and Δ*Industry pay in other industries* are reliably distinct from each other at the 1% level across all columns (F-test p-values: 0.003–0.008). This indicates that managerial pay in standalone firms

Table 3
Continued

Panel C: Synthetic conglomerates

Dependent variable	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)
ΔIndustry pay	1.025***	1.075***	1.062***
	[0.298]	[0.318]	[0.373]
ΔIndustry pay in other divisions	0.068	0.113	−0.102
	[0.150]	[0.409]	[0.672]
ΔEarnings per share (EPS)	0.024***	0.088***	0.085**
	[0.003]	[0.033]	[0.039]
Stock return	0.022***	0.039***	0.008***
	[0.004]	[0.004]	[0.002]
ΔMarket-to-book	0.042***	0.148*	0.169*
	[0.008]	[0.076]	[0.090]
ΔFree cash flow	0.038	0.077**	0.032
	[0.028]	[0.030]	[0.019]
ΔProfitability	0.032**	0.064***	0.058***
	[0.014]	[0.019]	[0.020]
ΔSize	0.123***	0.167***	0.137**
	[0.018]	[0.058]	[0.057]
Year fixed effects	Yes	Yes	Yes
Adjusted R^2	0.264	0.241	0.253
N_obs	2,131	2,051	2,070

This table studies how intra-firm spillovers in pay are related to firm boundaries. In Panel A, we estimate a placebo test that examines how a divisional manager's pay responds to pay changes in industries unrepresented in the conglomerate. The key variable of interest is Δ*Industry pay in industries outside the conglomerate*, defined as the average percentage change in CEO pay of standalone firms that operate in industries unrepresented in the conglomerate. In Panel B, we focus on standalone firms and estimate the sensitivity of managerial pay to changes in managerial pay in the firm's industry and to changes in pay in other industries. The key variable of interest is Δ*Other industry pay*, defined as the average percentage change in CEO pay of standalone firms that operate in other industries. In Panel C, we construct synthetic conglomerates, which represent sets of single-segment firms that have been pair-matched to conglomerate divisions. The pair-matching is based on industry and closest division assets in the previous year with replacement. Δ*Industry pay in other divisions* is defined analogously to Table 2. Industries are defined based on the three-digit SIC codes. Variable definitions appear in Appendix A. All regressions include year fixed effects. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

responds strongly to pay changes in the same industry, but not to pay changes in other industries, after controlling for firm attributes and time trends.

One caveat with the analysis in Panels A and B is that a conglomerate's choice of industries is not random because conglomerates operate in economically related industries (Hoberg and Phillips 2015). Therefore, it is possible that the results that a divisional manager's pay reacts only to pay changes in the industries spanned by the conglomerate (Panel A) and that managerial pay in standalone firms is not significantly related to pay changes in other industries (Panel B) are explained by the tighter economic links between conglomerates' industries rather than by firm-level factors.

To test this hypothesis, we replicate the industry mix of each conglomerate by constructing its synthetic match from standalone firms. In particular, for each division, we select a single-segment firm in the division's industry with the closest value of book assets. Using this pair-matching algorithm, for each conglomerate in our sample, we construct its synthetic replica that spans the same portfolio of industries and has similar size. If compensation spillovers are related to the unique portfolio of industries spanned by each conglomerate, they should be also observed in synthetic conglomerates because they replicate all the industry groupings. In contrast, if the spillovers are driven by intra-firm factors, they should be muted in synthetic conglomerates because each synthetic division is separated by firm boundaries.

Table 3, Panel C, shows no evidence of spillovers in synthetic conglomerates. The coefficients on Δ*Industry pay in other divisions* are never statistically significant, flip signs, and show small point estimates. In contrast, synthetic conglomerates respond strongly to pay changes in their own industry, as shown by the coefficients on Δ*Industry pay*, all of which are significant at the 1% level. The difference between the point estimates on Δ*Industry pay* and Δ*Industry pay in other divisions* is also significant at 1% (untabulated). The point estimates on Δ*Industry pay* are grouped around one (1.03–1.08), suggesting that managerial pay in the matched subsample of synthetic conglomerates responds dollar-for-dollar to pay changes in the same industry. These estimates are larger than those for actual conglomerates, indicating that managerial pay in standalone firms is more elastic to changes in pay in the same industry.

The comparison of results for synthetic and actual conglomerates suggests that changes in managerial pay in one industry affect managerial pay in other industries only when managers work for the same firm. In contrast, this effect disappears when managers work for separate standalone firms, even if these firms replicate the industry mix of each conglomerate and match its size. This distinction suggests that firm boundaries play an important role, and that spillovers are driven by mechanisms inside the firm.

3.4 Robustness

This subsection evaluates the robustness of our results along three dimensions. First, rather than relying on industry-level changes in pay, we exploit within-firm variation in pay and test whether compensation changes in one division propagate to other divisions of the same firm. Second, we use alternative sample filters and exclude firms that have multiple divisions in the same three-digit SIC code. Third, we test for spillovers in the levels of pay. We obtain similar conclusions in these tests. These results, presented in Internet Appendix Tables 1–3, are discussed in Section 1 of the Internet Appendix.

4. Mechanisms

This section studies three non-mutually exclusive mechanisms that may contribute to intra-firm spillovers in pay: (i) distribution of excess cash, (ii) benchmarking of pay, and (iii) internal transfers between divisions. The purpose of this analysis is twofold. First, beyond documenting the spillovers, it seeks to understand why these spillovers occur. Second, by studying the factors that amplify or attenuate the spillovers, it makes a first step toward understanding their relation with governance and efficiency.

4.1 Distribution of excess cash

A positive industry change in one division may affect compensation in other divisions via the distribution of excess cash. For example, excess cash may increase discretion in the allocation of funds (Denis and Denis 1993) and provide CEOs with financial flexibility to distribute part of the surplus as pay raises to all managers, even those whose marginal product was unaffected (Bertrand and Mullainathan 2003).

To examine this channel, we study how changes in a conglomerate's excess cash associated with an industry change affect managerial pay. To measure excess cash, we follow Bates, Kahle, and Stulz (2009) and estimate the portion of cash holdings unexplained by a firm's precautionary savings. Specifically, we measure excess cash as the residual from regressing a firm's cash-to-assets ratio on a vector of control variables from the empirical model in Bates, Kahle, and Stulz (2009), which includes cash flow, the market-to-book ratio, a foreign income dummy, net working capital (excluding cash), capital expenditure, debt, R&D expenditures, acquisitions, payout ratio, cash flow volatility, and firm size. In an unreported robustness check, we obtain similar results if we augment the Bates, Kahle, and Stulz (2009) empirical model of excess cash with two additional determinants of cash holdings specific to conglomerates: (i) the average intra-firm pairwise correlation in cash flows and (ii) the average intra-firm pairwise correlation in Tobin's q across the conglomerate's divisions, following Duchin (2010).

As another signal of excess cash, we use the initiation of a special dividend. We introduce a binary indicator, *Special dividend*, which equals 1 if the firm initiates a special dividend and 0 otherwise. Following Denis (1990) and DeAngelo et al. (2000), dividends are classified as special if they have CRSP distribution codes of 1262 or 1272, which identify those labeled "year-end," "final," "extra," or "special."

Table 4 tests the relation between excess cash and spillovers in pay. This table augments our base specification with the interaction terms between industry-level changes in pay and firm-level measures of excess cash: Δ*Excess cash* (columns 1–3) and *Special dividend* (columns 4–6). The results show that intra-firm spillovers in pay are magnified in the presence of excess cash. An increase in pay in a division's industry is associated with a stronger increase in pay in other divisions when this increase is associated with excess cash. This is shown by the positive and significant interaction terms between changes in industry pay in other divisions and measures of excess cash. A one-standard-deviation increase in excess cash (16.8% of assets) raises managerial pay in unaffected divisions by an extra 7 bps for every percentage point of an industry pay increase, indicating a 20% increase in the magnitude of spillovers. Similarly, a one-percentage-point increase in industry pay raises pay in other divisions by an extra 5–7 bps at firms that initiate special dividends. Finally, there is also a positive relation between an increase in excess cash and changes in pay in the treated division, suggesting that the surplus is distributed in the form of

Table 4
Distribution of excess cash

Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)
ΔIndustry pay	0.594***	0.625***	0.614***	0.609***	0.627***	0.598***
	[0.114]	[0.204]	[0.209]	[0.123]	[0.218]	[0.197]
ΔIndustry pay in other divisions	0.318***	0.312***	0.337***	0.309***	0.320***	0.345***
	[0.094]	[0.094]	[0.110]	[0.102]	[0.107]	[0.112]
ΔIndustry pay × ΔExcess cash	0.397**	0.403**	0.364**			
	[0.165]	[0.172]	[0.173]			
ΔIndustry pay in other divisions × ΔExcess cash	0.202**	0.330***	0.366***			
	[0.094]	[0.114]	[0.116]			
ΔExcess cash	0.158	0.118	0.131			
	[0.147]	[0.131]	[0.133]			
ΔIndustry pay × Special dividend				0.021	0.026	0.059**
				[0.028]	[0.025]	[0.023]
ΔIndustry pay in other divisions × Special dividend				0.053***	0.065***	0.062**
				[0.019]	[0.023]	[0.031]
Special dividend				0.007	0.019	0.038
				[0.025]	[0.034]	[0.028]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.251	0.247	0.252	0.246	0.241	0.244
N_obs	2,131	2,051	2,070	2,131	2,051	2,070

This table presents evidence on the relation between excess cash and intra-firm spillovers in pay. The dependent variable is the annual percentage change in a divisional manager's pay. Δ*Industry pay* and Δ*Industry pay in other divisions* are defined as the average percentage change in CEO pay of standalone firms that operate in the division's industry and in the industries of the other divisions in the conglomerate, respectively. Industry definitions are based on the three-digit SIC codes. Δ*Excess cash* is defined as the percentage change in the residual from regressing a firm's cash ratio on a vector of control variables following the model in Bates, Kahle, and Stulz (2009), which includes cash flow, the market-to-book ratio, a foreign income dummy, net working capital (excluding cash), capital expenditure, debt, R&D expenditures, acquisitions, payout ratio, cash flow volatility, and firm size. *Special dividend* is an indicator that equals 1 if the firm initiates a special dividend and 0 otherwise. Following Denis (1990) and DeAngelo et al. (2000), dividend distributions are classified as special if they have CRSP distribution codes of 1262 or 1272, which correspond to dividends labeled "year-end," "final," "extra," or "special." All regressions include year fixed effects and the same control variables as in Table 2, which are not shown. Variable definitions appear in Appendix A. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

pay raises to both affected and unaffected managers. This evidence parallels that in Blanchard, Lopez-de-Silanes, and Shleifer (1994), who studied 11 firms that received cash windfalls and found that 16% of the windfall was spent on raising executive pay.

We also find that firms with excess cash have higher managerial pay. In unreported specifications without the interaction terms, the relation between changes in excess cash and compensation is positive and significant. When the interaction terms are added, the point estimates on the direct measures of excess cash remain positive but lose significance to the interaction terms. One interpretation of this pattern is that the positive relation between cash and managerial pay is most pronounced around industry compensation shocks, perhaps because they provide a justification for pay raises.

In summary, excess cash magnifies spillovers in pay. When one of the divisions experiences a positive industry change that generates excess cash, part of the cash is distributed to managers via pay raises. This channel highlights similarities to cross-subsidization in internal capital markets—namely, the evidence that transfers between divisions increase when firms have more cash (Hovakimian 2011).

4.2 Internal benchmarking of managerial pay

A change in industry pay in one division may affect compensation in other divisions via intra-firm benchmarking. For example, when determining annual pay raises, the compensation committee may take into account considerations of equity between managers. Similarly, an increase in one manager's pay may lead his peers to lobby for a pay raise, and firms may anticipate or respond to such lobbying. This hypothesis is grounded in the theoretical work that emphasizes the importance of relative pay for agents' utility (Akerlof and Yellen 1990) and highlights the effect of perceived fairness on the pay-setting process (Akerlof 1982, 1984; Hart and Moore 2008).

Because the benchmarking channel is tied to intra-firm interactions, we need to measure the inclination and ease with which divisional managers can exchange information about their expected changes in pay before such information is finalized and disclosed outside the firm. In our first test, we focus on intra-firm social ties—informal connections between managers via social clubs, alumni networks, and professional appointments.[4] Socially connected managers are more likely to have had opportunities to form informal connections outside the firm via their mutual memberships in other organizations. They are also more likely to perceive one another as similar and to be inclined to interact and share information with one another (Reagans 2011). We conjecture that social ties facilitate intra-firm benchmarking via two mechanisms.

The first mechanism posits that social ties facilitate an exchange of information about pay raises between divisional managers, and they lobby for pay raises that match those of their peers. For example, Shue (2013) finds that managers obtain information about their peers' pay via social networks and that such information exchanges (e.g., at alumni reunions) are associated with large pay raises, consistent with lobbying. Because divisional managers learn about their next-year pay before such changes become effective, there is a significant time window when a manager can act upon this information. Research in other settings documents nearly immediate transfers of information via social networks even when there are major barriers to information sharing (Cohen, Frazzini, and Malloy 2008, 2010; Centola 2011; Ahern Forthcoming).

The second mechanism of internal benchmarking posits that boards anticipate a greater intensity of managerial lobbying at socially connected firms and take into account considerations of equity when setting managerial pay.

[4] Drawing on prior research (McPherson, Smith-Lovin, and Cook 2001; Reagans 2011), we assume that managers' shared memberships in external organizations increase the likelihood of creating a social tie, although they do not necessarily imply the existence of such a tie.

First, social ties allow managers to learn about the pay raises of their peers before they become effective, thus creating a window for lobbying. Second, social ties raise the pressure for within-group conformity (McPherson, Smith-Lovin, and Cook 2001), facilitate in-group comparisons (DiPrete, Eirich, and Pittinsky 2010), and foster coordination between peers (Attanasi et al. 2014). If boards rationally anticipate a higher degree of managerial coordination and lobbying at socially connected firms, they are likely to set more equitable pay raises.

We define three types of social ties: those via nonprofit organizations, education, and professional activities. Connections via nonprofit organizations proxy for managerial interaction via social clubs and philanthropic activities. Because these connections are location-specific (e.g., Greenwich Country Club or United Way of Toledo), they also proxy for geographic proximity between managers, which facilitates information sharing. Two managers are connected if they hold memberships in the same nonprofit chapter. Educational ties foster a sense of belonging to a common group—alumni network—as evidenced by alumni clubs and college sports. Two managers are connected if they hold degrees from the same university. Finally, professional ties reflect work-related connections, and two managers are connected if they worked together at another firm or served on the same board of directors.

We measure a divisional manager's social ties in a given year by the average number of connections to other divisional managers in the firm. To account for a manager's access to the CEO and the compensation committee, a proxy for the ease of lobbying, we also measure social ties between a manager and these agents. Because divisional managers rarely serve on the compensation committee (1.6% of observations), social ties provide an important channel of indirect access to its members.

Table 5, Panel A, shows that a divisional manager's pay responds more strongly to an industry change in another division when these managers have social ties, as indicated by the positive and significant coefficients on the term Δ*Industry pay in other divisions x Social ties to other divisional managers*. In columns 4–6, the coefficients on the interaction term Δ*Industry pay in other divisions x Social ties to compensation committee* indicate that managers connected to the compensation committee receive greater pay raises in response to the same industry change in pay. A similar increase in pay raises is observed for managers connected to the CEO. This magnifying effect of social connections extends to compensation changes in the same industry. The positive coefficients on the interaction terms Δ*Industry pay x Social ties to CEO* and Δ*Industry pay x Social ties to Compensation committee* indicate that a divisional manager connected to the CEO or the compensation committee gets a greater pay raise when compensation in his own industry goes up. This result is consistent with prior evidence that managers with social ties to the board earn higher compensation (Hwang and Kim 2009) and obtain greater

Table 5
Internal benchmarking of managerial pay

Panel A: Social ties

Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)
ΔIndustry pay	0.635***	0.690***	0.696***	0.617***	0.639***	0.679***
	[0.117]	[0.183]	[0.211]	[0.118]	[0.184]	[0.199]
ΔIndustry pay in other divisions	0.296***	0.303**	0.328**	0.292***	0.289**	0.297**
	[0.058]	[0.138]	[0.163]	[0.063]	[0.130]	[0.144]
ΔIndustry pay × Social ties to other divisional managers	−0.012	0.008	0.016			
	[0.049]	[0.035]	[0.051]			
ΔIndustry pay in other divisions × Social ties to other divisional managers	0.081*	0.166***	0.128*			
	[0.046]	[0.063]	[0.068]			
Social ties to other divisional managers	0.014	0.049**	0.069***			
	[0.033]	[0.025]	[0.021]			
ΔIndustry pay × Social ties to CEO				0.086**	0.099**	0.126**
				[0.037]	[0.044]	[0.058]
ΔIndustry pay × Social ties to compensation committee				0.094*	0.085	0.090*
				[0.053]	[0.056]	[0.050]
ΔIndustry pay in other divisions × Social ties to CEO				0.134***	0.084***	0.108***
				[0.034]	[0.029]	[0.034]
ΔIndustry pay in other divisions × Social ties to compensation committee				0.151**	0.141**	0.118*
				[0.066]	[0.056]	[0.066]
Social ties to CEO				0.023	0.014	0.016
				[0.015]	[0.015]	[0.013]
Social ties to compensation committee				0.033	0.021*	0.029
				[0.024]	[0.012]	[0.019]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.267	0.265	0.270	0.259	0.252	0.273
N_obs	2,131	2,051	2,070	2,131	2,051	2,070

Panel B: Positive and negative industry pay changes

Dependent variable	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)
ΔIndustry pay +	0.758***	0.764***	0.776***
	[0.117]	[0.186]	[0.206]
ΔIndustry pay –	0.461***	0.576**	0.554***
	[0.115]	[0.187]	[0.209]
ΔIndustry pay in other divisions +	0.398***	0.423***	0.457***
	[0.078]	[0.157]	[0.159]
ΔIndustry pay in other divisions –	0.147	0.195	0.135
	[0.148]	[0.313]	[0.572]
Year fixed effects	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Adjusted R^2	0.247	0.244	0.249
N_obs	2,131	2,051	2,070

This table studies the relation between spillovers in pay and proxies for internal compensation benchmarking. The dependent variable across all panels is the annual percentage change in a divisional manager's pay. Panel A provides evidence on social ties. *Social ties to CEO* is the number of social connections between a divisional manager and the CEO based on nonprofits, education, and prior employment. *Social ties to other divisional managers* is the average number of connections between a divisional manager and the other divisional managers in the same conglomerate based on nonprofits, education, and prior employment. *Social ties to compensation committee* is the average number of connections between a divisional manager and the members of the compensation committee based on nonprofits, education, and prior employment. Panel B distinguishes between positive and negative changes in industry pay. Δ*Industry pay*$^+$and Δ*Industry pay in other divisions*$^+$ are the average percentage changes in the division's industry pay and in the industry pay of the other divisional managers, respectively, when the average change is positive and 0 otherwise. Δ*Industry pay*$^-$ and Δ*Industry pay in other divisions*$^-$ are the average percentage changes in the division's industry pay and in the industry pay of the other divisional managers, respectively, when the average change is negative and 0 otherwise. Industry definitions are based on the three-digit SIC codes. All regressions include year fixed effects and the same control variables as in Table 2, which are not shown. Variable definitions appear in Appendix A. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

allocations of other resources, such as investment capital for their divisions (Duchin and Sosyura 2013).

As a second test of the benchmarking channel, we study the effects of positive and negative industry changes in pay. If the spillovers are related to intra-firm bargaining, we would expect managers to bargain for pay raises in response to positive industry shocks and to bargain against pay cuts in response to negative ones. To distinguish between positive and negative industry shocks, we define Δ*Industry pay in other divisions*$^{+}$ (Δ*Industry pay in other divisions*$^{-}$) as the average percentage changes in the industry pay of the other divisions when the average change is positive (negative) and 0 otherwise. We also introduce analogous variables for the positive and negative changes in managerial pay in the division's own industry: Δ*Industry pay*$^{+}$ and Δ*Industry pay*$^{-}$.

Table 5, Panel B, shows that the spillovers are driven by pay raises. The coefficients on Δ*Industry pay in other divisions*$^{+}$ are positive and significant at the 1% level across all columns. In contrast, the coefficients on Δ*Industry pay in other divisions*$^{-}$ are not significant at conventional levels and have much smaller point estimates. The difference in coefficient estimates between Δ*Industry pay in other divisions*$^{+}$ and Δ*Industry pay in other divisions*$^{-}$ is statistically significant at 5% across all columns (F-test p-values: 0.024–0.047). A similar asymmetric pattern—namely, a higher sensitivity to industry pay increases than to pay decreases—is also observed for pay changes in the division's own industry. This asymmetry between positive and negative changes in pay is consistent with downward rigidity in wages and the predictions of the benchmarking channel.

Overall, the benchmarking channel contributes to the spillovers in pay. Our findings add to prior evidence on other types of benchmarking in conglomerates, such as using the same discount rate to benchmark returns across divisions (Graham and Harvey 2001; Krueger, Landier, and Thesmar 2015).

4.3 Internal transfers between divisions

Divisions of conglomerates are linked through intra-firm transfers, such as transfers of materials and talent. If technological changes in one division raise the marginal product of managers in other divisions, the corresponding increase in these managers' pay could be consistent with efficient contracting.

If this channel is operative, spillovers should be stronger between divisions in economically related industries. To identify such industries, we obtain data on cross-industry transfers from the 2002 input-output matrix of the Bureau of Economic Analysis. Following Ahern and Harford (2014), we calculate the percentage of industry i's sales purchased by industry j and the percentage of industry j's inputs purchased by industry i. We define industries i and j as related if either percentage exceeds 1%. Finally, we define an indicator *Industry relatedness*, which is equal to 1 if the division is related to any of the other divisions' industries and 0 otherwise. In our sample, 27.6% of the divisions are industry-related. Our results are not sensitive to this definition of industry relatedness. We obtain similar conclusions if we impose alternative thresholds of industry relatedness in the input-output matrix, or if we define related industries as those that operate in the same two-digit SIC code or in the same Fama-French 10-industry classification. These alternative specifications are presented in Internet Appendix Table 4.

Columns 1–3 of Table 6 augment our baseline regression with the interaction term Δ*Industry pay in other divisions x Industry relatedness*. If the spillovers in pay are driven by transfers between related industries, we should observe a positive and significant coefficient on this term. In contrast to this prediction, the coefficients on the interaction term are statistically indistinguishable from zero across columns 1–3, and the point estimates are an order of magnitude smaller than the baseline effect of spillovers captured by the variable Δ*Industry pay in other divisions*. To the extent that our proxies are correlated with intra-firm transfers, their contribution to compensation spillovers is weak.

Another possible manifestation of this channel is the transfer of human capital. Even if two divisions have no overlap in materials, they may rely on similar managerial talent. For example, Tate and Yang (2015) find that conglomerates have active internal labor markets that move employees across divisions. In this case, a positive industry change in one division may raise employment options for managers in other divisions, and managers' pay raises may reflect these improved options.

This channel predicts that compensation spillovers will be stronger for managers with experience in multiple industries, a proxy for transferable skills. To test this hypothesis, we use divisional managers' work histories to construct the indicator *Experience outside industry*, which is equal to 1 if a divisional manager has experience in multiple industries over the past decade and 0 otherwise. Experience is defined as professional service in a standalone firm or a conglomerate's division in a given industry.

In columns 4–6 of Table 6, we add the interaction term Δ*Industry pay in other divisions x Experience outside industry* to our base specification. This interaction term captures the differential effect of industry shocks on the pay of divisional managers with multi-industry experience. Across columns 4–6, the coefficients on the interaction term are economically small and insignificantly different from zero, indicating that the spillovers in pay are not significantly different between divisional managers with multi-industry experience and those without any experience outside their industry.

In our final test of this channel, we use changes in the wages of managers at standalone firms as a proxy for changes in their marginal products (under the assumption of efficient contracting). Under this assumption, a positive association between an industry pay change in one division and the pay of managers in other divisions reflects their common exposure to a factor that affects marginal products in multiple industries. To test this hypothesis, we remove the common components of industry pay changes and focus on their idiosyncratic residuals. By construction, these idiosyncratic industry pay

Table 6
Internal transfers between divisions

Test	Industry relatedness			Experience outside industry			Idiosyncratic industry pay changes		
Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔIndustry pay	0.626***	0.650***	0.661***	0.641***	0.660***	0.620***	0.633***	0.683***	0.659***
	[0.117]	[0.192]	[0.204]	[0.115]	[0.187]	[0.211]	[0.125]	[0.182]	[0.209]
ΔIndustry pay in other divisions	0.302***	0.299*	0.363**	0.236***	0.269**	0.305**	0.301***	0.312**	0.321**
	[0.083]	[0.153]	[0.159]	[0.077]	[0.132]	[0.151]	[0.081]	[0.155]	[0.162]
ΔIndustry pay in other divisions × Industry relatedness	0.026	0.049	0.043						
	[0.088]	[0.076]	[0.084]						
Industry relatedness	0.013	−0.036	−0.016						
	[0.072]	[0.066]	[0.072]						
ΔIndustry pay in other divisions × Experience outside industry				0.055	0.043	0.043			
				[0.083]	[0.098]	[0.082]			
Experience outside industry				0.029**	0.035**	0.032**			
				[0.012]	[0.017]	[0.016]			
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.242	0.239	0.239	0.255	0.251	0.252	0.257	0.249	0.258
N_obs	2,131	2,051	2,070	2,131	2,051	2,070	2,131	2,051	2,070

This table presents evidence on the effect of intra-firm transfers of materials and managerial talent. The dependent variable is the annual percentage change in a divisional manager's pay. In columns 1–6, Δ*Industry pay* and Δ*Industry pay in other divisions* are defined as the average percentage change in CEO pay of standalone firms which operate in the division's industry and in the industries of the other divisions in the conglomerate, respectively. In columns 7–9, Δ*Industry pay* is defined as the residual from regressing the average percentage change in CEO pay of standalone firms in each industry on the average percentage change in CEO pay of standalone firms in all other industries. Δ*Industry pay in other divisions* is defined as the average residual Δ*Industry pay* in all other industries in the conglomerate. Industry definitions are based on the three-digit SIC codes. To construct *Industry relatedness*, we calculate the percentage of industry i's sales purchased by industry j and the percentage of industry j's inputs purchased by industry i, using data on trade flows between industries from the 2002 input-output matrix of the Bureau of Economic Analysis. We define industries i and j as related if either percentage is greater than 1%. *Industry relatedness* is an indicator equal to 1 if the division is related to any industry of the other divisions in the conglomerate and 0 otherwise. *Experience outside industry* is an indicator equal to 1 if the divisional manager worked at a standalone firm or a conglomerate division operating in a different industry over the last 10 years and 0 otherwise. All regressions include year fixed effects and the same control variables as in Table 2, which are not shown. Variable definitions appear in Appendix A. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

changes are uncorrelated with pay changes in any other industry in the same three-digit SIC classification.

To extract the idiosyncratic component of changes in industry pay, we rely on statistical analysis. This approach allows for a unique correlation structure at the level of each industry pair and avoids a selection bias in defining an ex ante driver of changes in pay. For each industry, we regress industry-level changes in CEO pay at standalone firms on industry-level changes in CEO pay at standalone firms in all other industries, thus extracting the industry-specific residual change in pay after accounting for all pairwise correlations between a given industry and all other industries. The distribution of the idiosyncratic residuals of changes in industry pay appears in Table 1. Next, we replace the percentage change in industry pay in earlier tests with this new measure of industry-specific change in pay.

Columns 7–9 of Table 6 show how a divisional manager's pay is associated with idiosyncratic pay changes in his own industry and idiosyncratic pay changes in the industries of other divisions of the conglomerate. The main independent variables of interest are Δ*Industry pay* and Δ*Industry pay in other divisions*. Δ*Industry pay* is defined as the residual from regressing the average percentage change in CEO pay of standalone firms in each industry on the average percentage change in CEO pay of standalone firms in all other industries. Analogously, Δ*Industry pay in other divisions* is defined as the average residual Δ*Industry pay* in all other industries in the conglomerate.

The removal of the common movements in pay across industries has little effect on the magnitude of spillovers. A divisional manager's pay responds strongly to an idiosyncratic change in industry pay in another division, and the magnitude of this effect is similar to that obtained using raw changes in pay. This suggests that the response of a divisional manager's pay to pay changes in other divisions is not driven by the common changes in marginal products across industries, to the extent that they are reflected in managerial wages at standalone firms.

In summary, among the three possible channels of spillovers examined in this section, we find stronger evidence in support of the distribution of excess cash and intra-firm benchmarking. In contrast, the evidence in support of intra-firm transfers is relatively weak.

4.4 Governance

The analysis so far suggests that spillovers are magnified in the presence of excess cash and intra-firm social ties. If these attributes reflect agency frictions, spillovers should be associated with weaker governance. However, if social ties and extra cash increase divisional managers' productivity, for example, by supporting cooperation and operating flexibility, spillovers should be associated with stronger governance. To distinguish between these interpretations, we study the association between the intensity of spillovers and three dimensions of governance: (i) firm-level governance, (ii) composition of the compensation committee, and (iii) quality of compensation advisers.

Table 7, Panel A, focuses on firm-level measures of governance: (i) block ownership, defined as an indicator equal to 1 if the percentage of shares held by any one institutional investor exceeds 5%, (ii) board independence, defined as the ratio of the number of independent directors to the total number of directors, and (iii) the Gompers, Ishii, and Metrick (2003) governance index. As before, the dependent variable is one of the measures of a divisional manager's annual percentage change in pay. The main independent variable of interest is the interaction term Δ*Industry pay in other divisions x Governance*, which shows how spillovers are associated with the three governance measures.

Panel A shows that compensation spillovers decline in the presence of strong governance. Based on columns 1–3, a change in a divisional manager's pay in response to a one-percentage-point change in industry pay in another division is reduced by 7–9 bps in the presence of large blockholders, as shown by the negative and significant coefficients on the main interaction term, suggesting an over 20% reduction in spillovers relative to the baseline effect.Similar conclusions emerge from the evidence on board independence and the G-index: stronger governance is associated with smaller spillovers in pay.

Panel B studies three measures of governance of the compensation committee. The first measure, *Independent committee*, is an indicator that equals 1 if all the committee members are independent directors and 0 otherwise. The second variable, *Socially independent committee,* is an indicator that equals 1 if the committee members have no social ties to the CEO or divisional managers and 0 otherwise. This proxy reflects the evidence that social ties to managers weaken the boards' monitoring and increase managerial influence on pay (Hwang and Kim 2009). The third variable, *Committee appointed under a prior CEO*, is an indicator that equals 1 if any committee member was appointed before the incumbent CEO and 0 otherwise. This measure is motivated by the evidence that managers influence board appointments (Shivdasani and Yermack 1999; Denis, Denis, and Walker 2014) and retain more power under the directors appointed during the manager's tenure (Coles, Daniel, and Naveen 2014).

Panel B shows that internal spillovers are significantly reduced when a firm's compensation committee is more independent. This result persists across all measures of committee independence, as shown by the consistently negative and statistically significant interaction terms of committee independence and Δ*Industry pay in other divisions* across all nine specifications.

Panel C focuses on compensation advisers. Using data from Equilar, we construct two variables that capture the external scrutiny of a firm's compensation policies. The first variable, *Review by an external compensation adviser*, is an indicator equal to 1 if the firm employs an external compensation adviser and 0 otherwise. The second variable, *Large compensation adviser*, is an indicator that equals 1 if the adviser is one of the "big four" advisory firms—the largest firms based on the number of clients (Frederic W. Cook &

Table 7
Corporate governance

Panel A: Firm-level governance

Governance measure	Block ownership			Board independence			G-index		
Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔIndustry pay in other divisions	0.334***	0.322***	0.411***	0.305***	0.361***	0.373***	0.299***	0.348***	0.408***
	[0.094]	[0.104]	[0.106]	[0.090]	[0.104]	[0.106]	[0.095]	[0.098]	[0.111]
ΔIndustry pay in other divisions × Corporate governance	−0.069***	−0.091***	−0.068*	−0.037	−0.084**	−0.086*	0.036***	0.047***	0.033**
	[0.023]	[0.033]	[0.037]	[0.027]	[0.037]	[0.045]	[0.013]	[0.017]	[0.015]
Corporate governance	−0.056	−0.068	−0.072	−0.085	−0.072	−0.095	0.042	0.071	0.038
	[0.060]	[0.084]	[0.091]	[0.084]	[0.047]	[0.068]	[0.064]	[0.061]	[0.052]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.263	0.261	0.267	0.253	0.269	0.260	0.254	0.248	0.249
N_obs	2,131	2,051	2,070	2,131	2,051	2,070	2,131	2,051	2,070

Panel B: Compensation committee

Compensation committee	Independent committee			Socially independent committee			Committee appointed under a prior CEO		
Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔIndustry pay in other divisions	0.274***	0.343***	0.440***	0.269***	0.292*	0.352**	0.275***	0.333**	0.331**
	[0.093]	[0.102]	[0.115]	[0.082]	[0.159]	[0.160]	[0.078]	[0.153]	[0.156]
ΔIndustry pay in other divisions × Compensation committee	−0.066**	−0.087**	−0.087**	−0.059**	−0.067*	−0.080***	−0.064**	−0.068***	−0.074**
	[0.029]	[0.040]	[0.044]	[0.026]	[0.035]	[0.034]	[0.029]	[0.024]	[0.034]
Compensation committee	−0.014	−0.038	−0.062	−0.035	−0.056	−0.064	−0.026	−0.069	−0.057
	[0.056]	[0.079]	[0.095]	[0.060]	[0.075]	[0.089]	[0.054]	[0.084]	[0.091]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.238	0.230	0.244	0.251	0.245	0.243	0.240	0.236	0.233
N_obs	2,131	2,051	2,070	2,131	2,051	2,070	2,131	2,051	2,070

(continued)

Table 7
Continued

Panel C: Compensation adviser

Dependent variable	ΔPay1	ΔPay2	ΔPay3	ΔPay1	ΔPay2	ΔPay3
Model	(1)	(2)	(3)	(4)	(5)	(6)
ΔIndustry pay in other divisions	0.277***	0.347**	0.329**	0.279***	0.311**	0.325**
	[0.083]	[0.156]	[0.154]	[0.083]	[0.154]	[0.155]
ΔIndustry pay in other divisions × Review by an external compensation adviser	−0.050	−0.052**	−0.057*	−0.049	−0.038**	−0.048**
	[0.032]	[0.024]	[0.031]	[0.036]	[0.018]	[0.021]
Review by an external compensation adviser	−0.048	−0.076	−0.091	−0.091	−0.022	−0.053
	[0.078]	[0.049]	[0.062]	[0.067]	[0.074]	[0.082]
ΔIndustry pay in other divisions × Large compensation adviser				−0.021	−0.020	−0.046**
				[0.017]	[0.018]	[0.022]
Large compensation adviser				0.030*	−0.010	−0.011
				[0.016]	[0.012]	[0.023]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.236	0.231	0.232	0.236	0.232	0.232
N_obs	1,636	1,564	1,499	1,636	1,564	1,499

This table presents evidence on the relation between internal spillovers in pay and three dimensions of corporate governance: (i) firm-level governance (Panel A), (ii) composition of the compensation committee (Panel B), and (iii) quality of compensation advisers (Panel C). The dependent variable is the annual percentage change in a divisional manager's pay. Δ*Industry pay* and Δ*Industry pay in other divisions* are defined as the average percentage change in CEO pay of standalone firms that operate in the division's industry and in the industries of the other divisions in the conglomerate, respectively. Industry definitions are based on the three-digit SIC codes. *Block ownership* is an indicator equal to 1 if the percentage of shares held by any one institutional investor exceeds 5%. *Board independence* is the ratio of the number of independent directors to the total number of directors. *G-index* is the Gompers, Ishii, and Metrick (2003) governance index. *Independent committee* is an indicator that equals 1 if all the committee members are independent directors and 0 otherwise. *Socially independent committee* is an indicator that equals 1 if the committee members share no social ties with the CEO or divisional managers and 0 otherwise. *Committee appointed under a prior* CEO is an indicator that equals 1 if any of the compensation committee members were appointed before the incumbent CEO and 0 otherwise. *Review by an external compensation adviser* is an indicator equal to 1 if the firm employs an external compensation adviser and 0 otherwise. *Large compensation adviser* is an indicator equal to 1 if the compensation adviser is one of the "big four" compensation advisory firms (Frederic W. Cook & Co., Towers Perrin, Mercer, and Hewitt Associates) and 0 otherwise. All regressions include year fixed effects and the same control variables as in Table 2, which are not shown. Variable definitions appear in Appendix A. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Co., Towers Perrin, Mercer, and Hewitt Associates). We posit that monitoring incentives increase with the advisory firm's reputation capital (proxied by size).

Panel C shows that the intensity of spillovers declines in the presence of advisory firms, particularly when these advisers are large and reputable. Based on the estimates in column 6, the magnitude of spillovers is reduced by 29% in the presence of large compensation advisers.[5]

Overall, spillovers in pay increase when managers play a greater role in the pay-setting process and decline in the presence of strong governance and external monitoring. These patterns persist across multiple layers of governance, suggesting that they likely reflect an overall balance of power inside a firm.

5. Links Between Spillovers in Pay and Capital Budgeting

This section examines how the redistribution of pay is related to another key resource distributed to divisional managers—investment funds. This analysis is motivated by theoretical work on corporate diversification that shows that monetary pay and capital budgets serve as the primary incentives for divisional managers, which should be examined jointly in the analysis of corporate outcomes.

For example, in Scharfstein and Stein (2000), CEOs allocate resources to divisional managers in the form of monetary pay or capital budgets. Since the authors wish to focus on capital budgets, they make two assumptions that lead the CEO to reallocate capital instead of pay. First, the CEO does not derive any utility from paying managers in cash, but can spend any unallocated capital funds on himself. Second, a divisional manager is indifferent between being paid in cash or with investment funds. The authors acknowledge that their assumptions are "not intended to be realistic" and that when they are relaxed, firms will redistribute both investment capital and pay.

This section considers such a general setting and studies the conditions that influence a firm's choice between the two methods of redistribution. We also investigate how both types of redistributions affect the link between each resource's marginal product and its allocation inside the firm.

5.1 Redistribution of capital and pay

To study the link between the allocation of capital and pay, we develop measures of their redistribution inside the firm. To measure pay redistribution, we estimate the firm-level elasticity of a divisional manager's percentage change in pay relative to (i) changes in pay in his industry and (ii) the average change in pay in other industries of the same conglomerate. This approach follows the intuition that spillovers increase the elasticity to changes in pay in other industries

[5] Based on the point estimates in column 6, the reduction is measured as follows: $(-0.048-0.046)/0.325=-29\%$.

and reduce the elasticity to the division's own industry. We also construct an analogous measure of capital redistribution by estimating the firm-level elasticity of the percentage change in divisional capital expenditures (CapEx) to (i) changes in Tobin's q in the division's industry and (ii) the average change in Tobin's q in other industries of the conglomerate.[6] Industry-level changes in the average pay and q are estimated on standalone firms. We estimate four firm-level elasticities: (i) elasticity of ΔPay to own industry, (ii) elasticity of ΔPay to other industries, (iii) elasticity of $\Delta CapEx$ to own industry, and (iv) elasticity of $\Delta CapEx$ to other industries. We define *Pay redistribution index* as the average between the percentile ranking of the ΔPay elasticity to other industries and the percentile ranking of the negative ΔPay elasticity to own industry. We define *Capital redistribution index* analogously. The details on the estimation of elasticities appear in Appendix B.

Appendix Table B2 shows summary statistics for the redistribution indexes. The table shows that the redistributions of pay and capital are positively correlated. The correlation between *Pay redistribution index* and *Capital redistribution index* ranges from 0.22 to 0.25 (significant at the 1% level), depending on the measure of divisional managers' pay. These estimates imply that redistributions of pay and capital arise in similar firms and appear to be firm-specific, consistent with our earlier analysis of firm boundaries. The relatively modest correlation magnitudes imply that these practices are far from perfectly correlated—namely, firms choose to redistribute one type of resources more than the other.

Our analysis of a firm's choice between the two methods of redistribution is motivated by theoretical work. Theory suggests that resource distribution inside a firm depends on how the incentives of agents responsible for these decisions are balanced against the disciplining forces that align these incentives with those of other stakeholders. This tension has been modeled separately in the allocation of capital (Scharfstein and Stein 2000) and pay (DeMarzo and Kaniel 2015). Motivated by this work, we conjecture that a firm's choice of the method of resource redistribution depends on the balance between managers' control rights over the particular decision and the disciplining forces that affect this type of resource distribution: (i) internal controls, (ii) external shareholder influence, and (iii) market competition.

Table 8 studies the determinants of the balance between the redistribution of pay and capital inside conglomerates. The dependent variable is the ratio of the pay redistribution index to the capital redistribution index. Columns 1–6 characterize the scrutiny of the firm's pay-setting process.

In columns 1–3, the main independent variable is a measure of internal controls in the pay-setting process—namely, the independence of a firm's

[6] This measure of capital redistribution follows prior work on cross-subsidization in internal capital markets to facilitate comparisons of the evidence (e.g., Shin and Stulz 1998; Billett and Mauer 2003; Ozbas and Scharfstein 2010).

Table 8
Choice between redistribution of pay and capital

Compensation measure	Pay1	Pay2	Pay3	Pay1	Pay2	Pay3	Pay1	Pay2	Pay3
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Independent compensation committee	−0.031**	−0.034**	−0.035**						
	[0.013]	[0.015]	[0.015]						
Shareholder compensation proposals				−0.019*	−0.021**	−0.024**			
				[0.010]	[0.010]	[0.011]			
Local product fluidity							0.050**	0.056**	0.048**
							[0.021]	[0.024]	[0.022]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.084	0.082	0.085	0.077	0.077	0.078	0.079	0.076	0.076
N_obs	548	522	531	548	522	531	548	522	531

This table studies the determinants of the choice between the redistribution of pay and capital. The dependent variable is the ratio of the pay redistribution index to the capital redistribution index. The *Pay and capital redistribution indexes* are calculated by estimating a firm-by-firm elasticity of divisional percentage changes in managerial pay and capital investment to changes in the same industry and in the other industries of the conglomerate. *Pay redistribution index* is the average between the percentile ranking of the ΔPay elasticity to other industries and the percentile ranking of the negative ΔPay elasticity to own industry. The elasticities are calculated by estimating a firm-by-firm, five-year rolling window regression of the percentage change in the manager's pay on the average changes in the same industry and in the industries of the other divisions in the conglomerate, where industry-level pay is measured by the average CEO pay of standalone firms. *Capital redistribution index* is average between the percentile ranking of the $\Delta CapEx$ elasticity to other industries and the percentile ranking of the negative *CapEx* elasticity to own industry. The elasticities are calculated by estimating firm-by-firm regressions of the division's percentage change in capital expenditure on the average Tobin's Q changes in the same industry and in the industries of the other divisions in the conglomerate, analogously to the construction of the pay redistribution index. Additional details on the estimation of *Pay redistribution index* and *Capital redistribution index*, as well as their summary statistics, appear in Appendix B. In columns 1–3, *Independent compensation committee* is an indicator variable that equals 1 if the compensation committee comprises only independent directors and 0 otherwise. In columns 4–6, *Shareholder compensation proposals* is an indicator variable that equals 1 if shareholders raised a compensation-related proposal over the last three years and 0 otherwise. In columns 7–9, *Local product fluidity* is a textual analysis-based measure of competitive threats adopted from Hoberg, Phillips, and Prabhala (2014). Variable definitions appear in Appendix A. All regressions include year fixed effects. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

compensation committee (an indicator that equals 1 if the committee is fully independent and 0 otherwise). The number of firms is the same as in the main sample, but the number of observations declines because the unit of observation is now a firm-year rather than a division year (given the focus on firm-level policies) and because we use five-year rolling windows to obtain reliable estimates of the intra-firm elasticity of pay and capital for the redistribution indexes.

Columns 4–6 focus on shareholders' scrutiny of a firm's compensation practices, measured by the initiation of compensation-related proposals. Data on shareholder proposals at S&P 1500 firms come from Institutional Shareholder Services (ISS) and include the shareholder meeting date, proposal topic, and outcome. Using a four-digit topic code assigned by ISS, we identify shareholder proposals related to compensation. Of the 1,087 proposals for our sample firms, 18.7% are related to compensation. We define *Shareholder compensation proposals* as an indicator that equals 1 if shareholders made a proposal about compensation over the last three years and 0 otherwise. This indicator is equal to 1 for 20.1% of firm-year observations. Conditional on having a compensation proposal, shareholders raise 1.7 proposals over a three-year window. Shareholder scrutiny of pay, like most governance variables, is an endogenous outcome, and our analysis only seeks to describe its associations with the method of resource distribution.

Columns 7–9 examine a key disciplining force in investment decisions—product market competition. This analysis is grounded in theoretical work in industrial organization that singles out product market competition as one of the main disciplining mechanisms in a firm's investment decisions (Fudenberg and Tirole 1983). We conjecture that competition increases the cost of redistributing capital from strong to weak divisions because attractive investment opportunities are quickly captured by rivals. For example, Grenadier (2002) shows analytically that competitive threats reduce investment delays. Simintzi (2013) provides evidence that corporate investment responds quickly to competitive threats. To measure product market competition, we focus on product market fluidity. This measure, developed in Hoberg, Phillips, and Prabhala (2014) from textual analysis of corporate disclosure, is a proxy for the firm's own assessment of the intensity of competition.

Table 8 shows that the variation in a firm's competitive landscape and the scrutiny of its pay-setting process help explain the balance between the redistribution of capital and pay. Columns 1–6 show that firms facing a higher scrutiny of compensation policies, proxied by a more independent compensation committee (columns 1–3) and shareholder activism on compensation issues (columns 4–6), are more likely to redistribute capital rather than pay. Columns 7–9 show that firms facing competitive threats in the product markets are less likely to redistribute capital than pay. These relationships arise across all measures of pay and are statistically significant at conventional levels.

In summary, our evidence is consistent with a simultaneous cross-subsidization via managerial pay and capital budgets inside conglomerates. These practices are positively correlated and arise in similar firms. A firm's choice between the redistribution of capital and pay depends on the monitoring intensity of the pay-setting process and the strength of product market competition.

5.2 Resource redistribution and marginal products

This subsection studies how the redistribution of capital and pay affects the link between the marginal product of each resource and its allocation inside the firm. This analysis makes a step toward understanding the relation between intra-firm spillovers and the productivity of capital and labor.

To examine the relation between intra-firm spillovers in pay and the productivity of labor, we study how compensation spillovers affect the link between a manager's pay and his marginal product. As a measure of a manager's marginal product, we use divisional ROA, the main evaluation criterion for divisional managers' performance (Cichello et al. 2009). If compensation spillovers are consistent with efficient contracting, they should tighten the link between a manager's pay and performance. In contrast, if compensation spillovers are symptomatic of agency frictions, they should weaken managerial incentives and loosen the link between pay and performance. Further, the effect of spillovers on the sensitivity of a divisional manager's pay to his marginal product could be offset or amplified by their effect on the sensitivity of a manager's pay to total shareholder returns. Therefore, we also study the effect of spillovers on the sensitivity of divisional managers' pay to the performance of the entire firm, as measured by its stock return. Because spillovers in pay arise as an endogenous outcome, our analysis only seeks to describe the association between spillovers and pay-performance sensitivity.

We use a similar framework to study how capital redistributions affect the link between investment and the marginal product of capital. Following the literature on internal capital markets that studies the sensitivity of capital investment to its marginal product (Shin and Stulz 1998; Ozbas and Scharfstein 2010), we use industry q as a proxy for the marginal product of capital. If the redistributions of capital are consistent with efficient cross-subsidization, as in Stein (1997), they should increase the sensitivity of investment to the marginal product of capital. If, on the other hand, such redistributions reflect agency frictions inside the firm, as in Rajan, Servaes, and Zingales (2000), they should weaken the link between the allocation of capital and its marginal product.

Table 9 tests how the redistributions of capital and pay affect the link between the allocation of these resources and their marginal products. Columns 1–3 examine the relation between the intra-firm redistribution of pay and the sensitivity of a divisional manager's pay to the performance of his division

Table 9
Spillovers in resource distribution and the marginal product of labor and capital

Compensation measure	ΔPay1	ΔPay2	ΔPay3	ΔCapEx
Model	(1)	(2)	(3)	(4)
ΔDivision ROA	0.031	0.045***	0.067***	
	[0.085]	[0.016]	[0.018]	
ΔDivision ROA × Pay redistribution index	−0.022	−0.029*	−0.036**	
	[0.021]	[0.017]	[0.017]	
Firm stock return	0.011***	0.024***	0.024***	
	[0.002]	[0.007]	[0.005]	
Firm stock return × Pay redistribution index	−0.003	0.005	0.011	
	[0.005]	[0.007]	[0.009]	
Pay redistribution index	0.024**	0.018*	0.019*	
	[0.012]	[0.010]	[0.011]	
ΔIndustry market-to-book				0.375**
				[0.154]
ΔIndustry market-to-book × Capital redistribution index				−0.176**
				[0.083]
Capital redistribution index				0.051
				[0.040]
Year fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.276	0.256	0.264	0.194
N_obs	2,131	2,051	2,070	2,131

This table studies how spillovers in pay (columns 1–3) and capital (column 4) affect the link between the marginal product of each resource and its allocation inside the firm. In columns 1–3, the dependent variable is the annual percentage change in divisional managers' pay. In column 4, the dependent variable is the annual percentage change in divisions' annual capital expenditures. Variable definitions appear in Appendix A. Details on the estimation of *Pay redistribution index* and *Capital redistribution index*, as well as their summary statistics, appear in Appendix B. All regressions include year fixed effects. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

and that of the entire firm. Column 4 examines the relation between the intra-firm redistribution of capital and the sensitivity of investment to the marginal product of capital.

Table 9 shows two main results. First, the redistributions of pay weaken the link between managerial performance and compensation. The coefficients on the interaction term between the pay redistribution index and managerial performance are consistently negative across all components of managerial pay and statistically significant in two of the three specifications (columns 2–3). This reduction in the sensitivity of pay to the manager's own performance is not offset by an increase in the sensitivity of pay to total shareholder returns. The interaction term between the pay redistribution index and the firm's stock return is never statistically significant, has near-zero point estimates, and flips signs across specifications. Second, the redistributions of capital across divisions weaken the link between divisional investment and the marginal product of capital, as shown by the negative and statistically significant interaction term of the capital redistribution index and industry q in column 4.

In summary, the redistributions of capital and pay appear to loosen the link between a resource's marginal product and its allocation across divisions.

6. Economic Outcomes

This section studies the association between intra-firm spillovers and economic outcomes. Because corporate outcomes depend on a variety of correlated factors, separating out the marginal contribution of each effect is challenging. Thus, the goal of this analysis is to understand whether the spillovers in pay and investment are positively or negatively associated with firm outcomes rather than to estimate the precise magnitude of these effects or to provide causal inferences.

6.1 Empirical predictions

The evidence in the previous sections suggests that managerial pay in conglomerates is less sensitive to changes in pay in the manager's own industry, but is significantly affected by changes in pay in other industries within the boundaries of the firm. This pattern condenses the distribution of pay raises inside the firm and contributes to internal pay equity, a result that may have several possible interpretations.

On the one hand, more equitable pay raises may increase internal collaboration across divisions, encourage resource sharing, and improve managerial effort. This view, which we label the collaboration hypothesis, is consistent with models of organization design (e.g., Kogut and Zander 1992) and experimental evidence (Pfeffer and Langton 1993; Woolley et al. 2010). To promote collaboration and improve effort, a firm may design a contract under which a manager's pay is sensitive to the performance of his peers. For example, DeMarzo and Kaniel (2015) show theoretically that such contracts can be optimal and value-increasing. Under this view, compensation spillovers improve performance and value.

On the other hand, compensation spillovers may be driven by managerial influence, thus reflecting the interests of managers to a greater extent than those of shareholders. For example, if an industry factor raises one divisional manager's marginal product, other managers may lobby for a pay raise even if their productivity was unaffected, consistent with predictions of managerial rent-seeking in conglomerates (e.g., Rajan, Servaes, and Zingales 2000). This would dampen pay raises in the affected divisions (to avoid internal distortions), while also pushing up wages in the unaffected ones. This scenario is consistent with our evidence that spillovers are amplified under weaker governance and that they dampen the sensitivity of pay to performance. According to this view, which we label the managerial influence hypothesis, compensation spillovers are unlikely to improve performance and value.

6.2 Performance and value

This subsection studies whether the redistributions of managerial pay and investment funds in conglomerates are associated with three firm outcomes: performance, Tobin's q, and excess value.

Table 10 tests whether spillovers predict firm outcomes. In columns 1–3, the dependent variable is firm-level operating performance (*Profitability*), defined as the ratio of net income to assets. In columns 4–6, the dependent variable is firm-level Tobin's q, which approximates the ratio of the firm's market value to its book value.[7] In columns 7–9, the dependent variable is *Excess value*, which compares the conglomerate's valuation with that of standalone firms in the same industries. Following Berger and Ofek (1995), *Excess value* is the natural logarithm of the ratio of the conglomerate's actual value to its imputed value. A firm's actual value is the sum of the book value of debt, the liquidation value of preferred stock, and the market value of equity. A firm's imputed value is the sum of the imputed values of its segments, where each segment's imputed value is equal to the segment's book assets multiplied by the median ratio of the market-to-book ratio for standalone firms in the same industry.

The analysis of the association between the intra-firm spillovers and performance outcomes is subject to two sources of endogeneity: (i) simultaneity (reverse causality) and (ii) omitted variables. The first issue—simultaneity—arises because an empirical relation between spillovers and firm outcomes may indicate that spillovers respond to corporate outcomes rather than affect them. For example, strong or weak corporate performance may generate the spillovers. To mitigate this issue, we use predictive regressions where dependent variables are measured in the next period—that is, they *follow* the spillovers.

The second issue—omitted variables—may arise because a missing factor could drive performance outcomes while being correlated with spillovers. To mitigate this possibility, our analysis controls for the main firm characteristics that have been shown to affect performance and value of conglomerates: *Size* (logarithm of the firm's book assets), *Number of divisions, Herfindahl index of division size, Diversity in q*, and *Leverage*, which are defined in Appendix A. To reduce the possibility of an unobservable omitted variable, all regressions include firm fixed effects, which absorb the influence of all attributes that remain unchanged during our sample period. To account for the effect of business cycles and nationwide temporal variation in performance outcomes, all regressions include year fixed effects.

Table 10 shows that intra-firm redistributions of pay are associated with lower profits and firm values in the subsequent year. *Pay redistribution index* is negatively related to all of the three outcome measures: forward-looking profitability, Tobin's q, and excess value. This negative relation is uniformly consistent across all columns and statistically significant in seven of the nine columns. Based on the estimates for total pay (*Pay3*) in Table 10, a one-standard-deviation increase in *Pay redistribution index* corresponds to a subsequent decrease of 1.4% in profitability and of 5.8% in Tobin's q.

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[7] Following Kaplan and Zingales (1997), Tobin's q = market value of assets (book assets (at) + market value of common equity (csho × prcc) – common equity (ceq) – deferred taxes (txdb))/(0.9 × book value of assets (at) + 0.1 × market value of assets).

Table 10
Firm performance and value

Dependent variable	Firm profitability			Tobin's Q			Excess value		
Compensation measure	Pay1	Pay2	Pay3	Pay1	Pay2	Pay3	Pay1	Pay2	Pay3
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pay redistribution index	−0.010	−0.013**	−0.016**	−0.129**	−0.122**	−0.124**	−0.020*	−0.038*	−0.034
	[0.011]	[0.006]	[0.007]	[0.060]	[0.049]	[0.052]	[0.011]	[0.021]	[0.025]
Capital redistribution index	−0.005	−0.006	−0.007*	−0.079*	−0.093*	−0.110*	−0.007	0.023**	−0.025**
	[0.004]	[0.005]	[0.004]	[0.044]	[0.054]	[0.059]	[0.022]	[0.010]	[0.012]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.572	0.573	0.575	0.426	0.426	0.427	0.447	0.448	0.448
N_obs	548	522	531	548	522	531	548	522	531

This table studies whether intra-firm redistributions of managerial pay and investment capital predict firm performance and value. All dependent variables are measured over the year immediately following the year when intra-firm redistributions of capital and pay are measured. In columns 1–3, the dependent variable is *Firm profitability*, defined as the ratio of net income to book assets at the beginning of the year. In columns 4–6, the dependent variable is *Tobin's Q*, defined as the ratio of the market value of equity plus book value of debt to book value of assets. In columns 7–9, the dependent variable is *Excess value*, defined as the natural logarithm of the ratio of the conglomerate's actual value to its imputed value, as in Berger and Ofek (1995). We construct the redistribution indices by estimating a firm-by-firm elasticity of divisional percentage changes in managerial pay and capital investment to changes in the same industry and in the other industries of the conglomerate. *Pay redistribution index* is the average between the percentile ranking of the ΔPay elasticity to other industries and the percentile ranking of the negative ΔPay elasticity to own industry. The elasticities are calculated by estimating a firm-by-firm, five-year rolling window regression of the percentage change in the manager's pay on the average changes in the same industry and in the industries of the other divisions in the conglomerate, where industry-level pay is measured by the average CEO pay of standalone firms. *Capital redistribution index* is average between the percentile ranking of the $\Delta CapEx$ elasticity to other industries and the percentile ranking of the negative *CapEx* elasticity to own industry. The elasticities are calculated by estimating firm-by-firm regressions of the division's percentage change in capital expenditure on the average Tobin's Q changes in the same industry and in the industries of the other divisions in the conglomerate, analogously to the construction of the pay redistribution index. Additional details on the estimation of the redistribution indexes and their summary statistics appear in Appendix Table A1. Summary statistics on the measures of redistribution appear in Appendix Table A1. All regressions include year and firm fixed effects and the following set of controls variables: *Size*, *Leverage, Number of divisions, Herfindahl index of division size,* and *Diversity in Q*. Variable definitions appear in Appendix A. Standard errors [in brackets] are adjusted for heteroscedasticity and clustered by firm. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Redistributions of capital are also negatively related to future performance and value, consistent with prior work (e.g., Rajan, Servaes, and Zingales 2000; Ozbas and Scharfstein 2010). The coefficients on the capital redistribution index are uniformly negative across all columns and statistically significant in six of the nine specifications. According to the specifications that correspond to total pay, a one-standard-deviation increase in *Capital redistribution index* is followed by a 0.6% decrease in profitability and a 2.2% decline in *Excess value*. This result is consistent with the findings in Shin and Stulz (1998) that an increase in capital redistributions across divisions is associated with a steeper conglomerate discount.

In summary, the evidence supports the managerial influence view. Both types of redistributions —those of capital and pay—are important for corporate outcomes. When included jointly in the analysis, they predict declines in near-term operating performance and valuation. These distinct effects suggest that the analysis of managerial pay helps extend prior work on resource allocation in conglomerates.

6.3 Robustness

In this subsection, we test the robustness of our evidence to an alternative, model-free measure of intra-firm redistributions based on the cross-divisional dispersion in the annual changes in managerial pay and capital budgets. We also investigate an omitted variable that could explain the negative relation between compensation spillovers and firm outcomes—namely, CEO expectations about future firm performance. We infer CEO expectations from insider trades. Our conclusions persist in these robustness tests. This evidence, presented in Internet Appendix Tables 5–6, is discussed in Section 2 of the Internet Appendix.

7. Conclusion

This article studies spillovers in managerial pay in conglomerates. We find that an increase in industry pay in one division raises managerial pay in other divisions, an effect confined by the boundaries of the firm. Such spillovers are stronger when firms have more excess cash and when managers are more likely to influence its distribution. The spillovers loosen the link between managerial pay and performance.

Our paper extends the literature on the allocation of resources in conglomerates. Complementing prior work on the distribution of capital, we examine the distribution of both investment capital and managerial pay and find that both types of redistributions arise in similar firms.

Our paper also adds to the debate on the relation between managerial pay and performance outcomes in conglomerates. While some authors find a negative relation between intra-firm convergence in pay and performance outcomes in conglomerates (Silva 2015; Gartenberg and Wulf 2015), other researchers find evidence consistent with optimal contracting (Alok and Gopalan 2015).

We hope that future work will provide causal evidence in this direction. An increased focus on the interplay between human capital and investment capital can provide further insights into the inner workings of a firm.

Appendix A: Variable Definitions

Note: Entries in parentheses refer to the annual Compustat item name.

A.1 Firms

Earnings per share (EPS) = Basic EPS, including extraordinary items (epspi).

Free cash flow = Operating income before depreciation (oibdp) – total taxes (txt) – interest expense (xint) / total assets (at) at the beginning of the year.

Market-to-book = Market value of assets (book assets (at) + market value of common equity (csho $\times$ prcc) – common equity (ceq) – deferred taxes (txdb)) / (0.9 $\times$ book value of assets (at) + 0.1 $\times$ market value of assets).

Profitability = Net income (ni) / total assets (at) as of the beginning of the year.

Size = The natural logarithm of book assets (at) at the beginning of the year.

Stock return = Realized annual return on the firm's stock.

Special dividend = an indicator that equals 1 if the firm initiates a special dividend and 0 otherwise. Following Denis (1990) and DeAngelo et al. (2000), dividend distributions are classified as special if they have CRSP distribution codes of 1262 or 1272, which correspond to dividends labeled "year-end," "final," "extra," or "special."

Δ*Excess cash* = The percentage change in the residual from regressing a firm's cash ratio on a vector of control variables following the model in Bates, Kahle, and Stulz (2009), which includes cash flow, the market-to-book ratio, a foreign income dummy, net working capital (excluding cash), capital expenditure, debt, R&D expenditures, acquisitions, payout ratio, cash flow volatility, and firm size.

Diversity in q = Standard deviation of *Industry market-to-book* over all divisions of a conglomerate. *Herfindahl index of division size* = Herfindahl index based on the book assets of the division.

Leverage = Short-term debt (dlc) + long-term debt (dltt) / total assets (at) at the beginning of the year.

Number of divisions = The number of the conglomerate's business segments reported on Compustat.

A.2 Divisions

Cash flow = Annual net sales (sale) divided by book assets (at) as of the beginning of the year.

Industry market-to-book = The median market-to-book ratio across all single-segment firms in the division's industry (based on the three-digit SIC code industry classification).

Industry relatedness = An indicator based on trade flows between industries obtained from input-output data provided by the Bureau of Economic Analysis. This measure is constructed using data from the 2002 industry input-output matrix. Following Ahern and Harford (2014), we calculate the percentage of industry i's sales purchased by industry j and the percentage of industry j's inputs purchased by industry i. We define industries i and j as related if either percentage exceeds 1%. The indicator *Industry relatedness* is equal to 1 if the division is related to any other division's industry in the conglomerate and 0 otherwise.

ROA = Annual operating profit of a division (ops) divided by its book assets (at) as of the beginning of the year.

Size = The natural logarithm of the division's identifiable total assets (ias) at the beginning of the year.

A.3 Divisional Managers

Age = Manager's age in years.

Male indicator = An indicator equal to 1 if the manager is male and 0 if the manager is female.

Bachelor's degree indicator = An indicator equal to 1 if the manager has a bachelor's degree and 0 otherwise.

Master's degree indicator = An indicator equal to 1 if the manager has a master's degree and 0 otherwise.

Board member indicator = An indicator equal to 1 if the manager is an inside director and 0 otherwise.

Tenure with the company = Number of years the manager worked at the firm.

Experience outside industry = An indicator equal to 1 if the divisional manager has worked at a standalone firm or a conglomerate division operating in a different industry over the past 10 years and 0 otherwise.

Social ties to CEO = The number of connections between the divisional manager and the CEO based on nonprofits, education, and prior employment.

Social ties to other divisional managers = The average number of connections between the divisional manager and the other divisional managers of the same firm based on nonprofits, education, and prior employment.

A.4 Pay and Investment Capital

Pay1 = Annual salary and bonus.

Pay2 = Annual salary and bonus plus stock and stock option grants.

Pay3 = Total annual compensation, including salary, bonus, other annual compensation, long-term incentive payouts, and other cash payouts.

Δ*Industry pay* = The average percentage change in CEO pay of standalone firms that operate in the division's industry, defined according to the three-digit SIC code industry classification.

Δ*Industry pay in other divisions* = The average percentage change in CEO pay of standalone firms that operate in the industries of the other divisions in the conglomerate.

Δ*Other industry pay* = The average percentage change in CEO pay of standalone firms that operate in other industries outside of the standalone firm's core industry.

Idiosyncratic Δ*Industry pay* = The residual from regressing the average percentage change in CEO pay of standalone firms in each industry on the average percentage change in CEO pay of standalone firms in all other industries.

Pay redistribution index = The average between the percentile ranking of the Δ*Pay* elasticity to other industries of the conglomerate and the percentile ranking of the negative Δ*Pay* elasticity to own industry. The elasticities are calculated by estimating a firm-by-firm regression of the percentage change in the manager's pay on the average changes in the same industry and in the industries of the other divisions in the conglomerate, where industry-level pay is measured by the average CEO pay of standalone firms.

Capital redistribution index = The average between the percentile ranking of the Δ*CapEx* elasticity to other industries of the conglomerate and the percentile ranking of the negative *CapEx* elasticity to own industry. The elasticities are calculated by estimating a firm-by-firm regression of the division's percentage change in capital expenditure on the average Tobin's q changes in the same industry and in the industries of the other divisions in the conglomerate.

Heterogeneity in Δ*Pay* = The cross-divisional annual standard deviation of industry-adjusted percentage changes in pay.

Heterogeneity in Δ*Capital* = The cross-divisional annual standard deviation of industry-adjusted percentage changes in capital expenditures.

A.5 Governance

Block ownership = An indicator equal to 1 if any one institutional investor holds more than 5% of the firm's outstanding shares and 0 otherwise.

Board independence = The number of independent directors divided by the total number of directors on the board.

G-index = The Gompers, Ishii, and Metrick (2003) index of shareholder rights.

Size of compensation committee = The number of directors who serve on the compensation committee.

Compensation committee member = An indicator equal to 1 if a divisional manager serves on the compensation committee and 0 otherwise.

Compensation committee appointed under a prior CEO = An indicator equal to 1 if any members of the compensation committee were appointed under a prior CEO and 0 otherwise.

Independent compensation committee = An indicator equal to 1 if the compensation committee consists of only independent directors and 0 otherwise.

Socially independent compensation committee = An indicator equal to 1 if the compensation committee members share no social ties with the CEO or divisional managers and 0 otherwise.

Review by an external compensation adviser = An indicator equal to 1 if the firm employs an external compensation adviser and 0 otherwise.

Large compensation adviser =An indicator equal to 1 if the compensation adviser is one of the "big four" compensation advisory firms (Frederic W. Cook & Co., Towers Perrin, Mercer, and Hewitt Associates) and 0 otherwise.

Shareholder compensation proposals = An indicator equal to 1 if shareholders raised a compensation-related proposal over the last three years and 0 otherwise.

Local product fluidity = A textual analysis-based measure of competitive threats adopted from Hoberg, Phillips, and Prabhala (2014).

Net seller = An indicator equal to 1 if the number of shares sold by the CEO is greater than the number of shares bought in a given firm-year and 0 otherwise.

Sell-buy imbalance = The difference between the number of shares sold and bought by the CEO, scaled by the total number of shares traded by the CEO in a given firm-year.

Appendix B: Sample and Variables

B.1 Sample Criteria and Characteristics

This appendix describes the construction of our sample and compares the characteristics of our sample firms with those of all other industrial conglomerates in the S&P 1500 index.

B.2 Redistribution Measures

This appendix details the construction of the indexes of redistribution of pay and capital inside conglomerates. Appendix Table B2 provides summary statistics for these measures.

Table B1
Sample Construction and Characteristics

Panel A: Sample Construction

Sample	# Firms	# Divisions	# Observations
S&P 1500 industrial firms with at least two divisions	806	3,024	13,672
– Firms with non-divisional organizational structure	396	1,706	7,491
– Firms with incomplete data on all divisional managers	35	127	566
– Firms with missing pay data on divisional managers	213	656	3,484
= Final sample	**162**	**535**	**2,131**

Panel B: Comparison of Sample Characteristics

Variable	Our sample	Other S&P 1500 conglomerates	Difference	*t*-statistic
Earnings per share (EPS)	1.659	1.477	0.182	1.486
Stock return	0.067	0.055	0.012	1.144
Free cash flow	0.066	0.056	0.010	1.160
Profitability	0.048	0.043	0.005	1.285
Investment	0.042	0.044	−0.002	−0.985
Market-to-book	1.910	1.819	0.091	1.126
Size (log assets)	8.638	7.158	1.480	6.344

This table describes the construction of the main sample, which consists of industrial conglomerates in the S&P 1500 index, excluding firms with functional organizational structure and firms with missing data on divisional managers or their pay. The sample period is from January 2000 to December 2008. Panel A shows sample selection criteria and provides the number of firms screened out by each sample filter. Panel B compares the characteristics of firms in the main sample with the characteristics of all other industrial conglomerates in the S&P 1500 index that are excluded by sample filters. The values reported are time-series averages over the sample period. All variable definitions appear in the Appendix. In Panel B, statistical significance levels for the test of the difference in means are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Table B2
Indexes of Redistribution of Pay and Investment Capital

Measure of redistribution	Mean	25th percentile	Median	75th percentile	Standard deviation	Correlation with redistribution in capital
Pay1 redistribution index	0.037	−0.506	−0.005	0.464	0.842	**0.224*****
Pay2 redistribution index	0.052	−0.488	0.023	0.493	0.864	**0.247*****
Pay3 redistribution index	0.041	−0.481	0.018	0.506	0.887	**0.233*****
Capital redistribution index	0.069	−0.479	0.031	0.511	0.895	**1.000**

This table presents summary statistics and correlations for measures of intra-firm redistributions of pay and investment funds. Statistical significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

B.2.1 Pay Redistribution Index The pay redistribution index is a composite index that measures the elasticity of a divisional manager's pay to the pay of managers in his industry and in the industries of the other divisional managers in his company.

The index is calculated in two steps. First, we estimate firm-by-firm five-year rolling window regressions of the annual percentage change in the divisional manager's pay on the average annual changes in the pay of managers in the same industry and in the industries of the other divisions in the conglomerate. The industry-level measures of pay are computed by using the pay of CEOs of standalone firms that operate in one industry, defined according to the three-digit SIC code industry classification. To provide a reliable estimate of industry averages, we require that each industry contain at least five publicly-traded standalone firms with available data on executive pay that operate in the same three-digit SIC code. After we impose this requirement, the average (median) number of standalone firms in an industry-year is 15.5 (9). This step generates two elasticities per firm: (i) average same-industry pay elasticity and (ii) average other-industry pay elasticity. Note that the same-industry pay elasticity captures the manager's outside option, whereas the other-industry pay elasticity captures pay spillovers across industries in the same conglomerate.

Second, we calculate the percentile ranking of the two elasticities across all the firms in our sample. To compute *Pay redistribution index,* we use the average between the percentile ranking of the ΔPay elasticity to other industries and the percentile ranking of the negative ΔPay elasticity to own industry.

B.2.2 Capital Redistribution Index The capital redistribution index is a composite index that measures the elasticity of a division's investment capital (as measured by its capital expenditure) to the investment opportunities (as measured by Tobin's Q) in its industry and in the industries of the other divisions in the company.

Similar to the pay redistribution index,the index is calculated in two steps. First, we estimate firm-by-firm five-year rolling window regressions of the annual percentage change in the division's investment on the average annual changes in investment opportunities in the same industry and in the industries of the other divisions in the conglomerate. The industry-level measures of investment opportunities are computed by using standalone firms that operate in one industry, defined according to the three-digit SIC code industry classification. As before, this step generates two elasticities per firm: (i) average same-industry investment elasticity and (ii) average other-industry investment elasticity. Note that the same-industry investment elasticity captures the effect of the division's investment opportunity set, whereas the other-industry investment elasticity captures investment spillovers across industries in the same conglomerate.

Second, we calculate the percentile ranking of the two elasticities across all the firms in our sample. To compute the *capital redistribution index*, we use the average between the percentile ranking of the Δ*Capital expenditure* elasticity to other industries and the percentile ranking of the negative Δ*Capital expenditure* elasticity to own industry.

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