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An Empirical Assessment of Empirical Corporate Finance

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Abstract

We empirically evaluate 20 prominent contributions across a broad range of areas in the empirical corporate finance literature. We assemble the necessary data and apply a single, simple econometric method, the connected-groups approach of Abowd et al. to appraise the extent to which prevailing empirical specifications explain variation of the dependent variable, differ in composition of fit arising from various classes of independent variables, and exhibit resistance to omitted variable bias and other endogeneity problems. We assess empirical performance across a wide spectrum of areas in corporate finance and indicate varying research opportunities for empiricists and theorists.

I. Introduction, Framework for Analysis, and Overview

In this article, we empirically evaluate empirical corporate finance. Building on recent representative contributions to a broad spectrum of subfields in the empirical corporate finance literature, we assemble the necessary data and then apply to each representative regression model the "connected groups" method of Abowd, Karmarz, and Margolis (AKM) (1999). Through the construction of connected groups, this approach allows the empiricist to separately identify manager and firm fixed effects (FEs) in a way not previously possible. Using the method of AKM, we appraise and quantify the extent to which prevailing empirical specifications: i) explain variation of the dependent variable, ii) differ in composition of fit arising from various classes of independent variables, and iii) exhibit vulnerability to omitted variable bias and other endogeneity problems.

More specifically, we select two or more papers from each of 20 subfields in empirical corporate finance to serve as approximate representatives of the state of progress in that subfield. To assess progress and set a benchmark for comparison,

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we reestimate the representative specifications using our sample period, including time-fixed effects. We then build on each benchmark specification by adding firm fixed effects alone, manager fixed effects alone, and finally, by using AKM, both firm and manager fixed effects. The manager (firm) fixed effects capture time-invariant, unobserved heterogeneity in manager (firm) attributes.[1] Based on the full version with all 5 classes of explanatory variables, we decompose variation in the dependent variable into 6 components: four portions explained by each of the observed and unobserved firm and manager characteristics; time fixed effects; and the residual unexplained portion of variation.

The specific areas (and dependent variables) we consider include the following:

- Executive compensation: Pay level, wealth-performance sensitivity (known as *delta*), and the sensitivity of wealth to firm risk (*vega*, risk incentives);
- Board structure: Independence, size, and leadership structure (CEO duality);
- Corporate control: Merger target, takeover bidder, and poison pill;
- Payout policy: Propensity to pay dividends;
- Financial policy: Book and market leverage and cash balances;
- Investment policy: R&D, capital expenditure, firm focus, and firm risk; and
- Firm performance: ROA and TOBIN'S_Q.

There is no reason to expect a priori that the same classes of variables will be important across different subfields. For instance, managerial attributes are likely to be more important in executive compensation, board structure, and other aspects of governance such as corporate control proclivities and protections. In the case of executive pay, for example, beyond managerial skill and risk aversion our analysis accommodates the likelihood that heretofore unmeasured or inaccurately measured managerial attributes (e.g., social capital, psychological traits, personality, genetics, and functional experience) influence the incentive properties of managerial contract design and, accordingly, firm policy and performance. We surmise that firm features will be relatively important in explaining the various aspects of financial, investment, and payout policy. For example, cost structure, the nature of the product market, asset base, and other attributes of a firm should affect its access to capital markets, leverage, cash holdings, resources for investment, components of investment, and the ability to return cash to shareholders. Both managerial capabilities and firm characteristics are likely to matter for firm value and accounting return.

Variation explained by *observed* firm and manager characteristics represents how successful empiricists have been in explaining the dependent variable, and provides evidence on the economic content and explanatory power of theory. We find that observed manager characteristics have relatively high power to explain compensation contract design and aspects of the board and low power for investment and payout policy. Furthermore, our analysis indicates that observed firm

[1] To our knowledge, Graham, Li, and Qiu (2012) were the first to apply the connected groups method in finance. Like Graham et al. (2012), "unobserved" indicates information that is difficult to quantify or is costly or impossible to obtain and, hence, unobservable to the econometrician. The manager and firm fixed effects each capture time-invariant, unobserved heterogeneity in manager and firm attributes, respectively.

characteristics do best in explaining market leverage, cash holdings, CEO pay level, and accounting performance, and worst for takeover defenses and outcomes, some board characteristics, and firm value (TOBIN'S_Q).

The variation in dependent variable "explained" by *unobserved* manager and firm fixed effects indicates to empiricists where to look for better observable proxies for factors that theory suggests are important and suggests to theorists where to focus new attention so as to identify additional economic determinants of organizational structure, policy, or performance. Like observed managerial attributes, we find that unobserved manager attributes deliver a high proportion of explained variation in the dependent variable for compensation contract design and aspects of board structure. In contrast, unobserved firm attributes provide a high proportion of explained variation in dividend payout, antitakeover defenses, book leverage, and corporate cash holdings.

To provide a relative comparison of empirical progress versus opportunity, for each subfield we calculate both: i) the ratio of variation in the dependent variable explained by manager observables to that explained by *both* manager and firm observables, and ii) the proportion of variation "explained" by manager fixed effects to that provided by *both* manager and firm fixed effects. The former proportion indicates in relative terms where scholars have been successful in identifying and deploying manager-specific explanatory variables, versus firm-specific observables, across the subfields. The latter proportion indicates where future relative empirical and theoretical opportunity lies. We find that these two measures of relative fit, for manager characteristics versus both manager and firm characteristics, are significantly positively correlated across the 20 subfields. Supposing that scholars have been working on the "right" (manager vs. firm) observable attributes in each area, then a high correlation indicates that those same elements (unobserved manager vs. firm attributes) have not been fully exhausted/exploited and continue to have the most potential.

Finally, we assess the relevance of omitted variables for empirical designs in the various areas. Including manager and firm fixed effects significantly alters inference on primary explanatory variables in *all 20* of the representative specifications. Perhaps this is not a surprise, but it is useful to know for which standard explanatory variables inference is modified.

The primary predecessor to our analysis is Graham et al. (2012), who apply AKM to assess the importance of managerial versus firm attributes for the level of executive compensation. Coles and Li (CL) (2020) do the same for executive incentives, as measured by compensation delta and vega. To extend this prior work, we assemble new data on 17 other subfields, update the GLQ and CL data, apply AKM to all, and compare and assess sources of explanatory power, research success and opportunity, and omitted variable concerns across the 20 subfields.

Our analysis is related to at least two other research thrusts. Lemmon, Roberts, and Zender (LRZ) (2008) find that initial leverage has high power to explain the cross-sectional variation and intertemporal stability of future leverage. We comparatively assess, while *including manager fixed effects*, the power of the LRZ (2008) "back to the future" approach across all subfields. We find that the coefficients on initial leverage remain economically and statistically significant, as in LRZ (2008). Nonetheless, our results indicate that the explanatory proportion of market (book) leverage ranks surprisingly low, specifically 15th (18th) across

19 subfields. It appears that the back-to-the-future effect applies with greater empirical force to dimensions of empirical corporate finance other than capital structure.

We also provide new evidence on manager-specific "style" effects, a notion examined previously in restricted samples with conflicting results. Bertrand and Schoar (2003) use the mover dummy variable (MDV) method to separate manager and firm unobservables. MDV restricts the sample of firm-manager matches to cases in which the manager moves from one sample firm to another. Selection bias, however, potentially arises insofar as movers may be significantly different from nonmovers. Fee, Hadlock, and Pierce (2013) address this problem by using specialized samples (e.g., turnover due to CEO deaths) that are less prone to selection. Bertrand and Schoar (2003) find that manager FEs matter for some aspects of firm policy and performance, while the results in Fee, Hadlock, and Pierce (2013) cast doubt on the presence of managerial style effects.[2] In our analysis, AKM enable the use of large samples that are less likely to suffer from selection bias. We find that unobserved managerial attributes matter. The explanatory share of manager fixed effects, however, does vary substantially across the 20 subfields, from a high of 0.579 for managerial compensation delta to a low of 0.155 for firm risk.

This article contributes to the corporate finance field in several dimensions. First, we expand the empirical corporate finance literature by providing a relatively comprehensive empirical examination and comparison of overall empirical fit and sources of fit from observed independent variables across a wide set of subfields. Second, in doing so, we also gauge the role of unobserved firm and managerial heterogeneities in determining important aspects of organization design, policy, and behavior. Our empirical exploration of the economic content of the estimated manager fixed effects contributes to the growing literature on how unobservable versus observable managerial attributes affect corporate policy and performance. Third, our analysis suggests potentially productive research directions for empiricists and theorists in corporate finance. Fourth, our approach allows us to assess the extent to which omitted variables contaminate conventional empirical designs in the various subfields. Including manager and firm fixed effects significantly alters inference in a large number of instances.

II. Hypotheses and What to Expect

Our main analysis employs 5 classes of explanatory variables: observable attributes of firms, observable attributes of executives, year fixed effects, time-invariant firm fixed effects, and time-invariant manager fixed effects. Observable attributes of managers and firms can vary through time. The firm and manager fixed effects account for unobserved attributes of firms and managers that are stable through time. These attributes can be those that are imperfectly represented by included observables, but also would be characteristics that are important in models

[2]As described in Bertrand and Schoar ((2003), fn. 3), there is a branch of management research that analyzes the determinants of decision making among CEOs. The focus in that literature is on using subjective surveys, case studies, or experiments to examine outcomes, such as communication process or charisma. See Hambrick (2007).

not yet tested or understood or in theories not yet recognized, developed, or articulated. Year fixed effects capture trends in the economic environment, such as time variation in fiscal and monetary policy, regulation, trade conditions, market volatility, and technological change. Year fixed effects also can capture time variation in unobserved firm and manager characteristics. The residual accommodates what is left, such as time variation in the idiosyncratic unobserved firm and manager attributes not captured by time fixed effects, nonstationarity in the cross-sectional effect of observed attributes, and noise.

The relative explanatory power of these variables should vary across subfields. As discussed above, we expect managers and their attributes to be relatively important in explaining the structure of managerial compensation contracts, the nature of the board of directors, and perhaps corporate control activity. For instance, one would expect risk aversion, cost of effort, talent, general human capital, and firm-specific human capital to be important for the structure of managerial compensation and characteristics of the board or directors. As another example, managerial acquisitiveness, arising from either the intent to enhance shareholder wealth or instead to build empire, would affect the likelihood the firm bids for another. Managerial capabilities (or incapacity) and a tendency toward entrenchment and rent extraction would affect whether the firm is a target in a control context and whether the firm adopts antitakeover protections.

To the extent that observables are good proxies for these underlying attributes, these time-varying manager characteristics should have high explanatory power. If observed attributes are poor proxies (e.g., for risk aversion or talent), then manager fixed effects are likely to have some power, especially for attributes that are slow-moving and relatively time-invariant. This would also be the case for other attributes newly identified by theory but not yet tested and traits not yet identified or isolated by theory. For instance, managerial fixed effects accommodate the assertion that psychological traits (Grable (2000), Malmendier and Tate (2005), (2008), Chatterjee and Hambrick (2007), Hackbarth (2008), and Graham, Harvey, and Puri (2009)), personalities (Kaplan, Klebanov, and Sorensen (2008)), and functional background (Hambrick (2007)) influence firm policies and performance. Likewise, managerial fixed effects can capture social capital, interpersonal networks, charisma, ability to self-regulate, religious beliefs, and genetic makeup.[3]

On the other hand, we hypothesize that firm heterogeneity will be relatively important in explaining variation in financial, investment, and payout policy. For example, the cost structure, nature of the product market, asset base, and other attributes of the firm should affect access to capital markets, leverage, cash holdings, resources for investment, the components of investment, the ability to return cash to shareholders, firm value, and accounting return. Then, observable firm attributes and firm fixed effects will have explanatory power, with the mix being determined by the quality of the proxies, the insight and predictive power of existing theory, and the elements of theory not yet tested or developed.

[3]In this last respect, recent evidence suggests that genetic makeup has high explanatory power for job choice, satisfaction, and (poor) performance (Shane (2010)). Other evidence shows that genes affect behavior through bloodstream levels of neurotransmitters and hormones (e.g., see *Homo Admistrans*: The Biology of Business, *The Economist*, Sept. 25, 2010, pp. 99–101).

Nevertheless, it is important to note that we decline to assert that managerial characteristics are unimportant in these areas. For instance, managerial characteristics, such as risk aversion, are likely to shape decisions on leverage (e.g., Cronqvist, Makhija, and Yonker (2010)) and cash holdings, while managerial talent and skill are likely to affect firm performance.[4]

We have no strong priors on time fixed effects except that they should reflect how variation in general economic performance and volatility affect individual firm structure, policy, performance and risk. Regulation, accounting and other rules, listing requirements, fiscal policy, trade policy, and interest rates also likely affect at least some of the 20 corporate finance questions we assess. Finally, the estimated time fixed effects will contain some of the intertemporal variation that time-invariant firm and manager fixed effects do not capture.

Overall fit, or the ability of all classes of variables combined to explain the dependent variable, is also likely to vary across areas. Some aspects of empirical corporate finance are more mature and better developed empirically and/or theoretically. In contrast, the residual error will be larger in areas that are less developed and in which the unobserved attributes are highly variable through time. The study of capital structure was initiated some 60 years ago (Modigliani and Miller (1958)), while the empirical examination of the structure of managerial compensation is more recent (Jensen and Murphy (1990), following Mirrlees (1976), and Holmstrom (1979); also see Murphy (1999)). Thus, perhaps, one would expect less residual variation for leverage as opposed to the level and incentive properties (delta and vega) of executive compensation. Along these lines, Graham et al. ((2012), p. 145) note that "… it is well known that observationally equivalent individuals often earn markedly different levels of compensation." In some subfields, much remains that is unexplained.

We note that the goal of empirical research is not solely or even primarily to increase R^2 or adjusted R^2. Rather, we hope to understand the implications of the inclusion (or exclusion) of unobservable firm and managerial characteristics on empirical research across various subfields. While identifying and including both manager and firm FEs generally will increase fit, we also have a strong interest in assessing how the inclusion of fixed effects can mitigate bias arising from omitted variables. Accordingly, we compare across the various subfields whether the inclusion of firm and manager fixed effects changes coefficient estimates and statistical inference for primary explanatory variables employed in leading regression specifications. We have no prior view on which subfields suffer most from bias.

III. Estimation Methodology

We employ the connected groups method of AKM (1999). Below follows a brief description that borrows from GLQ (2012) and CL (2020). GLQ (2012), the first to deploy the connected groups approach in finance, apply AKM to executive

[4]A priori, managerial characteristics will not matter much in determining corporate policies if managers lack discretion (Hambrick (2007)). For example, manager fixed effects may matter more for investment policy than for financial policy, supposing that investment policy is more centrally located within managerial discretion and control and managers have the flexibility to determine investment policy.

pay level, while CL (2020) apply it to the incentive properties of managerial compensation contracts, specifically delta and vega.

The simplest way to include fixed effects is to create a dummy variable for each unique combination of manager and firm (i.e., for each employment spell). This "spell method" enlarges the feasible sample and addresses possible omitted variable bias, but it can only estimate the combined firm and manager effects and does not disentangle the two. This method does suggest one way forward, which is to restrict the sample to managers who have moved from one company to another. Bertrand and Schoar (2003), for example, use this approach to examine whether manager "style" (unobserved managerial heterogeneity) has the power to explain return on assets, investment, leverage, and cash holdings. Potential difficulties with this MDV approach include selection bias from restricting the sample to movers only, a small sample size arising from infrequent managerial turnover, and computational difficulties from inverting a covariate matrix with many dummy variables.

Relative to the MDV and spell approaches, the method of Abowd, Karmarz, and Margolis (1999) achieves separate "identification" of the firm and manager fixed effects and still retains a substantially larger portion of the sample. The intuition is fairly simple. Consider a manager who switches firms once during the sample period. The fixed effect for this manager can be estimated, along with the fixed effects for the two firms that employed the manager. Based on the firm fixed effects, the fixed effects for all other named executive officers (NEOs) at those two firms can also be estimated, even if they did not move. Culling all firms that never had a manager depart or arrive during the sample period leaves groups of multiple firms connected by managerial transitions.

AKM (1999) prove that such connectedness is necessary and sufficient to separately identify firm and individual fixed effects. Again, this approach restricts sample *attrition* to executive years arising from firms that employ the same group of executives for the entire sample period. At least some manager mobility is the key ingredient that allows the identification of both manager and firm fixed effects. The mobility of a manager, which is a *requirement* for the MDV approach, is sufficient but not necessary for the connected groups approach to identification. As the example illustrates, constructing a group with more than a single firm-manager match requires mobility, but only for at least a single top manager.[5] We report results based on the AKM method.

Whether or not one should employ a fixed effects model depends on the research objectives. At least two are pertinent. First, if the focus is on a specific direct effect of time-invariant variables (such as NEO gender or firm domicile) on a dependent variable, such as board structure or investment policy, then such explanatory observables would be absorbed into the fixed effects and the empirical analysis would be uninformative. Such, however, is not our purpose. Our objective, in part, is to appraise the extent to which augmented versions of the prevailing empirical specifications in 20 subfields in empirical corporate finance differ in

[5]Note that AKM estimates are not always fully incisive. When very few NEOs move in a company's history, the estimation of the fixed effects may not be as accurate because these moves could be noises (outliers) or could have happened a long time ago, capturing old information about the firm and the movers.

composition of fit arising from various classes of independent variables, specifically observed and unobserved manager and firm attributes and time fixed effects. This mode of broadly encompassing empiricism should indicate: i) the nature of the gaps in our knowledge about the determinants of the 20 dependent variables; ii) where to look for better observable proxies for factors that theory suggests are important; and iii) where to focus new theoretical attention so as to identify novel economic determinants of organizational structure, policy, or performance.

Second, we augment, with identified firm and manager fixed effects, regression models for 20 subfields. These regression models do not employ instrumental variables methods or natural experiments, so a potential concern is omitted variables. Assessing whether the estimated coefficients on observables change when including fixed effects indicates whether omitted variable bias and spurious inference are more or less important across the various subfields.

Firm and manager fixed effects represent characteristics that are not observed by the econometrician. Note that for any unobserved factor to affect the dependent variable, at least one decision maker must have at least some information on that attribute. Write the dependent variable for firm i and manager j at time t, y_{ijt}, as

$$y_{ijt} = F_{it}\hat{\beta} + M_{jt}\hat{\alpha} + \hat{\mu}_i + \hat{\theta}_j + \hat{\lambda}_t + \varepsilon_{ijt}, \tag{1}$$

where the right-hand side is comprised of observable time-varying firm characteristics ($F_{it}\hat{\beta}$), observable time-varying manager characteristics ($M_{jt}\hat{\alpha}$), firm fixed effects ($\hat{\mu}_i$), manager fixed effects ($\hat{\theta}_j$), year fixed effectsand residuals (ε_{ijt}). The hat denotes an estimate of a parameter or a vector of parameters, i indexes firms, j indexes managers, and t indexes time.[6] Predicted values $\hat{y}_{ijt}$ arise from estimated equation (1) absent the residual.

To provide a quantitative comparison of the relative economic significance of the classes of variables, we follow GLQ (2012) to decompose the *total* variation of the dependent variable into 5 estimated components and the unexplained remainder. Based on the predicted $\hat{y}_{ijt}$ from estimated equation (1), *model* R^2 can be decomposed as

[6]As GLQ (2012, p. 179, note 27) illustrate, including dummy variables for each manager and each firm and then estimating equation (1) using standard least squares, as under the MDV method, is computationally infeasible in any one of our 20 connectedness samples; the reason is that a large number of dummy variables requires substantial computer memory.

Thanks to the algorithm of Cornelissen (2008) and the efforts of numerous other Stata programmers, researchers can use the Stata command "felsdvreg" to implement the AKM method. In Stata, first load our data provided through the University of Michigan's online data repository, ICPSR (https://www.openicpsr.org/openicpsr/project/108302/version/V1/view/), and then implement the following command: felsdvreg dependent independent, i(manager_id) j(firm_id) f(firm) p(manager) m(mover) g(group) xb(xb) r(res) mnum(mnum) pobs(pobs), where the i() option is used to input the variable name of the manager ID and the j() option does the same for the firm ID. The f() and p() options define the names of new variables to be created to store the firm and manager fixed effects after estimation (i.e., the coefficients of firm and manager dummies). The xb() and res() options store the linear combinations Xb and the residual e in the equation y = Xb + e. The remaining options define the names of the new variables that store a dummy variable indicating a manager who has moved between firms, m(); a group variable indicating the groups of firms connected through these movers, g(); a variable containing the number of movers per firm, mnum(); and a variable indicating the number of observations per manager, pobs().

$$(2)\quad R^2=\frac{\operatorname{cov}\left(\hat{y}_{ijt},y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}=\frac{\operatorname{cov}\left(F_{it}\hat{\beta}+M_{jt}\hat{\alpha}+\hat{\mu}_i+\hat{\theta}_j+\hat{\lambda}_t,y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}=\frac{\operatorname{cov}\left(F_{it}\hat{\beta},y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}$$
$$+\frac{\operatorname{cov}\left(M_{jt}\hat{\alpha},y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}+\frac{\operatorname{cov}\left(\hat{\mu}_i,y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}+\frac{\operatorname{cov}\left(\hat{\theta}_j,y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}+\frac{\operatorname{cov}\left(\hat{\lambda}_t,y_{ijt}\right)}{\operatorname{var}\left(y_{ijt}\right)}.$$

The proportion of *model* variation attributable to the residual is $1R^2$.

A second comparison is based on the proportion of R^2 (explained variation) provided by each class of variable. Normalizing the components in (2) gives:

$$(3)\quad \frac{\operatorname{cov}\left(F_{it}\hat{\beta},y_{ijt}\right)}{R^2\operatorname{var}\left(y_{ijt}\right)},\frac{\operatorname{cov}\left(M_{jt}\hat{\alpha},y_{ijt}\right)}{R^2\operatorname{var}\left(y_{ijt}\right)},\frac{\operatorname{cov}\left(\hat{\mu}_i,y_{ijt}\right)}{R^2\operatorname{var}\left(y_{ijt}\right)},\frac{\operatorname{cov}\left(\hat{\theta}_j,y_{ijt}\right)}{R^2\operatorname{var}\left(y_{ijt}\right)},\text{and}\frac{\operatorname{cov}\left(\hat{\lambda}_t,y_{ijt}\right)}{R^2\operatorname{var}\left(y_{ijt}\right)}.$$

When the benchmark specification is a qualitative response model, such as logit or probit, we estimate the corresponding linear probability model to produce these fit statistics.

IV. Representative Specifications

To reduce the data requirements for our analysis and for brevity, we select at least two published contributions to the literature in each area, and then either select one model or combine the primary regression specifications motivated by those papers into one model. All else equal, we choose papers that we understand to be approximately representative of the prevailing mainstream empirical designs in that area. In addition, given the scale of our empirical undertaking, we favor specifications for which the required data are not too costly to obtain. In most areas, multiple papers meet some of these criteria, though generally no paper dominates on all dimensions. Accordingly, we make some arbitrary choices in selecting benchmark papers and specifications. It should be clear that this approach reflects pragmatism and the desire to manage data collection and other costs rather than the conclusion that one prior paper is necessarily a better product than another. Note that in some instances we supplement the set of right-hand side variables with manager and firm observables recently discovered to be pertinent for the left-hand side object of interest.

We then estimate each of the 20 models with time fixed effects only, time and manager FEs only, time and firm FEs only, and then, using the approach of AKM, with time, manager, and firm FEs. The headings in Table 1 specify the full set of 20 areas in empirical corporate finance that we examine and the corresponding papers that we select to build on and enlarge. The table (row 1) identifies the papers we emphasize, the particular specification we use as the benchmark (row 1), and the dependent variable (row 4). Again, the six broad topic areas we consider are compensation contract design, board governance, corporate control, financial

TABLE 1
Summary of Results

Table 1 summarizes all the results for an empirical assessment of empirical corporate finance. The composition of total variation in the dependent variable attributable to (6) variable classes is reported as proportions. The composition of explained variation in the dependent variable attributable to (5) variable classes is reported as percentages. T FEs, time fixed effects; M FEs, manager FEs; F FEs, firm FEs; LPM, linear probability model (vs. logit or probit); and NA, not applicable.

Contract Design (C)

	C1: DELTA	C2: VEGA	C3: COMPENSATION_LEVEL
(1) Benchmark Papers (Year/T = Table/P = Panel/ C = Column/M = Model)	Coles et al. (2006/T3/PA/C3)	Coles et al. (2006/T3/PA/C2)	Graham et al. (2012/T4/PA/C1)
(2) *N*; Adj. R^2	5,352; 0.48	5,352; 0.20	65,421; 0.49
(3) Data years	1992–2002	1992–2002	1992–2006
(4) Dependent variable	ln(CEO_DELTA)	CEO_VEGA	ln(EXECUTIVE_TOTAL_PAY)
(5) Notes	Industry year FE		
Our sample based on AKM connected groups method (data years 1993–2018)			
(6) Additional variables from	Low (2009/T7/C3) Jayaraman and Milbourn (2012/T2/C6)	Low (2009/T7/C7)	Harford and Li (2007/T4/C1) Faleye et al. (2011/T3/PB/C1)
(7) Sample size	83,670	83,670	83,670
(8) Dependent variable	NEO_DELTA	NEO_VEGA	NEO_TOTAL_PAY
(9) Adj. R^2: T FEs only	0.25	0.28	0.35
(10) Adj. R^2: M + F + T FEs	0.72	0.47	0.65
Proportion of total variation explained (rank)/Percentage of explained variation explained			
(11) Manager attributes	0.051 (3)/6.30%	0.060 (2)/9.85%	0.084 (1)/11.31%
(12) Firm attributes	0.125 (5)/15.43%	0.119 (6)/19.54%	0.138 (3)/18.57%
(13) Year FEs	0.012 (12)/1.48%	0.031 (5)/5.09%	0.101 (2)/13.59%
(14) Manager FEs	0.579 (1)/71.48%	0.361 (5)/59.28%	0.350 (6)/47.11%
(15) Firm FEs	0.043 (19)/5.31%	0.038 (20)/6.24%	0.070 (18)/9.42%
(16) Residual	0.190 (7)/NA	0.391 (3)/NA	0.257 (5)/NA
(17) M/(M + F) FE, M/(M + F) OBS	0.931 (1), 0.290 (6)	0.905 (2), 0.335 (4)	0.833 (3), 0.378 (2)
M FE&OBS/(M + F) FE&OBS)	0.789 (1)	0.728 (2)	0.676 (3)
Selected changes in inference based on including manager and firm fixed effects			
(18) Changes in inference? T FEs to T + F + M FEs	TENURE + TO 0; FIRM_RISK +/−; BOARD_IND. −/0; INST'L_HOLD'S 0/+	AGE − TO +; R&D +/0; FIRM_RISK 0/−; MTB +/−	AGE 0/+; R&D +/0
(19) Changes in inference? T + F FEs to T + F + M FEs	TENURE + TO 0; BOARD_IND. +/0; INST'L_HOLDINGS 1/0	AGE − TO +; MARKET_TO_BOOK +/−	AGE 0/+

Board Governance (B)

	B1: Board Independence	B2: Board Size	B3: Leadership Structure (Duality)
(1) Benchmark papers (Year/T = Table/P = Panel/ C = Column/M = Model)	Linck et al. (2008/T 4/C 2)	Linck et al. (2008/T 4/M 1)	Linck et al. (2008/T 4/M 3)
(2) *N*; Adj. R^2	8,840; 0.17	10,636; 0.44	3,610; 0.116
(3) Data years	1990–2004	1990–2004	1990–2004
(4) Dependent variable	BOARD_INDEPENDENCE	BOARD_SIZE	BOARD_LEADERSHIP
(5) Notes	Industry, year FE	Industry, year FE	Industry, year FE
Our sample based on AKM connected groups method (data years 1993–2018)			
(6) Additional variables from	Guest (2008/T 6/C 4)	Guest (2008/T 6/C 3)	Dey et al. (2011/T 3)
(7) Sample size	45,518	36,745	30,891
(8) Dependent variable	BOARD_INDEPENDENCE	BOARD_ SIZE	BOARD_LEADERSHIP
(9) Adj. R^2: T FEs Only	0.25	0.39	Logit = 0.08
(10) Adj. R^2: M + F + T FEs	0.74	0.80	Logit = 0.68 / LPM = 0.47
Proportion of total variation explained (rank)/Percentage of explained variation explained			
(11) Manager attributes	0.008 (7)/0.96%	0.044 (11)/5.09%	0.019 (5)/2.96%
(12) Firm attributes	0.031 (17)/3.73%	0.085 (11)/9.84%	0.055 (15)/8.57%
(13) Year FEs	0.060 (4)/7.23%	0.015 (11)/1.74%	0.020 (8)/3.12%
(14) Manager FEs	0.502 (2)/60.48%	0.445 (3)/51.50%	0.343 (8)/53.43%
(15) Firm FEs	0.229 (14)/27.59%	0.275 (13)/31.83%	0.205 (15)/31.93%
(16) Residual	0.170 (10)/NA	0.136 (16)/NA	0.358 (4)/NA
(17) M/(M + F) FE, M/(M + F) OBS	0.687 (4), 0.205 (8)	0.618 (7), 0.341 (3)	0.626 (6), 0.257 (7)
M FE&OBS/(M + F) FE&OBS	0.662 (4)	0.576 (8)	0.582 (7)
Selected changes in inference based on including manager and firm fixed effects			
(18) Changes in inference? T FEs to T + F + M FEs	MTB −/0; R&D +/0; DEBT +/−; MGR_OWN −/0; FCF+/0; TENURE −/0	DEBT +/0; R&D −/+; MGR_OWN −/0; AGE +/0	R&D 0/+; BOARD_IND. +/0; AGE +/0; RETSTD −/0
(19) Changes in inference? T + F FEs to T + F + M FEs	MTB −/0; R&D +/0; DEBT 0/−; FCF+/0	MGR_OWN +/0	R&D 0/+; BOARD_IND. +/0; AGE −/0

(continued on next page)

TABLE 1 (continued)
Summary of Results

Corporate Control (MA)

	MA1: M&A Bidder	MA2: M&A Target	MA3: Takeover Protections (Pill)
(1) Benchmark papers (Year/T = Table/P = Panel/ C = Column/M = Model)	Harford (1999/T III/C 3)	Comment and Schwert (1995/T 3/C 1)	Comment and Schwert (1995/T 3/C 3)
(2) *N*; Adj. R^2	2,857	21,869	21,871
(3) Data years	1991–1993	1977–1991	1977–1991
(4) Dependent variable	BIDDER	TARGET	POISON_PILL
(5) Notes		Year FE	Year FE
Our sample based on AKM connected groups method (data years 1993–2018)			
(6) Additional variables from	Meneghetti and Williams (2017/T2/ C5)	Meneghetti and Williams (2017/T2/C5)	Meneghetti and Williams (2017/T2/C5)
(7) Sample size	64,428	48,365	48,365
(8) Dependent variable	BIDDER	TARGET	POISON_PILL
(9) Adj. R^2: T FEs Only	Probit = 0.14	Probit = 0.09	Probit = 0.07
(10) Adj. R^2: M + F + T FEs	Probit = 0.58/LPM = 0.39	Probit = 0.63/LPM = 0.79	Probit = 0.90/LPM = 0.82
Proportion of total variation explained (rank)/Percentage of explained variation explained			
(11) Manager attributes	0.003 (19)/0.57%	0.005 (16)/1.06%	0.008 (12)/0.91%
(12) Firm attributes	0.026 (18)/4.95%	0.008 (20)/1.70%	0.018 (19)/2.05%
(13) Year FEs	0.004 (17)/0.76%	0.009 (14)/1.91%	0.007 (15)/0.80%
(14) Manager FEs	0.302 (11)/57.52%	0.289 (14)/61.36%	0.348 (7)/39.59%
(15) Firm FEs	0.190 (16)/36.19%	0.160 (17)/33.97%	0.498 (3)/57.24%
(16) Residual	0.475 (2)/NA	0.530 (1)/NA	0.123 (18)/NA
(17) M/(M + F) FE, M/(M + F) OBS M FE&OBS/(M + F) FE&OBS	0.614 (8), 0.103 (10) 0.585 (6)	0.644 (5), 0.385 (1) 0.636 (5)	0.411 (13), 0.308 (5) 0.408 (11)
Selected changes in inference based on including manager and firm fixed effects			
(18) Changes in inference? T FEs to T + F + M FEs	NONCASH_WORKING_CAP. +/0; DELTA +/0; PRICE_TO_EARNINGS +/−	POISON_PILL +/0; SALES_GROWTH 0/−; SIZE −/0	ABNORMAL_RETURN +/0; PRICE_TO_EARNINGS +/−; MARKET_TO_BOOK −/0; DEBT/EQUITY 0/+; SIZE +/−
(19) Changes in Inference? T + F FEs to T + F + M FEs	DELTA +/0	POISON_PILL +/0; SALES_GROWTH 0/−	ABNORMAL_RETURN +/0; SALES_GROWTH 0/−; PRICE_TO_EARNINGS 0/−

Financial Policy (F)

	F1: Book Leverage	F2: Market Leverage	F3: Cash Holdings
(1) Benchmark papers (Year/T = Table/P = Panel/ C = Column/M = Model)	Lemmon et al. (2008/T II/P A/C 3)	Lemmon et al. (2008/T II/P A/C 3)	Harford et al. (2008/T 3/C 1)
(2) *N*; Adj. R^2	117,914;0.30	117,300, 0.42	11,645;0.47
(3) Data years	1965–2003	1965–2003	1993–2004
(4) Dependent variable	BOOK_LEVERAGE	MARKET_LEVERAGE	CASH_HOLDINGS
(5) Notes	Year FE	Year FE	
Our sample based on AKM connected groups method (data years 1993–2018)			
(6) Additional variables from	Kayhan and Titman (2007/T2/PA)	Kayhan and Titman (2007/T2/PA)	Gao/Harford/Li (2013/T4/C2)
(7) Sample Size	73,629	73,629	63,698
(8) Dependent Variable	BOOK_LEVERAGE	MARKET_LEVERAGE	CASH_HOLDINGS
(9) Adj. R^2: T FEs Only	0.23	0.38	0.42
(10) Adj. R^2: M + F + T FEs	0.73	0.78	0.82
Proportion of total variation explained (Rank)/Percentage of explained variation explained:			
(11) Manager attributes	0.009 (8)/1.11%	0.009 (9)/1.06%	0.009 (10)/1.03%
(12) Firm attributes	0.086 (10)/10.62%	0.190 (1)/22.46%	0.151 (2)/17.36%
(13) Year FEs	0.004 (18)/0.49%	0.011 (13)/1.30%	0.021 (7)/2.41%
(14) Manager FEs	0.206 (18)/25.43%	0.201 (19)/23.76%	0.248 (15)/28.51%
(15) Firm FEs	0.505 (2)/62.35%	0.435 (6)/51.42%	0.441(4)/50.69%
(16) Residual	0.190 (8)/NA	0.153 (12)/NA	0.129 (17)/NA
(17) M/(M + F) FE, M/(M + F) OBS M FE&OBS/(M + F) FE&OBS	0.290 (19), 0.095 (11) 0.267 (18)	0.316 (17), 0.045 (20) 0.251 (20)	0.360 (16), 0.056 (17) 0.303 (16)
Selected changes in inference based on including manager and firm fixed effects			
(18) Changes in inference? T FEs to T + F + M FEs	LOG(SALES) +/0; DIVIDEND_PAYER +/0; TENURE −/0	DIVIDEND_PAYER 0/+; TENURE −/0	INST'L_OWNERSHIP +/0; R&D +/−; BOND_INDICATOR −/+; AGE 0/−
(19) Changes in inference? T + F FEs to T + F + M FEs	LOG(SALES) −/0; DIVIDEND_PAYER +/0; TENURE −/0	TANGIBILITY 0/+; TENURE −/0	BOND_INDICATOR−/+; AGE 0/−

(continued on next page)

TABLE 1 (continued)

Summary of Results

	Payout Policy (D)	Investment Policy (I)–Composition and Risk		
	D1: Dividend Payout	I1: Capital Expenditure	I2: R&D	I3: Firm Risk
(1) Benchmark papers (Year/T = Table/ P = Panel/ C = Column/ M = Model)	DeAngelo et al. (2006/T3/Row D6)	Coles et al. (2006/T3/PB/C1)	Coles et al. (2006/T3/PA/C1)	Coles et al. (2006/T9/C1)
(2) *N*; Adj. R^2	4,363, 0.36	9,422; 0.29	9,551; 0.39	9,689; 0.39
(3) Data years	1973–2002	1992–2002	1992–2002	1992–2002
(4) Dependent Variable	DIVIDEND_ PAYOUT	CAPEX	R&D	FIRM_RISK
(5) Notes	Industrial firms	Industry FE	Industry FE	Industry FE
Our sample based on AKM connected groups method (data years 1993–2018)				
(6) Additional variables from	Hoberg et al. (2014/TVI/C3)	Coles et al. (2018/T7/C2)	Faleye et al. (2011/T5/C1) Coles et al. (2018/T6/C1)	Low (2009/T4/C3)
(7) Sample size	31,980	46,103	68,924	67,846
(8) Dependent Variable	DIVIDEND_PAYOUT	CAPEX	R&D	FIRM_RISK
(9) Adj. R^2: T FEs Only	Logit = 0.37	0.07	0.28	0.46
(10) Adj. R^2: M + F + T FEs	Logit = 0.94/LPM = 0.87	0.63	0.79	0.82
Proportion of total variation explained (rank)/Percentage of explained variation explained:				
(11) Manager attributes	0.005 (17)/0.55%	0.006 (14)/0.80%	0.006 (15)/0.71%	0.012 (6)/1.37%
(12) Firm attributes	0.061 (14)/6.71%	0.080 (12)/10.67%	0.110 (8)/12.94%	0.078 (13)/8.87%
(13) Year FEs	0.005 (16)/0.55%	0.004 (19)/0.53%	0.001 (20)/0.12%	0.239 (1)/27.19%
(14) Manager FEs	0.244 (16)/26.84%	0.310 (10)/41.33%	0.295 (13)/34.71%	0.155 (20)/17.63%
(15) Firm FEs	0.594 (1)/65.35%	0.350 (12)/46.67%	0.438 (5)/51.53%	0.395 (8)/44.94%
(16) Residual	0.090 (20)/NA	0.250 (6)/NA	0.150 (12)/NA	0.121 (19)/NA
(17) M/(M + F) FE, M/(M + F) OBS M FE&OBS/(M + F) FE&OBS	0.291 (18), 0.076 (12) 0.275 (17)	0.470 (10), 0.070 (16) 0.424 (10)	0.402 (14), 0.052 (18) 0.355 (14)	0.282 (20), 0.133 (9) 0.261 (19)
Selected changes in inference based on including manager and firm fixed effects				
(18) Changes in inference? T FEs to T + F + M FEs	MTB −/+; AGE +/0	VEGA −/0; LOG(SALES) 0/+; TENURE +/0; SURPLUS_CASH −/+	VEGA +/0; DELTA −/0; BOOK_LEVERAGE −/+; AGE −/0	BOOK_LEVERAGE −/+; AGE −/0
(19) Changes in inference? T + F FEs to T + F + M FEs		VEGA +/0	TENURE 0/−	R&D 0/+

	Investment Policy – Diversification (ID)		Firm Performance (P)	
	I4: Herfindahl Index	I5: ln(SEGMENTS)	P1: Valuation Ratio (TOBIN'S_Q)	P2: Accounting Perf. (ROA)
(1) Benchmark papers (Year/T = Table/ P = Panel/C = Column/ M = Model)	Coles et al. (2006/T4/PA/C1)	Coles et al. (2006/T4/PB/C1)	Mehran (1995/T4/PA/C4)	Mehran (1995/T4/PB/C4)
(2) *N*; Adj. R^2	4,219; 0.29	4,220; 0.32	153; 0.43	153; 0.30
(3) Data years	1992–2002	1992–2002	1979–1980	1979–1980
(4) Dependent variable	HERFINDAHL_ INDEX	ln(SEGMENTS)	TOBIN'S_Q	ROA
(5) Notes	Industry FE	Industry FE	manufacturing firms	manufacturing firms
Our sample based on AKM connected groups method (data years 1993–2018)				
(6) Additional variables from	Coles et al. (2018/T7/C4)	Coles et al. (2018/T7/C3)	Knyazeva et al. (2013/T8/C1)	Knyazeva et al. (2013/T7/C1)
(7) Sample size	61,825	61,825	31,918	31,918
(8) Dependent Variable	HERFINDAHL_INDEX	ln(SEGMENTS)	TOBIN'S_Q	ROA
(9) Adj. R^2: T FEs only	0.16	0.21	0.23	0.17
(10) Adj. R^2: M + F + T FEs	0.78	0.78	0.74	0.76
Proportion of total variation explained (rank)/Percentage of explained variation explained:				
(11) Manager attributes	0.001 (20)/0.12%	0.008 (13)/0.94%	0.004 (18)/0.49%	0.010 (7)/1.20%
(12) Firm attributes	0.112 (7)/13.13%	0.100 (9)/11.72%	0.053 (16)/6.44%	0.129 (4)/15.49%
(13) Year FEs	0.030 (6)/3.52%	0.071 (3)/8.32%	0.020 (9)/2.43%	0.020 (10)/2.40%
(14) Manager FEs	0.320 (9)/37.51%	0.296 (12)/34.70%	0.390 (4)/47.39%	0.244 (17)/29.29%
(15) Firm FEs	0.390 (9)/45.72%	0.378 (10)/44.31%	0.356 (11)/43.26%	0.430 (7)/51.62%
(16) Residual	0.147 (14)/NA	0.147 (15)/NA	0.177 (9)/NA	0.166 (11)/NA
(17) M/(M + F) FE, M/(M + F) OBS M FE&OBS/(M + F) FE&OBS)	0.451 (11), 0.009 (20) 0.390 (12)	0.439 (12), 0.074 (13) 0.389 (13)	0.523 (9), 0.070 (15) 0.491 (9)	0.362 (15), 0.072 (14) 0.312 (15)
Selected changes in inference based on including manager and firm fixed effects				
(18) Changes in inference? T FEs to T + F + M FEs	VEGA −/0; SALES_GROWTH +/−; CEO_TURNOVER 0/−	VEGA +/0; DELTA −/0; SALES_GROWTH −/+; CEO_TURNOVER 0/+; TENURE +/0	DELTA +/−; %_OUTSIDE_ DIR'S. −/+; LOG(ASSETS) +/−; TENURE +/−; STD_OF_% _CHANGE_IN_ OP'G_INCOME +/−	%_OUTSIDE_DIR'S. +/0
(19) Changes in inference? T + F FEs to T + F + M FEs	VEGA +/0; DELTA 0/+; TENURE 0/−	DELTA +/0	DELTA +/−; %_OUTSIDE_DIR'S. 0/+; TENURE 0/−	%_OUTSIDE_DIR'S. +/0; TENURE 0/+

policy, payout policy, investment policy (composition and risk, firm diversification, and focus), and firm performance.

V. Assembling the Samples

We begin with all executive-year observations from Execucomp for firms with fiscal years ending from 1993 to 2018. For a firm-year, this includes up to 5 NEOs. We not only include the CEO, who is likely to have the most discretion, span of control, and effect on structure, policy, and performance, but also include the other NEOs for the reason that top management team attributes tend to predict organizational attributes better than CEO attributes alone (Hambrick (1994)). Including NEOs, to the extent they switch firms, also allows the identification of the firm and manager fixed effects in more cases. We exclude any observations without matching CRSP and Compustat North America data and, consistent with prior literature, we eliminate financial services and utility firms from the sample. Observations carry the subscript *ijt* for firm (*i*), executive (*j*), and year (*t*). The full sample to which the spell approach could apply consists of 129,294 executive-year observations. Restricting the sample to include movers only (per Bertrand and Schoar (2003)) would reduce the number of observations considerably to 14,809. AKM, which allows the identification of both firm and manager fixed effects, generates connected subsamples that aggregate to 99,683 executive-firm-year observations arising from 1,794 firms and 20,502 managers. The usable samples will be smaller for different specifications when one or more data values generally are missing in a year.

We obtain corporate governance data from RiskMetrics Governance, director data from RiskMetrics Directors, daily stock returns and prices from CRSP, executive compensation data from Execucomp, company diversification information from the Compustat Segment data, corporate bond information from Compustat Ratings data, information on institutional holdings from Thomson Reuters data, and all other financial items from Compustat Fundamentals. For data on corporate control and mergers and acquisitions, we rely on SDC Platinum. We follow Coles, Daniel, and Naveen ((2013), (2014), Appendix) in adjusting Execucomp data for reporting changes based on the 2006 implementation of FAS123R. For brevity, we provide selected variable definitions in the Appendix and selected summary statistics in Table 2. Inspection of those statistics indicates that our dependent and independent variables are characterized by sample moments similar to those reported in the prior studies on which we build.

The representative papers across the various areas differ depending on the variables employed, variable definitions, sample period, and thus sample size. In our analysis, toward the objective of a cleaner comparison across empirical questions, we use the same core sample of firms and managers over a common period. Some secondary variables, such as manager age and tenure, are often missing. To maximize sample size, for some control variables, we define dummy variables that indicate whether the variable is missing in a year (= 1, otherwise = 0), and set the variable itself equal to 0 when the indicator equals 1. This procedure follows a number of papers, including Himmelberg, Hubbard, and Palia (1999) and Byoun (2008).

TABLE 2

Selected Summary Statistics

Table 2 presents summary statistics for the full sample of the cross-sectional yearly data from 1993 to 2018. Refer to the Appendix for variable definitions. All variables are winsorized at the 1st and 99th percentile levels. The number of executive-year observations is 129,294 for the spell sample, 14,809 for the MDV sample, and 99,683 for the AKM sample.

	Mean	Median	Std. Dev.
Managerial attributes			
AGE	51	50	7.88
TENURE	10	5	10.70
FEMALE	0.06	0	0.25
CEO	0.16	0	0.36
DIRECTOR	0.27	0	0.43
MOVER	0.16	0	0.38
Coles et al. (2006) variables			
DELTA ($ MIL)	0.24	0.05	0.63
VEGA ($ MIL)	0.06	0.01	0.08
MARKET_TO_BOOK	2.00	1.36	2.55
FIRM_RISK	2.74	2.67	0.93
LOG(NET ASSETS)	7.22	7.17	1.89
R&D	0.03	0	0.11
SURPLUS_CASH	0.10	0.08	0.16
BOARD_INDEPENDENCE	71.01	72.73	16.42
INSTITUTIONAL_HOLDINGS	61.67	65.60	21.56
ROA	0.13	0.13	0.13
PPE	0.30	0.24	0.23
NET_CAPEX	0.06	0.04	0.06
LEVERAGE	0.17	0.14	0.15
CASH_COMPENSATION	0.74	0.50	1.09
STOCK RETURN	0.01	0.001	0.58
SALES_HERFINDAHL	0.80	1.00	0.28
DIVIDEND_CUT	0.27	0	0.44
Linck et al. (2008) variables			
BOARD_SIZE	9.60	9	2.79
BOARD_LEADERSHIP	0.08	0	0.25
LOG(MVE)	7.98	7.85	1.65
DEBT	0.19	0.18	0.15
FIRM_AGE	11.43	7.00	12.28
RETSTD	0.43	0.37	0.21
CEO_OWN	0.53	0.08	0.28
DIRECTOR_OWN	0.98	0.90	0.87
FCF	0.08	0.06	0.10
PERFORMANCE	0.004	0.004	0.02
Harford (1999) variables			
BIDDER	0.13	0	0.33
ABNORMAL_RETURN	0.01	0.001	0.47
NONCASH_WORKING_CAPITAL	0.01	0.002	0.11
PRICE_TO_EARNINGS	16.10	14.73	14.27
SIZE	7.42	7.35	1.61
Comment and Schwert (1995) variables			
TARGET	0.02	0	0.15
LIQUIDITY	0.10	0.03	0.10
DEBT/EQUITY	0.23	0.21	0.18
CONTROL_SHARE_LAW	0.18	0	0.35
BUSINESS_COMBINATION_LAW	0.71	1	0.46
POISON_PILL	0.63	1	0.45
Lemmon et al. (2008) variables			
INITIALBOOK_LEVERAGE	0.21	0.19	0.19
INITIAL_MARKE_ LEVERAGE	0.20	0.15	0.20
PROFITABILITY	0.14	0.14	0.12
CASH_FLOW_VOLATILITY	0.05	0.03	0.06
TANGIBILITY	0.29	0.25	0.21
DIVIDEND_PAYER	0.52	1	0.48
Harford et al. (2008) variables			
LOG(CASH_HOLDINGS)	−2.72	−2.58	1.65
GINDEX	9.02	9.00	2.68
INSIDE_OWNERSHIP	0.002	0.001	0.004
SIZE	7.40	7.39	1.51
WORKIN_ CAPITAL	0.08	0.06	0.17
CF_VOLATILITY	0.05	0.03	0.05
R&D	0.04	0	0.10
CAPEX	0.04	0.03	0.06
ACQUISITION	0.03	0	0.06
BOND_INDICATOR	0.58	1	0.49

(continued on next page)

TABLE 2 (continued)
Selected Summary Statistics

	Mean	Median	Std. Dev.
DeAngelo et al. (2006) variables			
RE/TE	0.41	0.03	0.22
TE/TA	0.58	0.42	0.63
Mehran (1995) variables			
TOBIN'S_Q	2.15	1.68	1.43
%_OF_MANAGERS' EQUITY_COMPENSATION	0.58	0.61	0.23
%_OF_SHARES_HELD_BY_ALL_OUTSIDE BLOCKHOLDERS	0.18	0	0.31
%_OF_OUTSIDE DIRECTORS	0.70	0.72	0.17
STD_ OF_%_CHANGE_IN_OPERATING_INCOME	0.44	0.34	0.36
Low (2009) variables			
SEGMENTS	1.41	1	0.98
SALEHERF	0.80	1.00	0.28
NET CAPEX	0.08	0.05	0.09
Harford and Li (2007) variables			
SALES_GROWTH	0.18	0.11	0.60
σROA	0.15	0.04	0.34
Jayaraman and Milbourn (2012) variables			
LIQUIDITY	13.09	13.23	1.46
CASH_FLOW_VOLATILITY	0.16	0.04	0.42
Guest (2008) variables			
CONCENTRATION	0.16	0.11	0.16
FCF	0.08	0.06	0.10
ROA	0.13	0.10	0.14
Kayhan and Titman (2007) variables			
FINANCIAL_DEFICIT	(31.17)	1.59	572
Meneghetti and Williams (2017) variables			
NON-CASH_WORKING_CAPITAL	(0.28)	(0.002)	1.77
Hoberg et al. (2014) variables			
LOCAL_PRODUCT_FLUIDITY	7.29	6.69	3.58
SELF_PRODUCT_FLUIDITY	19.61	15.40	15.07
ASSET_GROWTH	0.34	0.06	1.34
SALES_GROWTH	0.12	0.08	0.61
Faleye et al. (2011) variables			
MONITORING_INTENSIVE_BOARD	0.30	0	0.46
EXTERNALLY_BUSY_BOARD	0.27	0	0.16
Dey et al. (2011) variables			
CEO_#BDS	0.29	0	0.43

VI. Main Results

We have no hope in a short paper of fully explaining in detail our results for the 20 areas. Thus, in Section VI.A, we use our analysis of board independence as an example to illustrate our approach. In Section VI.B, we characterize the fit results across all subfields. For the reader interested in greater detail in a specific area, see the Supplementary Material. Section VI.C reports the implications of including the two fixed effects for the coefficient estimates on standard explanatory observables.

As a roadmap to tables and figures, note that Table 1 consolidates in one place the main evidence. Table 1 summarizes the model specifications, the antecedent papers we adopt as the benchmark, sample characteristics, overall fit, the composition of fit, and the effect of including manager fixed effects on the parameter estimates on observable firm and manager attributes. For example, Table 1 (rows 11–16) provides a comprehensive summary of fit comparisons based on both attribution to five variable classes of *explained* variation in the dependent variable, per expression (3), as well as attribution of *total* variation, including to the residual, of the dependent variable, as in expression (2). Figure 1 reports the adjusted R^2

arising from the benchmark specification and also the increment to adjusted R^2 associated with including firm and manager fixed effects. Figures 2–6 depict the components of total variation attributable to the 5 classes of variables, per (2).

FIGURE 1

Adjusted R^2

Figure 1 reports the adjusted R^2 of each of the 20 regressions based on observed firm and manager characteristics with time fixed effects only (black bars) versus regressions based on observed firm and manager characteristics and time fixed effects, firm fixed effects, and manager fixed effects. The results are sorted from left to right in terms of the *benchmark adjusted* R^2 with time fixed effects only. The additional offset (gray) bar (and label) represents the *additional adjusted* R^2 arising from the inclusion of identified (per AKM (1999)) manager and firm fixed effects. See Table 1 (rows 9–10). The sample period covers 1993–2018.

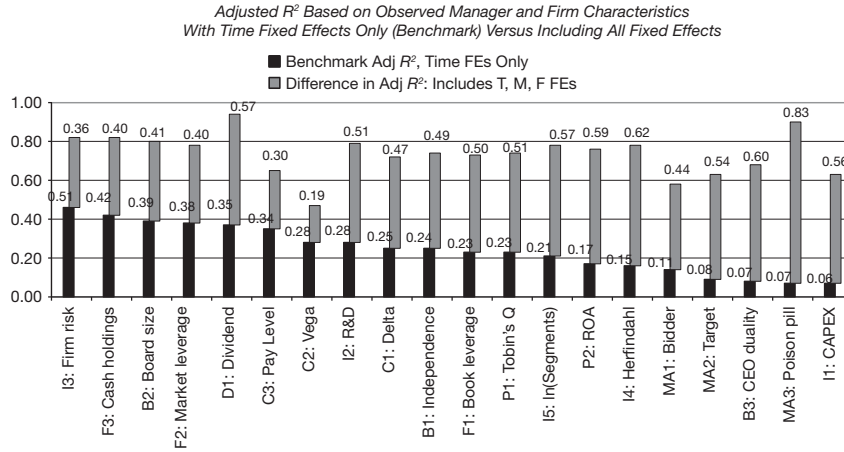
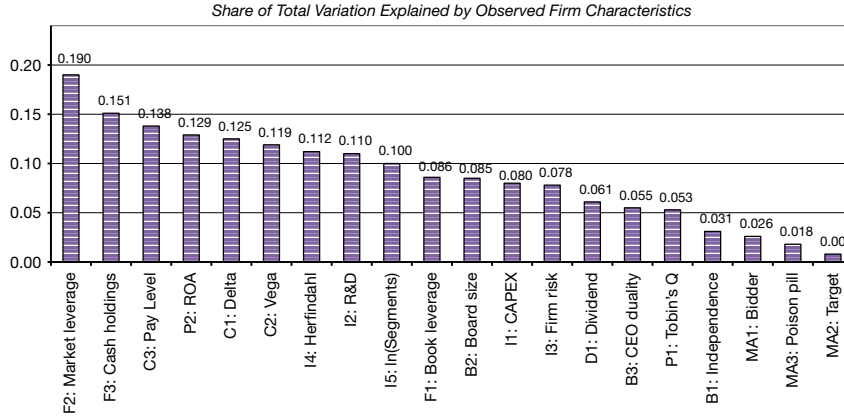


FIGURE 2

Explanatory Power of Observable Firm Characteristics

Figure 2 reports the *share of total variation* explained by *observable firm characteristics* in the regressions, estimated per AKM (1999), including the residual and all 5 classes of RHS variables: observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The results are sorted from left to right as the proportion of explained share decreases. See Table 1 (row 12). The sample period covers 1993–2018.



Readers who prefer a graphical summary can skip ahead to Figure 7, which combines the results depicted in Figures 2–6 to provide a graphical representation of the composition of fit arising from all 5 classes of variables *and* the residual.

FIGURE 3

Explanatory Power of Observable Manager Characteristics

Figure 3 reports the *share of total variation* explained by *observable manager characteristics* in the regressions, estimated per AKM (1999), including the residual and all 5 classes of RHS variables: observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The results are sorted from left to right as the proportion of explained share decreases. See Table 1 (row 11). The sample period covers 1993–2018.

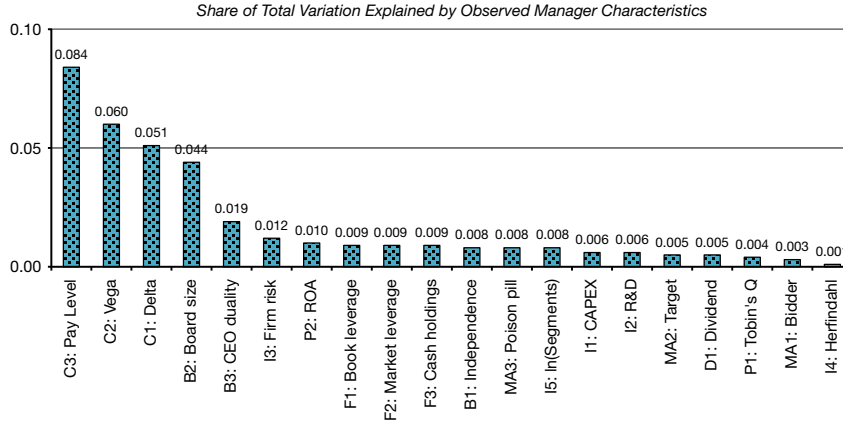


FIGURE 4

Explanatory Power of Firm Fixed Effects

Figure 4 reports the *share of total variation* explained by *unobserved firm characteristics* (i.e., firm fixed effects) in the regressions, estimated per AKM (1999), including the residual and all 5 classes of RHS variables: observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The results are sorted from left to right as the proportion of explained share decreases. See Table 1 (row 15). The sample period covers 1993–2018.

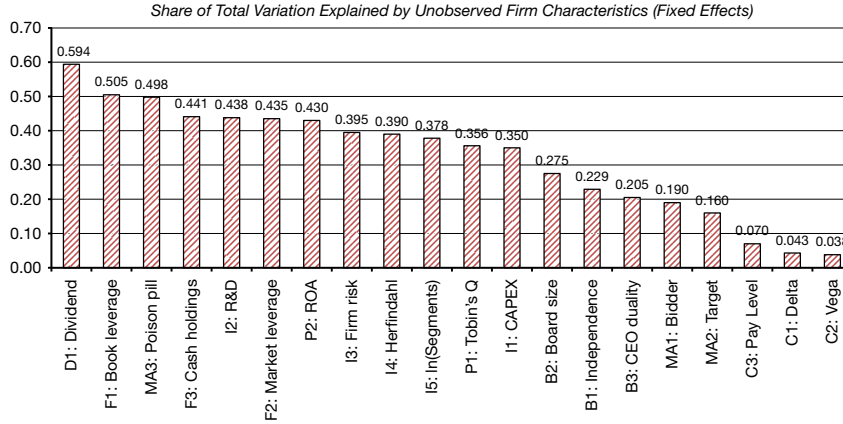


FIGURE 5

Explanatory Power of Manager Fixed Effects

Figure 5 reports the *share of total variation* explained by *unobserved manager characteristics* (i.e., manager fixed effects) in the regressions, estimated per AKM (1999), including the residual and all 5 classes of RHS variables: observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The results are sorted from left to right as the proportion of explained share decreases. See Table 1 (row 14). The sample period covers 1993–2018.

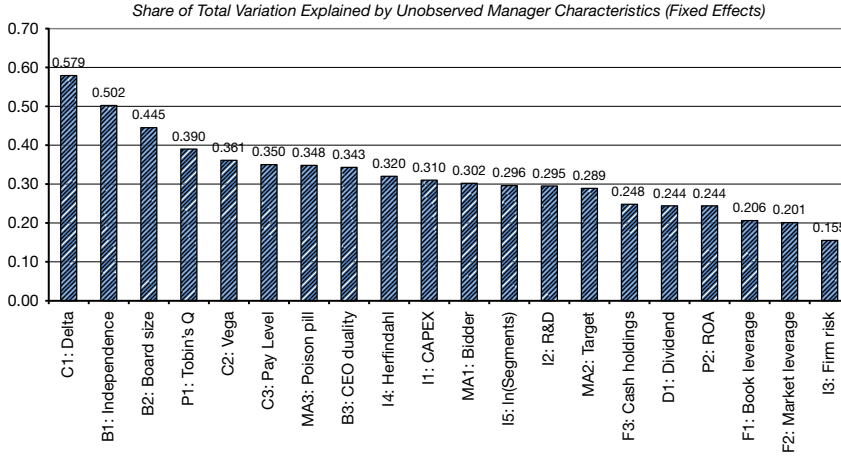


FIGURE 6

Explanatory Power of Year Fixed Effects

Figure 6 reports the *share of total variation* explained by *time fixed effects* in the regressions, estimated per AKM (1999), including the residual and all 5 classes of RHS variables: observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The results are sorted from left to right as the proportion of explained share decreases. See Table 1 (row 13). The sample period covers 1993–2018.

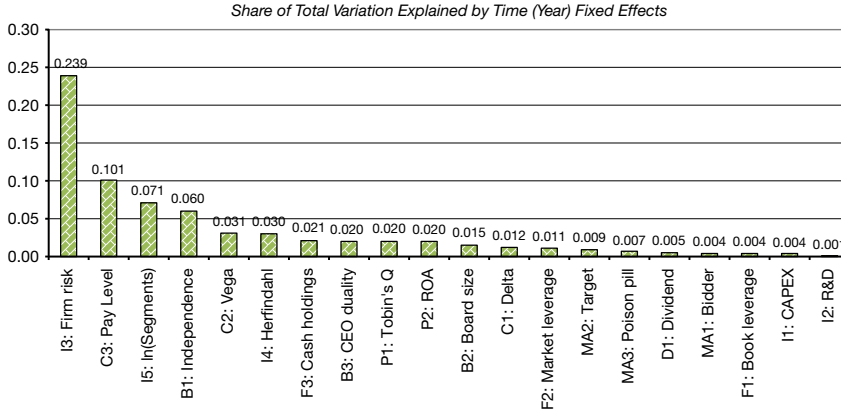
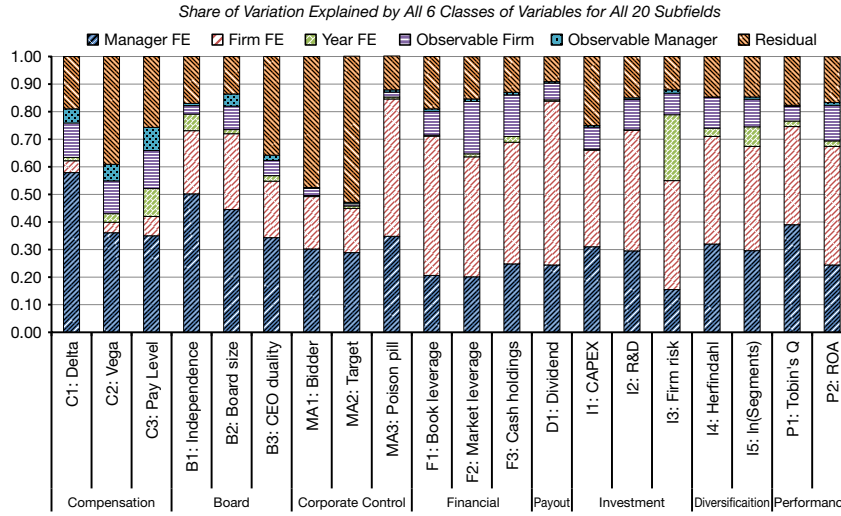


FIGURE 7

Summary: Explanatory Power

Figure 7 reports the share in total variation of the dependent variable explained by each of the 5 classes of variables and the residual. This figure captures Figures 2–6 and the portion explained by the residual. Applying the connected groups method of AKM (1999) allows the separation of firm and manager fixed effects. In addition to the residual, the 5 remaining classes of variables are observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects. The sample period covers 1993–2018. See rows 11–16 in Table 1.



A. Board Independence as an Example

Each of the 20 areas has a benchmark specification derived from prior literature. For board independence, the benchmark specification (model 1 in Panel A of Table 3) is a pooled OLS regression, without firm or manager fixed effects, which is based on the explanatory variables in Linck, Netter, and Yang ((2008), their Table 4, column 2) and Guest ((2008), his Table 6, column 4), plus selected observable managerial attributes and year fixed effects. The dependent variable is the proportion of board members who are not executive employees of the company.

The benchmark adjusted R^2 is 0.25 (model 1 in Panel A of Table 3). Adding firm fixed effects increases the adjusted R^2 to 0.70 (model 2), while adding manager fixed effects alone boosts the adjusted R^2 to 0.71 (model 3). Model 4 includes both firm and manager fixed effects to yield an increment of 0.49 to achieve an adjusted $R^2 = 0.74$.

As Panel B of Table 3 indicates (see Table 1, rows 11–15), when normalized by variation of board independence explained by the model, the 5 classes of variables (observable firm attributes, observable manager attributes, firm fixed effects, manager fixed effects, and year fixed effects) contribute 3.7%, 1.0%, 27.6%, 60.5%, and 7.2%, respectively, of model R^2. Column B1 in Figure 7 represents graphically the components of total variation in board independence, including the unexplained residual.

TABLE 3

An Illustration for One Subfield – Observable and Unobservable Determinants of Board Independence: Connectedness Sample with AKM Method

Table 3 presents the results for specifications regressing board independence on observable managerial and firm characteristics and on various combinations of fixed effects that proxy for time and for unobserved manager and firm attributes. The benchmark specification (model 1 in Panel A) is a pooled OLS regression, without firm or manager fixed effects (FE), which is based on the explanatory variables in Table 3 column 2 in Linck et al. (2008) and Table 3 column 3 in Guest (2008) plus selected observable managerial attributes. Model 2 adds firm fixed effects only to the benchmark model, Model 3 adds manager fixed effects only, and model 4 includes both firm and manager fixed effects. We include year fixed effects in all specifications. We delete observations with missing values for right-hand side (RHS) variables included in the benchmark specification, but include observations with missing values of tenure and age by using indicator variables for whether each is missing. Panel B uses the coefficient estimates in model 4 of Panel A to decompose model R^2 in order to quantify the relative importance of each class of variable in determining the portion of board independence explained. Refer to the Appendix for variable definitions. Heteroskedasticity robust *t*-statistics clustered at the firm level are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

Panel A. Dependent Variable is BOARD_INDEPENDENCE

	Dependent Variable: BOARD_INDEPENDENCE			
	Pooled OLS (No Firm or Manager FE)	Firm FE (No Manager FE)	Manager FE (No Firm FE)	Firm and Manager FE
	1	2	3	5
LOG(MVE)	0.013***	0.011***	0.008***	0.008***
	16.88	7.05	5.16	4.65
DEBT	0.028***	−0.012	−0.018**	−0.019**
	3.41	−1.38	−2.00	−2.20
LOG(SEGMENTS)	0.018***	0.011***	0.016***	0.015***
	13.42	4.94	7.23	7.61
FIRM_AGE	−0.009***	N/A	0.005***	N/A
	−13.84		2.66	
$(FIRM\_AGE)^2$	0.000***	N/A	−0.000**	N/A
	15.03		−1.96	
MTB	−0.009***	−0.003***	−0.001	−0.001
	−11.89	−4.18	−1.07	−0.65
R&D	0.103***	0.055*	−0.025	0.014
	5.07	1.79	−0.85	0.45
RETSTD	−0.048***	−0.013**	−0.027***	−0.023***
	−8.36	−2.39	−3.47	−3.80
MGR_OWN	−0.426***	0.000	0.012	−0.008
	−10.83	0.00	0.26	−0.18
DIRECTOR_OWN	0.581***	0.353***	0.364***	0.332***
	45.38	31.92	25.72	24.70
FCF	0.138***	0.025**	0.004	0.003
	9.74	2.47	0.32	0.26
CONCENTRATION	0.002	−0.037***	−0.008	−0.022**
	0.28	−4.87	−0.90	−3.64
ROA	0.092***	0.012	0.001	0.009
	5.87	0.89	0.08	0.59
LAG(BOARD_LEADERSHIP)	0.052***	0.022***	0.022***	0.017***
	23.11	10.26	9.01	8.15
AGE	0.000	0.000**	0.002***	0.002***
	0.85	2.08	2.90	2.75
TENURE	−0.001***	−0.000	−0.000	−0.000
	−2.96	1.04	−0.70	−0.14
FEMALE	−0.006	−0.001	N/A	N/A
	−1.21	−0.32		
MOVER	0.014***	0.005***	N/A	N/A
	5.45	3.10		
CEO	0.070***	0.016***	0.013***	0.011***
	21.09	7.59	3.99	3.42
DIRECTOR	−0.055***	−0.022***	−0.040***	−0.036***
	−17.48	−11.26	−11.51	−10.28
Year fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.25	0.70	0.71	0.74
N	45,518	45,518	45,518	45,518

(continued on next page)

TABLE 3 (continued)

An Illustration for One Subfield – Observable and Unobservable Determinants of Board Independence: Connectedness Sample with AKM Method

Panel B. Relative Importance of Components in Determining BOARD_INDEPENDENCE

	$\frac{\text{cov(BOARD\_INDEPENDENCE, COMPONENT)}}{\text{var(BOARD\_INDEPENDENCE)}}$	% of R^2 Attributable to the Component
Observable firm characteristics	0.031	3.73
Observable manager characteristics	0.008	0.96
Firm fixed effects	0.229	27.59
Manager fixed effects	0.502	60.48
Year fixed effects	0.060	7.23
Residual	0.170	

Manager fixed effects have the highest explanatory power. There are several potential sources of managerial influence over board structure. For example, despite the exclusion of management from the nominating committee in U.S. listed companies, the selection of directors continues to be influenced by the CEO (Shivdasani and Yermack (1999)). Consistent with the negotiation hypothesis in Hermalin and Weisbach (1998) and Baker and Gompers (2003), Boone, Field, Karpoff, and Raheja (2007) find board independence is negatively related to managerial influence. Furthermore, if managers are highly capable or influential, they will be elected to the board, potentially decreasing board independence, increasing board size, and increasing the likelihood of CEO duality (where the CEO is also the board chair). Manager fixed effects potentially capture the time-invariant portions of these factors.

Firm fixed effects are also important in determining board independence. In part, this likely reflects the assertion that board structure is determined by the scope and complexity of the firm's operations (Coles, Daniel, and Naveen (2008), and Lehn, Patro, and Zhao (2009)) and is influenced by the specific business and information environment (e.g., Raheja (2005), Harris and Raviv (2008)). Further, although board governance is often an important control system, it is clearly not the only one. Firm fixed effects likely capture some unobserved characteristics of other governance features that can supplement direct board monitoring, such as shareholder activism (Gillan and Starks (2000)), mutual monitoring among executives (Acharya, Myers, and Rajan (2011), Li (2014), (2022)), analyst coverage (Yu (2008)), and regulatory environment (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000)), among others. The regression residual potentially reflects the findings of Boone et al. (2007) that board size and independence increase as firms grow and diversify over time, effects that cannot be captured in time-invariant fixed effects.

Finally, there is at least one important change in inference on observables arising from including manager and firm FEs. The sign of the estimated coefficient on debt changes from positive to negative, suggesting that leverage[7] and board monitoring are substitutes rather than complements in governance. See Table 1 (Panel B, rows 18 and 19).

[7]Grossman and Hart (1982) suggest that, by creating a probability of bankruptcy (an event assumed to impose high costs on management), the issuance of debt induces managers to take actions that reduce the bankruptcy probability.

B. Fit and the Components of Fit for all 20 Subfields

Our analysis enables the same style of discussion for all 20 of the areas in empirical corporate finance we assess. We provide that detailed discussion in the Supplementary Material that accompanies this article. We now present a comprehensive overarching summary of the results across the 20 subfields.

To frame the results on composition of fit, we first consider overall explanatory power. In Figure 1 (also see Table 1, rows 9–10), the fit results are sorted from left to right in terms of the benchmark adjusted R^2 with time fixed effects only. The additional offset (gray) bar (and label) represents the additional adjusted R^2 arising from the inclusion of identified (per AKM (1999)) manager and firm fixed effects. Figure 1 indicates that estimated specifications without firm and manager fixed effects do poorly in explaining total variation in capital expenditure (0.07), poison pill adoption (0.07), CEO duality, and whether the firm is a takeover target, and they do best in explaining firm risk (0.46), cash holdings, market leverage, board size, and dividend payout. Including manager and firm fixed effects, along with firm and manager observables, delivers the largest increment to fit for poison pill adoption (0.83), dividend payout, CEO duality, accounting performance (ROA), and firm focus. The increment to fit from both fixed effects combined is small for pay level and surprisingly small for compensation vega (0.19). These figures reflect the extent of empirical progress using observable firm and manager attributes and potential progress based on including as-yet-unobservable manager and firm attributes.

Turning now to our hypotheses on the explanatory power of the various classes of variables, in Figures 2–6, we order the subfields from left to right as the share of total variation in the dependent variable provided by the specified class of variable in the AKM (1999) regressions declines. Table 1 (rows 11–16) also provides the fit proportions by subfield, unsorted but with ranks.

Figure 2 (Table 1, row 12) indicates that observed firm characteristics do best in explaining market leverage (0.190), cash holdings, pay level, and ROA, and worst in being a takeover target (0.008), pill adopter, takeover bidder, and in board independence. In contrast (Figure 3 and Table 1, row 11), observed manager characteristics have relatively high power to explain CEO pay level (0.084), vega, delta, and board size, and low power for firm focus (segment Herfindahl, 0.001), whether the firm is a TAKEOVER_BIDDER, TOBIN'S_Q, and DIVIDEND_PAYOUT. These proportions likely reflect the conventional wisdom of scholars engaged in research in these subfields. Also note that, in comparing Figures 2 and 3, it is clear that in prior research observed firm attributes generally tend to have higher explanatory power than observed manager attributes.

A primary innovation in this article is the joint identification and measurement of the "explanatory" power of unobserved manager and firm attributes. Figure 4 (Table 1, row 15) shows that unobserved firm attributes explain a high proportion of variation in the dependent variable for dividend payout (0.594), book leverage, poison pill adoption, and cash holdings. In contrast, unobserved firm attributes capture a low proportion of variation for compensation vega (0.038), pay delta, pay level, and whether the firm is a takeover target.

Figure 5 (Table 1, row 14) indicates that unobserved manager characteristics explain a high proportion of variation in the dependent variable for compensation delta (0.579), BOARD_INDEPENDENCE, BOARD_SIZE, and TOBIN'S_Q. In contrast, unobserved manager attributes capture a low proportion of variation for firm risk (0.155), market and book leverage, ROA, and dividend payout.

While we did not have a specific hypothesis on the relative explanatory value of time fixed effects, we find that the explanatory power of time fixed effects varies substantially across subfields. As Figure 6 shows, the explanatory share is largest for firm risk (0.238), pay level, the number of business segments, and board independence. It is very small for the other 16 subfields, with the bottom four being R&D intensity (0.001), capital expenditure, book leverage, and whether the firm bids for another. Perhaps year fixed effects best capture variation through time in market volatility, pay trends in the market for managers, trends in antitrust regulation and in views on the effectiveness of diversified conglomerates, and changing regulations and listing requirements for board composition.

Figure 7 collects the full spectrum of results on fit comparisons in one location. The results in Figure 7 are not sorted by any one component of fit; rather, the intent is to allow a visual comparison of the fit results across all 20 subfields.

As shown in Figures 2–7, the results on manager and firm FEs generally accord with the hypotheses laid out in Sections I and II. In part, these results suggest where empiricists could consider better proxies for what current theory identifies as important and where theorists could focus on creating new models to capture economic forces not contained in existing models. Financial and payout policy variables, including leverage, beg for explanation by as-yet-unobserved firm characteristics that illuminate the level and stability of those policy variables through time. In contrast, the structure of incentive alignment and monitoring mechanisms await further insight stemming from manager characteristics.

To further compare past progress to future potential empirical opportunity, we calculate for all 20 subfields the relative fit supplied by firm and manager observed and unobserved attributes (see Table 1, row 17). Figure 8 displays, sorted from high to low, the explained variation provided by *observed* manager attributes as a proportion of the fit arising from *observed* manager and firm attributes combined.[8] The proportion arising from observed managerial characteristics is largest for whether the firm is a takeover target (0.385), pay level, board size, and pay vega. It is miniscule for the segment Herfindahl index (0.009) and low for market leverage, R&D intensity, and cash holdings. Figure 9 reports the fit arising from *unobserved* manager characteristics as a proportion of explained variation provided by both manager and firm fixed effects. The proportion is highest for compensation delta (0.931), pay vega, pay level, and board independence. It is lowest, though still substantial, for firm risk (0.282), book and market leverage, and dividend payout.

Figure 8 characterizes the relative importance of observable managerial attributes compared to firm attributes in past research in the 20 subfields. Figure 9, in doing so for unobserved manager attributes versus unobserved firm attributes, indicates where future work might reasonably focus. Comparing Figures 8 and 9,

[8]Note that the calculation yields the same ratio regardless of whether explanatory shares are defined by total or explained variation of the dependent variable.

FIGURE 8

Explanatory Power: Observable Manager Versus Observable Manager and Firm Characteristics

Figure 8 reports variation explained by manager observables as a proportion of variation explained by both manager and firm observed characteristics. The results are sorted from left to right as the proportion of explained share decreases. The sample period covers 1993–2018. See Table 1 (row 17).

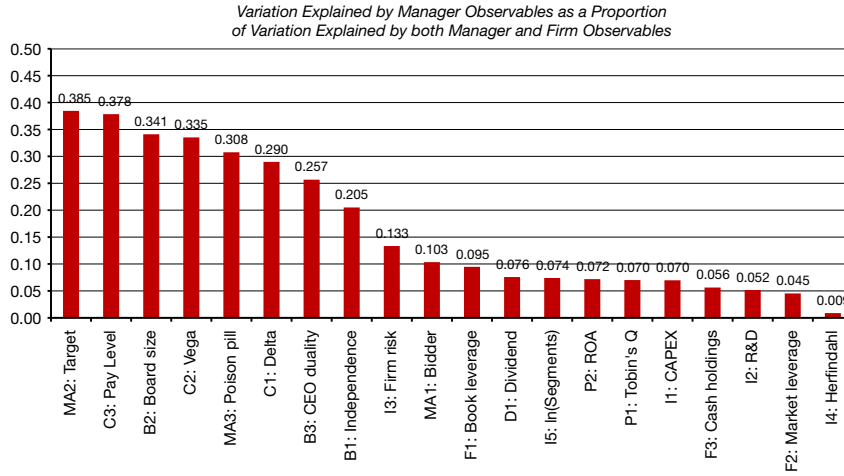
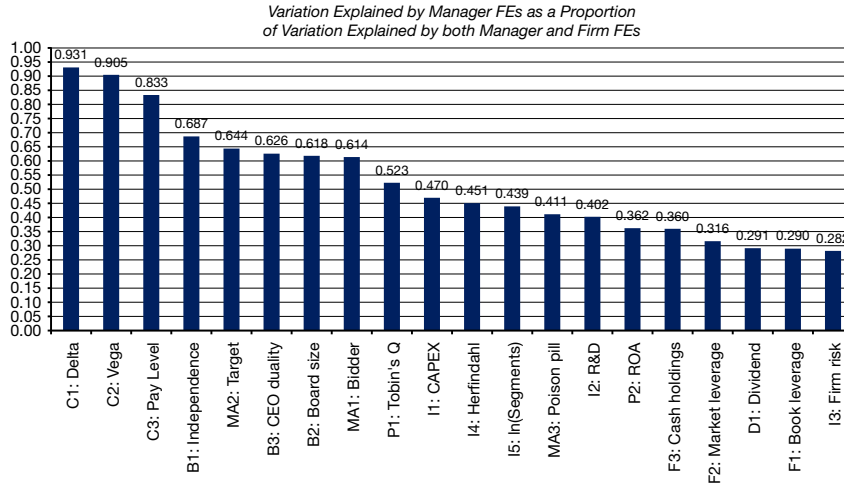


FIGURE 9

Explanatory Power: Manager Fixed Effects Versus Manager and Firm Fixed Effects

Figure 9 reports variation explained by manager fixed effects as a proportion of variation explained by both manager and firm fixed effects. The results are sorted from left to right as the proportion of explained share decreases. The sample period covers 1993–2018. See Table 1 (row 17).



in all 20 cases the proportion of fit provided by manager FEs exceeds the proportion of observable fit provided by manager observables. In general, theoretical and empirical effort potentially would concentrate on managerial characteristics and decision making.

We now assess whether this conclusion applies unequally across the subfields. It is possible for some subfields that prior research efforts oriented toward observable firm attributes have not exhausted future research opportunities along those same lines. In contrast, in other subfields, perhaps the low-hanging empirical fruit among firm attributes has already been picked and it is managerial attributes where empirical opportunity remains. For the proportions reported in Figures 8 and 9, the Pearson and Spearman correlation coefficients across the 20 categories for the fixed effect versus observable fit proportions are positive (0.724 and 0.591, respectively) and highly significant. High relative fit from observed manager attributes predicts high relative fit from unobserved manager attributes. The same holds for observed and unobserved firm characteristics. Scholars in financial economics seem to have pursued and may well continue to pursue the same most promising types of explanatory variables, in terms of firm versus manager attributes.

C. Omitted Variables and Coefficient Bias

We now assess the relevance of omitted variables and endogeneity for conventional empirical designs in the various areas. It is widely known that when unobservable manager or firm heterogeneity is correlated with observable characteristics, regression specifications that do not explicitly account for such heterogeneity can produce biased coefficient estimates (e.g., see Kennedy (2003) on omitted variables). Table 1 (rows 18 and 19) indicates that this is a concern for all 20 areas of empirical inquiry in corporate finance that we assess. Detailed results are provided in the Supplementary Material.

For example, adding manager and firm fixed effects changes the estimated coefficient when regressing managerial compensation delta on firm risk from significantly positive to significantly negative. A positive coefficient is inconsistent with standard theory, while the latter result is consistent with the standard agency model (e.g., Holmstrom (1979)). For the level of compensation, adding the FEs changes the estimate on CEO age from insignificant to significantly positive.

As another example, for firm value and governance, hundreds of papers have been written on the relation between Q and managerial ownership (one measure of delta), with varying results and conclusions (Coles, Lemmon, and Meschke (2012), fn. 3). Hundreds more papers examine the relation between firm performance and board independence, with some reporting a positive relation (Weisbach (1988), Byrd and Hickman (1992)), others reporting a negative relation (Agrawal and Knoeber (1996), Yermack (1996)), and still others reporting both (Duchin, Matsusaka, and Ozbas (2010)). For TOBIN'S_Q as the dependent variable, adding both FEs changes the estimate on delta from significantly positive to significantly negative, and vice versa for board independence. While the specification surely matters in general, our analysis provides specific instances that illustrate that omitting manager and firm characteristics matters for the reported evidence and conventional wisdom among scholars, practitioners, and regulators.

VII. Initial Values, Industry Norms, and More on Omitted Variables

A. Initial Values

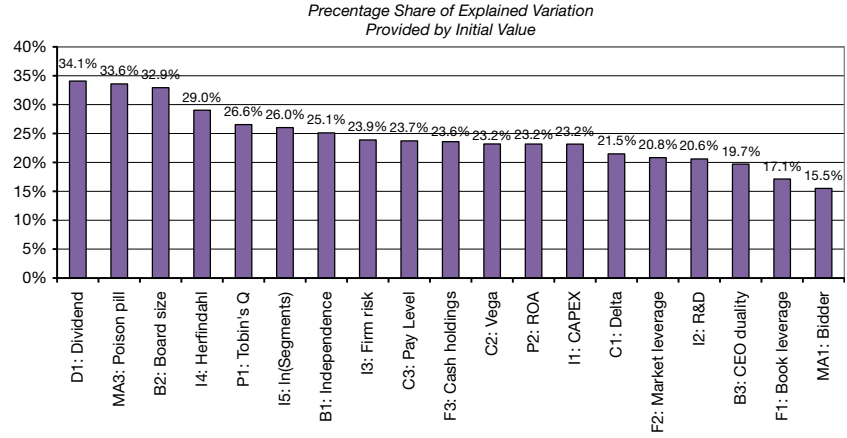
Firm fixed effects encapsulate time-invariant omitted variables that drive variation of corporate policy, structure, and behavior in the cross section. Along these lines, some portion of the dependent variable likely captures such omitted variables and can be viewed as permanent and stable through time. Accordingly, for each regression model, we now augment the 5 classes of variables with an additional variable on the right-hand side, specifically the initial observation of the dependent variable. This procedure follows the "back to the future" analysis of capital structure in Lemmon et al. (2008), which estimates the coefficient for subsequent leverage on initial leverage. For each firm, we pinpoint the first year in the sample in which the dependent variable was not missing and estimate the regression model including that initial value. Note that this empirical device captures only cross-sectional variation in the dependent variable. Obviously, this approach requires that we drop that initial year from the data for each corresponding firm. We also exclude the subfield in which the dependent variable is an indicator for whether the firm is a target, because a firm that is acquired disappears subsequently from the data. Thus, 19 subfield regression models remain.

We find that the relative importance, based on the decomposition of *explained* variation (total variation scaled by R^2), of the initial value of leverage is relatively low. As reported in Figure 10, initial market (book) leverage explains 20.8% (17.1%) of the explained variation in market (book) leverage, which is ranked 15th (18th) of 19 dependent variables. Therefore, as it turns out, the particular point

FIGURE 10

Explanatory Power of Initial Value of Dependent Variable

Figure 10 reports the *fraction of explained variation* in the dependent variable attributable to the *initial value of the dependent variable*, estimated per AKM (1999), including four classes of RHS variables (observable firm attributes, observable manager attributes, manager fixed effects, and year fixed effects, with firm fixed effects excluded). The results are sorted from left to right as the proportion of explained share decreases. The sample period covers 1993–2018, excluding the year for a firm in which the dependent variable is first not missing (the initial value).



made by Lemmon et al. (2008) about the explanatory power of the initial value of the dependent variable ("leverage" in their case) applies with even more force to numerous other dimensions of empirical corporate finance. Those dimensions include multiple aspects of investment policy, firm performance and risk, board structure, and executive compensation.

We also note that firm fixed effects continue to capture a high proportion of "explained" variation even after controlling for the initial value of the dependent variable. This arises in our data for both market and book leverage, similar to Lemmon et al. ((2008), Tables II and III), as well as in the other 17 regression specifications.

B. Industry Norms

The initial value of the dependent variable captures variation across firms of what we interpret to be the permanent effects of time-invariant omitted variables. To address omitted variables that instead change through time, we explicitly account for the explanatory power of a firm's reference group. We continue to include the other 5 categories of explanatory variables, including firm fixed effects. While firm fixed effects capture time-invariant omitted variables (and thus encompass the industry fixed effects for the many firms that do not change industry), we augment each specification to include the industry median (excluding the reference firm) of the dependent variable in each year. That is, for each firm-year, we obtain the median value of the dependent variable for all *other* firms in the same 4-digit industry. We exclude the experiments for whether the firm is a bidder or target, because the median in the industry (and in the other peer groups we use below) is always 0 for both, leaving 18 subfield regression models.

The industry norm varies across firms in the same industry only insofar as excluding reference firms causes the industry norm measure to vary across firms. The variation of the industry norm across firms is small, so this empirical approach primarily captures time-series variation. Figure 11 shows the percentage share of *explained* variation provided by the industry norm, ordered across the 18 subfield models from highest to lowest. The industry median has the highest share of explained variation for firm risk (19.4%) and cash holdings (18.2%) and the lowest share for CEO duality (9.2%) and book leverage (9.6%). Including the industry median reduces the explanatory power of firm fixed effects only slightly.

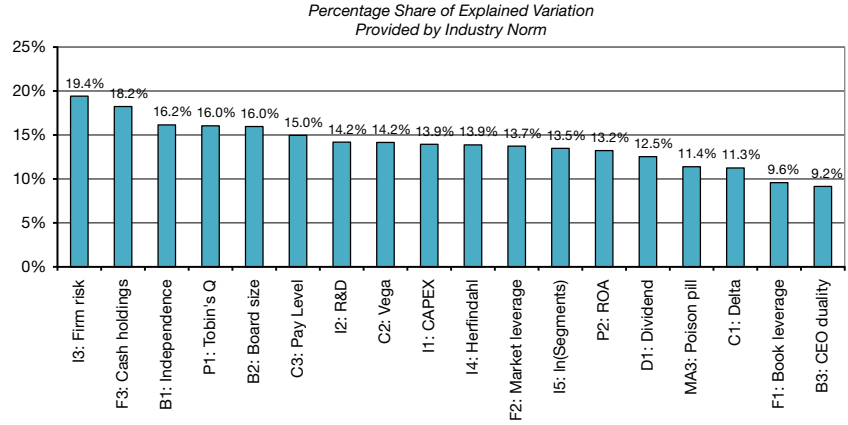
We perform the same analysis using two other peer groups: compensation peers (Lemmon et al. (2008)) and relative performance evaluation (RPE) peers (Bettis, Bizjak, Coles, and Young (2014), Bizjak, Kalpathy, Li, and Young (2020)). The results for these different norm measures are similar in terms of the level and ranking of explained share for the industry median. Again, the explanatory power of firm fixed effects is only slightly reduced.

While the initial value captures some of the variation in the cross section of firms, the industry median of the dependent variable is meant to capture industry dynamics. As it turns out, averaging across the subfields, the initial value explains almost twice as much of the variation in the dependent variable as the industry median. Compare Figures 10 and 11.

FIGURE 11

Explanatory Power of Industry Norm of Dependent Variable

Figure 11 reports the *fraction of explained variation* in the dependent variable attributable to the *industry (4-digit SIC) median of the dependent variable*, estimated per AKM (1999), including 5 classes of RHS variables (observable firm attributes, observable manager attributes, manager fixed effects, firm fixed effects, and year fixed effects). The industry norm is time-varying. The results are sorted from left to right as the proportion of explained share decreases. The sample period covers 1993–2018.



C. Time-Invariant Versus Time-Varying Omitted Variables

For all 20 subfields, the cross-sectional variation exceeds the time-series variation. The average (maximum, minimum) across the 20 experiments of the ratio of with-out to with-in variation is 2.81 (6.00, 1.57). Comparing the (cross-sectional) explanatory power of firm and manager fixed effects versus (time-series) firm and manager observables and time fixed effects, it appears that firm and manager with-out variation tends to exceed with-in variation. This conclusion is consistent with the higher share of explained variation provided by the initial value of the dependent variable versus the share provided by the industry norm (see Figure 10 vs. Figure 11). The average across the subfields of the ratio of the former share over the latter share is 1.81. The maximum of the explained share ratio is for poison pill adoption (2.95), and the minimum is for firm risk (0.84) where time-series variation in economic conditions is relatively important.

The shares of explained variation from Figures 10 and 11 are not highly correlated. The Pearson and Spearman correlation coefficients, among the proportions of explained variation explained by the initial value versus industry norm across the 18 experiments, are 0.092 and 0.266, respectively. The correlation is low because the initial value of the dependent variable captures time-invariant differences in omitted variables across firms, while the industry norm primarily captures time-series variation of omitted variables.

VIII. Additional Considerations and Discussion

A. Interaction Effects

One obvious possibility is that a low explanatory share of explained variation for observed firm and manager characteristics and poor overall fit (large residual

variation) arise from nonstationarity through time of the estimated cross-sectional coefficients on observed manager and firm characteristics. To test this notion, we reestimate each of the 20 empirical specifications including a sixth class of variable, namely the interaction of 3 or 4 of the primary observed manager and firm characteristics predicted by theory to be important, with time indicators for each year (except one case). This allows the cross-sectional parameters for each of these primary observables to vary through time.

Across all 20 cases, the class of interactive variables typically provides less than 2% of explained variation of the dependent variable. This class of variables subsumes very little of the explained variation of the other 5 classes of independent variables. The nonstationarity of the cross-sectional coefficients on observed manager and firm characteristics appears not to be a main reason for poor overall fit and the low explanatory power of observed manager and firm characteristics.

B. Matching Managers and Firms

We note that our setup does not necessarily fully eliminate problems associated with the matching (selection) problem or the possibility of dynamic rematching of NEOs to firms. In terms of sequential rematching based on predeparture performance and other characteristics of the former and new firms, all we can claim is that the results in Coles and Li (2020) on delta and vega in subsamples with exogeneous turnover are similar to those in the full connected-groups sample. This suggests that time-variant rematching/selection is not a major issue for the results on delta and vega. Whether the same conclusion extends to the other corporate finance subfields is an empirical question perhaps to be addressed in future research.

In terms of a nonsequential framework that does not encompass rematching, there are three reasons why we do not develop matching models for our analysis. First, it is possible that the bulk of the matching problem is time-invariant, in which case firm and manager fixed effects control for this type of selection. Nevertheless, it is important to fully acknowledge that if managers and firms are matched on the basis of unobserved time-variant person and firm effects, and not only observable characteristics and fixed effects, then neither our approach (AKM with identified manager and firm FEs) nor the alternative methods (MDV, spell FEs) can fully address the matching problem. Other methods to extract causation, such as instrumental variables, are required.

Second, in our case such an IV approach would require the development and estimation of a different matching model for each of the 20 experiments we examine, with each model customized to the specific economic circumstances of the applicable subfield. Successfully doing so for even one of the subfields would advance the literature in that area. We leave this to future research focused on the subfields in question. Third, the results in Coles and Li (2020) suggest the possibility that including a matching model would not materially change the empirical results that are the focus of *this* study, specifically, comparisons across the 20 subfields of the proportions of fit provided by the 5 classes of variables, overall fit, and

the effects of identifying and including manager fixed effects on the coefficients estimated for firm and manager observables.[9]

C. Explaining the Level and Components of Explanatory Power

One interpretation of the fit results in Figure 7 relies on the notion of supply and demand for economic understanding and explanatory power. Researchers invest in a research area up to the point where marginal benefit comes to be just offset by marginal cost. The benefit for an academic researcher or business practitioner to work on an empirical problem will be larger the more important the question is to effective practice and to investors, the more the empirical and related theoretical questions are seen as primary in academic finance and by journal editors, and the more prominent the question is in the media. The costs to researchers are related to the availability of data (or the costs of obtaining data), the ease of identification, the availability of computing power and computer code, and the presence or absence of compelling theoretical foundations that would guide empiricists. Changes in these factors, such as new methods, new theory, better computing, and new or lower-cost data, will shift activity within a field and across fields, thereby altering the "equilibrium" empirical landscape depicted in Figure 7.

D. Model Complexity and Overfitting in Corporate Finance

The capital structure and dividend payout literatures started in the 1950s. The youngest subfield, compensation vega, was initially developed and empirically examined starting in the early 2000s (e.g., Core and Guay (2002)). All of the subfields we assess and compare have been active for a significant amount of time. Thus, whether the well-accepted models in the literature suffer from overfitting is a concern in all 20 subfields.

We inherit the specifications we use from the literature and therefore view an empirical assessment of overfitting versus underfitting to be outside the scope of this already-long paper. While we set aside the task of evaluating the complexity of the models augmented by identified manager and firm FEs, it would be interesting in future research to assess the extent to which regression models are overfitted (or underfitted) in some areas in corporate finance versus others.

Although we do not directly test whether the models we assess are too complex or overfitted, we acknowledge the concern in several modest ways. We minimize the emphasis in the article on R^2. Unadjusted R^2 is useful for our purposes only insofar as it indicates how much of the variation in the dependent variable is due to

[9]Coles and Li (2020), in older data, explicitly control for matching. Building on Ackerberg and Botticini (2002), the first stage of the Coles and Li (2020) procedure estimates: i) firm risk as a function of proxies for managerial risk aversion, specifically executive gender and age and ii) growth opportunities in the asset base (market-to-book of assets) as a function of proxies for managerial talent, specifically tenure, age, and whether the executive serves as a director of the firm. The second stage inserts the fitted values in place of the actual values on the right-hand side of the equations that explain delta and vega. The right-hand side continues to identify firm and manager fixed effects using the connected groups approach of AKM (1999). For both delta and vega, overall fit and attribution of fit are similar to the specifications that use FEs and do not control for two-sided matching. Manager fixed effects continue to provide much of the explained variation in delta and vega, with observable firm characteristics coming in a distant second.

the residual versus the other 5 classes of right-hand side variables. When we do address the fit of the model, we focus on the increment to adjusted R^2 arising from adding manager and/or firm FEs. See Figure 1, Table 1 (rows 9 and 10), and the analogous rows in the tables in the Supplementary Material.

Adjusted R^2 does apply a penalty in the measurement of model fit to using more right-hand side variables – a penalty that is balanced against the better least squares fit arising from using more of such variables. Other approaches also apply penalties to more complex specifications, with the effect being to attenuate the coefficient estimates and also address multicollinearity (e.g., ridge regression) or to attenuate coefficient estimates or eliminate variables altogether (LASSO). Diagnostics for overfitting include checking whether there are fewer than 10 or 15 observations per independent variable and by comparing R^2 to *predicted* R^2. A side-by-side comparison of the extent to which the well-accepted models in the subfields fare in diagnosis or regularized regression approaches would be useful for researchers in empirical corporate finance.

IX. Conclusion

To empirically gauge the state of progress in empirical corporate finance and ascertain potential future research directions, we apply the connected groups approach of AKM (1999) to identify and estimate the role of observed and unobserved firm- *and* manager-specific characteristics in determining primary features of corporate governance, financial policy, payout policy, investment policy, and performance.

Measured by fit, some areas have been more successful than others. Estimated specifications without firm and manager fixed effects do poorly in explaining variation in CEO duality, corporate control variables, and capital expenditures, and best in explaining executive pay level, board size, market leverage, corporate cash holdings, and firm risk. Including both manager and firm fixed effects, along with firm and manager observables, delivers the largest increment to fit for poison pill adoption, dividend payout, CEO duality, accounting performance (ROA), and firm focus. The increment to fit from both fixed effects combined is small for pay level and surprisingly small for compensation vega. These results indicate areas with high potential for theory and empirics, particularly when fit based on observable manager and firm characteristics is poor.

Observed manager characteristics have relatively high power to explain CEO pay level, vega, delta, and board size, and minimal power for firm focus, whether the firm is a TAKEOVER_BIDDER, TOBIN'S_Q, and DIVIDEND_PAYOUT. Observed firm characteristics do best in explaining market leverage, cash holdings, pay level, and ROA, and worst in board independence and being a takeover target, pill adopter, or takeover bidder. In terms of empirical progress to date, in prior research observed firm attributes tend to have discernably higher explanatory power than observed manager attributes.

In assessing potential avenues for future progress, we find that unobserved firm attributes "explain" a high proportion of variation in the dependent variable for dividend payout, book leverage, poison pill adoption, and cash holdings. For these aspects of organizational structure and policy, a significant portion of what we now

know we do not know is related to time-invariant attributes of firms. In contrast, unobserved firm attributes capture a low proportion of variation for compensation vega, pay delta, pay level, and whether the firm is a takeover target.

A primary innovation in this article is the identification and measurement of the "explanatory" power of both unobserved manager and firm attributes. Unobserved manager characteristics explain a high proportion of variation in the dependent variable for COMPENSATION_DELTA, BOARD_INDEPENDENCE, BOARD_SIZE, and TOBIN'S_Q. In part, these results suggest where empiricists could consider better proxies for what current theory identifies as important and where theorists could focus on creating new models to capture economic forces not contained in existing models. In contrast, unobserved manager attributes capture a low proportion of variation for firm risk, market and book leverage, ROA, and dividend payout.

Finally, we assess the relevance of omitted variables and endogeneity for conventional empirical designs in the various areas. These concerns appear to be significant in all 20 of the subfields.

In one sense, this project is quite modest. We apply a single econometric approach across various empirical studies, which allows a relatively impartial comparison of progress across the different areas. In other dimensions, our research thrust is ambitious. It requires data collection for a large number of regression specifications. Using a computationally intensive method (AKM), we identify both firm and manager fixed effects. We assess empirical performance across a wide spectrum of areas and, in a broad sense, indicate varying research opportunities for empiricists and theorists across those areas.

Our intent is not to be critical of the current state of empirical corporate finance in general, or of specific contributions to the literature. Rather, our analysis suggests substantial progress in some areas of inquiry but less in others and, in some instances, indicates potential research opportunities and plausible ways forward for both theorists and empiricists. We are apologetic about not including many well-done and influential papers. Based on time and data limitations, however, we are constrained to evaluate a manageable number of areas and specifications.

Appendix. Selected Variable Definitions

The Appendix defines variables from different sources used within this article.

Managerial Attributes

AGE: Manager's age in years.

TENURE: Number of years of continuous employment with a firm.

FEMALE: A dummy variable with 1 for female and 0 for male.

CEO: A dummy variable with 1 if the executive served as the CEO of the company for all or most of the indicated fiscal year, and 0 otherwise.

DIRECTOR: A dummy variable with 1 if the executive served as a director of the company, and 0 otherwise.

MOVER: A dummy variable with 1 for managers who switched firms in the sample period and 0 for those who did not.

Coles, Daniel, and Naveen (2006)

DELTA: The dollar change in the executive's wealth for a 1% change in stock price.

VEGA: The dollar change in the executive's wealth for a 0.01 change in standard deviation of returns.

MARKET_TO_BOOK: The ratio of the market value of equity item minus the book value of equity plus the book value of assets to the book value of assets.

FIRM_RISK: The standard deviation of 1-year daily stock returns.

LOG(NET_ASSETS): The natural log of Net Assets, where Net Assets is calculated as total assets less cash and short-term investments.

R&D: Research and development expenditure scaled by assets.

SURPLUS_CASH: Amount of cash available to finance new projects, scaled by assets.

BOARD_INDEPENDENCE: The number of independent outside directors divided by board size.

INSTITUTIONAL_HOLDINGS: The percentage of a company's outstanding common shares held by institutions.

ROA: Return on assets, calculated as net income before extraordinary items and discontinued operations divided by total assets.

PPE: Investment in property, plant, and equipment scaled by assets.

NET_CAPEX: Capital expenditure net of sales of property, plant, and equipment, scaled by assets.

LEVERAGE: Book debt divided by book assets (i.e., book leverage).

CASH_COMPENSATION: The sum of a manager's salary and bonus.

STOCK_RETURN: The stock return over the fiscal year.

SALES_HERFINDAHL: The sum of the square of segment sales divided by the square of firm sales.

DIVIDEND_CUT: A dummy variable with 1 if there is a reduction in annual dividend, and 0 otherwise.

CEO_TURNOVER: A dummy variable with 1 if the CEO was replaced, and 0 otherwise.

Linck et al. (2008)

BOARD_SIZE: The number of directors on the board.

BOARD_LEADERSHIP: A dummy variable with 1 if the CEO is also the Chairperson of the Board, and 0 otherwise, which is also referred to as combined leadership or CEO duality.

LOG(MVE): The logarithm of market value of equity.

DEBT: Total long-term debt over total assets.

LOG(SEGMENTS): The logarithm of the number of business segments.

FIRM_AGE: The number of years since the firm first appeared on CRSP.

MTB: The market-to-book ratio of equity.

R&D: R&D expenses over total assets.

RETSTD: The standard deviation of the monthly stock return over the fiscal year immediately in the preceding fiscal year.

MGR_OWN: The percentage of shares held by the manager.

DIRECTOR_OWN: The average percentage of a firm's shares held by nonexecutive directors.

FCF: Free cash flow (operating income before depreciation minus total income taxes, change in deferred taxes, interest expense, preferred dividends, and dividends on common stock) scaled by total assets.

Harford (1999)

ABNORMAL_RETURN: The daily market-model abnormal return averaged over years $t - 4$ through $t - 1$.

BIDDER: Takes the value of 1 if the firm announces a bid in year t, and 0 otherwise.

CASH: Cash holdings plus short-term investments, scaled by sales.

SALES_GROWTH: The average sales growth over years $t - 4$ through $t - 1$.

NONCASH_WORKING_CAPITAL: Net working capital (current assets–current liabilities) minus cash and cash equivalents, normalized by total assets and averaged over years $t - 4$ through $t - 1$.

LEVERAGE: The ratio of book value of debt to market value of equity, averaged over years $t - 4$ to through $t - 1$.

MARKET_TO_BOOK: The ratio of market value of equity to book value of equity, averaged over years $t - 4$ through $t - 1$.

PRICE_TO_EARNINGS: The stock price divided by earnings per share, averaged over years $t - 4$ through $t - 1$.

SIZE: The natural logarithm of total assets.

Comment and Schwert (1995)

ABNORMAL_RETURN: The daily market-model abnormal return averaged over years $t - 4$ through $t - 1$.

TARGET: Equals 1 if the firm is announced to be a target of a successful tender offer, merger proposal, or merger agreement in year t, and 0 otherwise.

SALES_GROWTH: The average sales growth over years $t - 4$ through $t - 1$.

LIQUIDITY: The ratio of net liquid assets to total assets, averaged over years $t - 4$ through $t - 1$.

DEBT/EQUITY: The ratio of debt to equity, averaged over years $t - 4$ to through $t - 1$.

CONTROL_SHARE_LAW: A dummy variable with 1 if the control share law is effective for the state in which the company is incorporated, and 0 otherwise.

BUSINESS_COMBINATION_LAW: A dummy variable with 1 if the business combination law is effective for the state in which the company is incorporated, and 0 otherwise.

POISON_PILL: A dummy variable equal to 1 if the firm has a shareholder rights plan in effect, and 0 otherwise.

Lemmon et al. (2008)

BOOK_LEVERAGE: Total debt scaled by book assets.

MARKET_LEVERAGE: Total debt scaled by the sum of total debt and market equity.

INITIAL_BOOK_LEVERAGE: The first nonmissing value for book leverage in Compustat.

INITIAL_MARKET_LEVERAGE: The first nonmissing value for market leverage in Compustat.

PROFITABILITY: Operating income before depreciation scaled by book assets.

CASH_FLOW_VOLATILITY: The standard deviation of historical operating income, requiring at least 3 years of data.

TANGIBILITY: Investment in property, plant, and equipment (PPE) scaled by book assets.

DIVIDEND_PAYER: A dummy variable with 1 if the firm pays out dividend in the fiscal year, and 0 otherwise.

Harford, Mansi, and Maxwell (2008)

LOG(CASH_HOLDINGS): The natural log of the cash/sales ratio.

GINDEX: The Gompers, Ishii, and Metrick (2003) antitakeover index.

INSIDE_OWNERSHIP: The equity ownership of the top 5 officers.

PAY_SENSITIVITY: Managerial delta.

INSTITUTIONAL_OWNERSHIP: The percentage of intuitional equity holdings.

SIZE: The natural log of total assets.

LEVERAGE: The ratio of total debt (short- and long-term debt) to assets.

CASH_FLOW: Earnings after interest, dividend, and taxes, but before depreciation, divided by assets.

WORKING_CAPITAL: The ratio of current assets net of cash minus current liabilities divided by assets.

CF_VOLATILITY: The standard deviation of cash flows for the past 5 years.

R&D: The ratio of research and development to sales.

CAPEX: The ratio of capital expenditures to net assets.

ACQUISITION: The ratio of acquisition to sales.

BOND_INDICATOR: A dummy variable with 1 if the firm has long-term S&P rating, and 0 otherwise.

DeAngelo, DeAngelo, and Stulz (2006)

DIVIDEND_PAYOUT: A dummy variable with 1 if the firm pays out dividend in the fiscal year, and 0 otherwise.

RE/TE: The ratio of earned equity (retained earnings) to total common equity.

TE/TA: The ratio of total common equity to total assets.

Mehran (1995)

TOBIN'S_Q: The ratio of the market value of the firm's securities to the replacement cost of its tangible assets.

ROA: The ratio of net income to the book value of the firm's total assets.

%_OF_MANAGERS' EQUITY_COMPENSATION: The ratio of the sum of the value of awards from grants of new stock options, restricted stocks, phantom stocks, and performance shares to total compensation.

%_OF_SHARES_HELD_BY_ALL_OUTSIDE BLOCKHOLDERS: The sum of the percentages of equity held by individual investors, institutional investors, and corporations who own at least 5% of the common stock of the company.

%_OF_OUTSIDE DIRECTORS: The percentage of outside board directors who are neither top executives, retired executives, or former executives of the company nor relatives of the CEO.

STD_OF_%_CHANGE_IN_OPERATING_INCOME: Measured with annual data in the proceeding 5 years.

Low (2009)

LN(SEGMENTS): The natural logarithm of the number of business segments as reported in the Compustat segment database.

SALES_HERFINDAHL: The Herfindahl index of the segment sales.

NET_CAPEX: The ratio of capital expenditures net of sales of property, plant, and equipment, scaled by book assets.

Harford and Li (2007)

SALES_GROWTH: The difference in log sales from year $t - 1$ to t.

σROA: The standard deviation of ROA, computed over the prior 5 years.

Jayaraman and Milbourn (2012)

LIQUIDITY: The log of the ratio of total shares traded annually divided by shares outstanding.

CASH_FLOW_VOLATILITY: The standard deviation of CFO, computed over the prior 5 years.

Knyazeva, Knyazeva, and Masulis (2013)

TANGIBLE_ASSET_INTENSITY: The ratio of property, plants, and equipment to total assets.

Kayhan and Titman (2007)

FINANCIAL_DEFICIT: The sum of investments, dividends, and changes in working capital, net of net cash flow.

Gao, Harford, and Li (2013)

ACQUISITION: Acquisition expenditures scaled by total assets.

Meneghetti and Williams (2017)

NONCASH_WORKING_CAPITAL: Noncash working capital, (ACT-CHE-LCT)/AT.

Hoberg, Phillips, and Prabhala (2014)

LOCAL_PRODUCT_FLUIDITY: Measure of the competitive threats faced by a firm in its product market that captures changes in rival firms' products relative to the firm.

SELF_PRODUCT_FLUIDITY: One minus the cosine similarity between firm *i*'s year *t* product description and its year $t - 1$ product.

HHI: Sales Herfindahl index based on TNIC.

ASSET_GROWTH: The percentage growth in assets from year $t - 1$ to year *t*.

SALES_GROWTH: The log sales growth of the firm itself from year $t - 3$ to year *t*.

Coles, Li, and Wang (2018)

INDUSTRY_GAP: The pay gap between the second-highest-paid CEO's total compensation within the same Fama–French 30-industry classification and the CEO's total compensation.

FIRM_GAP: The pay gap between the CEO's total compensation and the median VP total compensation.

R&D: R&D expenditures divided by total assets, = 0 if "not material" or missing.

Faleye, Hoitash, and Hoitash (2011)

MONITORING_BOARD: Equals 1 when a majority of independent directors are monitoring-intensive, and 0 otherwise.

BUSY_BOARD: Equals 1 when a majority of independent directors serve on three or more corporate boards.

Guest (2008)

CONCENTRATION: The sum of all the squared market sales shares, where market share for each firm is firm sales divided by total sales for the industry.

FCF: Cash holdings divided by total assets.

ROA: The ratio of operating profit before depreciation and provisions divided by total assets.

Dey, Engel, and Liu (2011)

CEO_#BDS: The logarithm of the number of corporate boards the CEO serves on.

Supplementary Material

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