Agency Costs of Idiosyncratic Volatility, Corporate Governance, and Investment

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Abstract

This paper identifies a fundamental conflict of interest between managers and shareholders in risk taking decisions and explores its implications for the relation between external governance mechanisms, corporate investment, and value. Using a dynamic panel GMM estimator to address endogeneity, we show that antitakeover provisions (ATPs) lead to more conservative investment decisions, including relatively less investment in R&D, more investment in PPE, and more diversifying acquisitions, and that these effects are concentrated among high idiosyncratic volatility firms - i.e., firms with agency costs of idiosyncratic risk. In addition, we find that ATPs lead to large drops in firm value, and that this negative valuation effect of ATPs is also concentrated among high idiosyncratic volatility firms - i.e., the firms for which ATP-induced conservatism is more pronounced. These results suggest that ATPs lead to excess managerial conservatism. Thus, by curbing managers' tendency to avoid value-enhancing risks, corporate governance reforms can create value for shareholders.

1 Introduction

Does corporate governance create value for shareholders? A recent empirical literature, starting with Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2004), establishes a connection between firm value and measures of external governance - i.e., indices of antitakeover provisions (ATPs) that measure managers' exposure to the market for corporate control.[1] However, the question of how governance and value are related remains wide open. In particular, we know little about the precise channels through which external governance mechanisms matter for firm value. In an attempt to make progress on this front, we identify a fundamental conflict of interest between managers and shareholders in risk taking decisions and explore its implications for the relation between external governance mechanisms, corporate investment, and value.

There are two main reasons why managerial risk taking decisions are a potentially important channel through which ATPs matter for shareholders. First, risky investments such as R&D are a critical input to innovation and firm growth in modern economies. Thus, inefficiencies stemming from these decisions can have a large impact on firm value. Second, agency theory suggests a systematic relation between ATPs and managerial risk taking. This relation should be negative if managers who are relatively under-diversified (Amihud and Lev (1981)) and want to protect their private benefits (Jensen (1986)) opt to pass up value enhancing risky projects. In this case, by increasing managerial discretion, ATPs result in more positive net present value risky projects to be foregone. However, a positive relation could also emerge if ATPs reduce managers' downside risk (likelihood of hostile threats, forced turnover), which in turn facilitates risk-shifting to debtholders (Jensen and Meckling (1976)). While theory makes ambiguous predictions, there is no direct empirical evidence that ATPs destroy value by exacerbating risk-related agency

[1] See Manne (1965), Scharfstein (1988) for theoretical formulations of this classical "agency" view, and Bates, Becher, and Lemmon (2007) for recent evidence from the takeover market.

problems. This paper fills that gap and documents a robust link between ATPs and managerial risk taking in corporate investment decisions.

The focus of our study on managerial risk taking decisions in corporate investment enables us to employ a novel empirical strategy aimed at identifying the impact of ATPs on corporate investment and value. Our identification strategy consists of two main parts. First, we use basic theory principles from CAPM to gain identification of the risk taking channel. In particular, we exploit a direct prediction of CAPM theory (see Craine (1988), and, for a related discussion, Milgrom and Roberts (1992, Ch.13) and Guay (1999)): the only risk that matters for relatively well-diversified shareholders is the extent to which their firms stock returns co-vary with the market - i.e., the firms' market β. However, managers are relatively under-diversified (due to either specificity of their human capital or incentive-related equity ownership; Amihud and Lev (1981) emphasize that managers are under-diversified). Thus, not only covariance, but also total firm risk (variance) matters for managers. This simple reasoning suggests that risk-related agency conflicts are likely to be more severe when the wedge between the variance of firm returns and their covariance with the market is larger. We observe that this is the case when firm-specific (idiosyncratic) volatility is higher. The fundamental conflict of interest that arises from this difference in risk preferences between managers and shareholders leads to what we define as the agency cost of idiosyncratic volatility.

The second part of our empirical strategy recognizes that, although useful to identify our specific risk taking channel, our idea of using CAPM is not sufficient to identify the causal impact of ATPs on firm investment and value. In order to address the concern that investment, firm value (investment opportunities), and ATPs may be jointly determined, we use a dynamic panel "system" GMM approach to estimate dynamic capital expenditures, R&D, and valuation

(Tobin's Q) regressions.[2] Our estimation procedure treats all the explanatory variables – the entire set of ATPs and control variables – as potentially endogenous, based on important recent studies that emphasize the endogeneity of governance mechanisms (see Coles, Lemmon, and Meschke (2006), and Lehn, Patro, and Zhao (2006); the evidence in Anderson, Bates, Bizjak, and Lemmon (2000) is particularly relevant to our paper, as they show that governance structures are sensitive to firm risk profiles). Further, we use a firm's history as valid instrument for its current ATPs by exploiting the key insight of the optimal governance literature that firm's historical performance and characteristics ought to be correlated with current governance variables.

Our GMM approach enables us to derive estimates of the effect of ATPs on corporate investment and value while controlling for the feedback effect of corporate investment and value on ATPs - i.e., within an empirical setting that controls for unobserved heterogeneity, simultaneity, and reverse causality. Finally, the specification of our dynamic capital expenditures and R&D regressions includes only variables whose coefficients have a clear structural interpretation with respect to the original optimization problem (the "Euler condition" of the standard q-theory of investment with quadratic adjustment costs). The advantage of this approach is that it controls for expectations and isolates the effect of ATPs on investment decisions over and above standard determinants of efficient investment (Bond and Van Reenen (2007) survey the literature).

Our results show that ATPs lead to more conservative investment decisions, including relatively less investment in R&D and more investment in PPE, and that these effects are concentrated among high idiosyncratic volatility firms - i.e., firms that have agency costs of idiosyncratic volatility. Using a sample of 960 acquisitions from 1990 to 2006, we also offer evidence that diversifying acquisition decisions display an analogous pattern. These results show that ATPs lead

[2]This approach was developed by Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), and Blundell and Bond (1998), and is similar to recent paper in the literature on financial constraints and investment (see, for example, Bond and Meghir (2004) and Brown, Fazzari, and Petersen (2008)).

to managerial conservatism. However, they leave open the question of whether entrenched managers take too few risks in their investment decisions or unentrenched managers take too many risks. In other words, as Tirole (2003, p.307) puts it, do managers take too many risks when their jobs are endangered or are they too conservative when their jobs are relatively secure?

Our dynamic valuation (Tobin's Q) regressions address this important question. We find that ATPs lead to large drops in firm value, and that this negative valuation effect of ATPs is concentrated among high idiosyncratic volatility firms - i.e., the firms for which ATP-induced conservatism is more pronounced. These results suggest that ATPs lead to excess managerial conservatism. Thus, by curbing managers' tendency to avoid value-enhancing risks, corporate governance reforms can create value for shareholders.

Our study makes three main contributions. Our paper is the first, of which we are aware, to identify the agency cost of firm-specific risk and to document that ATPs destroy value by exacerbating risk-related agency problems in corporate investment. Thus, we identify a clear and important channel (risk taking) and a specific mechanism (corporate investment) through which takeover defenses matter for shareholders. Our evidence shows that ATPs exacerbate shareholder-manager agency costs by allowing managers to make inefficiently conservative investments without facing a serious threat of losing corporate control. This offers strong support to the agency-based interpretation of the negative relation between ATPs and firm value provided by Gompers, Ishii, and Metrick (2003) and subsequent literature.[3] Our direct evidence complements recent work by Masulis, Wang, and Xie (2006), who also study the market for corporate control, but focus on corporate acquisitions.

Our study also provides a novel perspective over the finding in the literature that firm

[3] Other studies of the governance-performance linkage are Bertrand and Mullainathan (2004) and Fahlenbrach (2004) (executive compensation), Garvey and Hanka (1999) (firm leverage), and GIM, BCF, Core, Guay, and Rusticus (2004), Bebchuk and Cohen (2005) and Cremers and Nair (2003) (long term stock performance).

valuation and ATPs are weakly linked. In fact, the focus of previous studies on estimating the effect of governance on performance across a large variety of firms may have contributed to the mixed results. By allowing the valuation effect of ATPs to vary across firms with different levels of idiosyncratic risk, we obtain much sharper estimates of the cost of ATPs for shareholders. Our evidence strongly suggests the need for researchers to control for firm-specific volatility in their study of the consequences of governance for shareholder value, since a failure to do so may lead to significantly underestimate the valuation effects of governance.

Second, we contribute to the classical literature on agency problems and corporate diversification (see, for example, Denis, Denis, and Sarin (1997), May (1995), Anderson, Bates, Bizjak, and Lemmon (2000)) by establishing that the market for corporate control provides managers strong incentives to take value enhancing risks, and in particular profitable investment. Our results are complementary to the earlier literature, which has traditionally focused on managerial stock ownership and other incentive features of managerial compensation contracts (see Coles, Daniel, and Naveen (2006) and references therein). A well-known issue with using managerial equity holdings to proxy for agency problems is that higher stock ownership can have both an incentive and an entrenchment effect (Mørck, Shleifer, and Vishny (1988)). Moreover, higher ownership also makes managers less diversified, thus introducing potentially confounding effects. In this sense, the market for corporate control offers evidence on managerial entrenchment that is less likely to be subject to these offsetting effects.

Our findings are also of importance to the debate on the role of the market for corporate control in providing incentives for managers to make long-term risky investments. Stein (1988) challenges the standard agency view and develops a model where takeover threats actually end up curtailing managerial incentives to take risks. Our findings fail to support this view and offer strong support for the alternative agency view that takeover impediments may reduce managerial incentives to engage in risky value-enhancing investments. Our results are consistent with the event-study evidence in Meulbroek, Mitchell, Mulherin, Netter, and Poulsen (1990).

Third, we contribute a novel identification approach to the literature that seeks to understand the consequences of agency problems for corporate investment and firm performance (see Stein (2003) for a survey). While the earlier literature finds a negative - although not always monotonic - relation between proxies for managerial entrenchment and firm value (see Mørck, Shleifer, and Vishny (1988) and McConnell and Servaes (1990) for insider ownership; Coles, Daniel, and Naveen (2008) and Yermack (1996) for board size; and Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2004) for ATPs), which is suggestive of agency costs of entrenchment for shareholders, it leaves open the notoriously thorny issue of the identification of managerial motives. Bertrand and Mullainathan (2003) and Garvey and Hanka (1999) attack the issue by exploiting the passage of state anti-takeover laws as a potentially exogenous source of variation and use a difference in difference approach. Coles, Lemmon, and Meshke (2006) and Coles, Lemmon, and Wang (2008) adopt a structural econometric approach, model-based calibration, which is related to the model-based estimation by Whited (1992), Hennessy (2004), and Hennessy and Whited (2007). Our findings of a significant role for agency problems in the distribution of investment are consistent with Bertrand and Mullainathan (2003). Moreover, our study complements other structural approaches by providing a direct estimate of the impact of agency problems on investment and value without the need to impose a priori parametric assumptions on the behavior of firms.

The organization of the paper is as follows. Section II presents the empirical specification and describes our estimation method. Data and sample summary statistics are presented in Section III. The main empirical results are presented in Sections IV and V. Section VI concludes.

2 Empirical Specification and Estimation

In order to implement empirical tests our risk-taking channel we need to estimate the impact of external governance mechanisms (ATPs) on firm investment policies and value. We consider three types of investment policies (investment in PPE (capital expenditures), R&D, and diversifying acquisitions) and one standard measure of value, Tobin's Q. An important concern that needs to be addressed is that external governance mechanisms are endogenous (see Coles, Lemmon, and Meschke (2006), and Lehn, Patro, and Zhao (2006)) or, in other words, that investment, firm value, and ATPs may be jointly determined. Due to the endogeneity of ATPs, simple regression analysis would lead to incorrect inferences and we need to address the potential bias due to the correlation between ATPs, investment, and value over time. In this section, we start with a brief discussion of our main hypotheses and then detail our empirical identification and estimation strategy.

Hypotheses A well-documented stylized fact in the industrial organization literature on innovation (see, for example, Hall, Griliches, and Hausman (1986), and Cohen (1995) for a survey), is that firms face substantial uncertainty over the outcome of their R&D expenditures. Moreover, several recent papers emphasize that R&D expenditures tend to be associated with higher firm-specific risk (see Comin and Philippon (2005) and Bartram, Brown, and Stulz (2008) who offer cross-country evidence that lagged R&D expenditures are among the most economically important determinants of idiosyncratic volatility). Thus, R&D expenditures are high risk investments compared to capital expenditures on property, plant, and equipment, and conservative managers may reallocate investment dollars away from R&D toward capital expenditures in order to avoid risk (Coles, Daniel, and Naveen (2006) make a similar point).

Another investment avenue through which a conservative manager could reduce risk is by increasing the level of firm diversification, that is by engaging in diversifying acquisitions. Managerial risk aversion as a motive for diversification is suggested in Amihud and Lev (1981), and May (1995). To the extent that we can construct measures of diversification that would allow us to capture expected decreases in firm risk (see data section for details), we expect that managerial conservatism should be associated with higher levels of diversification.

Based on these arguments, we expect that ATPs would lead to lower investment in R&D expenditures, higher investment in capital expenditures, and increased diversification. However, in order to gain identification of our risk-taking channel, our approach is to ask *when* ATPs lead to conservatism in investment decisions. We use basic theory principles from CAPM to obtain finer predictions of the risk taking channel. In particular, we exploit a direct prediction of CAPM theory (see Craine (1988), and, for a related discussion, Milgrom and Roberts (1992, Ch.13) and Guay (1999)): the only risk that matters for relatively well-diversified shareholders is the extent to which their firms stock returns co-vary with the market - i.e., the firms' market β. However, managers are relatively under-diversified (due to either specificity of their human capital or incentive-related equity ownership; Amihud and Lev (1981) emphasize that managers are under-diversified). Thus, not only covariance, but also total firm risk (variance) matters for managers. This simple reasoning suggests that risk-related agency conflicts are likely to be more severe when the wedge between the variance of firm returns and their covariance with the market is larger. We observe that this is the case when firm-specific (idiosyncratic) volatility is higher. The fundamental conflict of interest that arises from this difference in risk preferences between managers and shareholders leads to what we define as the agency cost of idiosyncratic volatility.

In summary, our primary hypotheses are that ATPs should lead to lower investment in R&D expenditures, higher investment in capital expenditures, and increased diversification, and that these effects should be concentrated among high idiosyncratic risk firms. Finally, to the extent that managerial conservatism is excessive - i.e., to the extent that it is a manifestation of agency problems - we would expect a negative impact of ATPs on firm value, particularly among high idiosyncratic risk firms.

Specification In order to take endogeneity seriously, we need to specify an empirical model that can deal with both static (due to omitted fixed effects) and dynamic (due to autoregressive relation in ATPs, investment, and value through time) correlation. To this end, we use the dynamic panel "system" GMM approach developed by Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), and Blundell and Bond (1998) and estimate dynamic capital expenditures, R&D, and valuation (Tobin's Q) regressions.[4] Our estimation procedure treats all the explanatory variables – the entire set of ATPs and control variables – as potentially endogenous and uses a firm's history as valid instrument for its current ATPs by exploiting the key insight of the optimal governance literature that firm's historical performance and characteristics ought to be correlated with current governance variables. This dynamic GMM approach enables us to derive estimates of the effect of ATPs on corporate investment and value while controlling for the feedback effect of corporate investment and value on ATPs - i.e., within an empirical setting that controls for unobserved heterogeneity, simultaneity, and reverse causality.

We consider the following dynamic specification:

$$y_{i,t} = \sum_{k=0}^{K_y} \alpha_k^{\sigma} y_{i,t-k-1} + \sum_{k=0}^{K_{ATP}} \beta_k^{\sigma} ATP_{i,t-k} + \sum_{k=0}^{K_X} \gamma_k^{\sigma} X_{i,t-k} + \eta_i + \xi_t + \varepsilon_{i,t} \tag{1}$$

where y is investment in PPE, R&D, and firm value (Tobin's Q), ATP is a firm-level index of

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antitakeover provisions, our key explanatory variable, and X is a set of controls. The subscripts i and t denote the firm and the year, respectively, and superscript σ denotes idiosyncratic volatility. We split our sample into two sub-samples, based on whether firms have relatively high or low idiosyncratic volatility (above or below median). Thus, letting $\sigma = H$ denote high idiosyncratic volatility firms and $\sigma = L$ denote low idiosyncratic volatility firms, we effectively estimate (1) separately in each of the two sub-samples. By including the lagged dependent variable in our specification, we can control for the dynamic correlation between ATPs and the dependent variable - i.e., lagged correlations due to the autoregressive relation between ATPs and investment or value. We also control for time-specific effects, ξ_t, and firm-specific effects, η_i, which eliminate any potential bias that may arise from unobserved heterogeneity.

Our specification allows for all slope coefficients to vary with idiosyncratic volatility, thus allowing for the effect of ATPs to be heterogeneous across firms. Our null hypothesis is that the difference between the (slope) coefficients on ATPs between the two sub-samples equals zero - i.e., $\beta_k^H = \beta_k^L$. Finally, an additional important feature of this specification is worth emphasizing. It is straightforward to show that our specification is equivalent to a dynamic vector autoregressive system of simultaneous equations where all the variables (y, ATP, X) are treated as potentially endogenous and are specified as linear functions of own lags, the other variables, and the lags of the other variables (see Appendix for a formal derivation). Thus, our approach controls for both simultaneity and reverse causality.

We estimate equation (1) in differences using the GMM estimator developed by Arellano and Bond (1991). This estimator uses (levels) of the explanatory variables lagged two years and further as instruments for the current changes of the explanatory variables. That is, we use historical values of investment or firm value, ATPs, and other firm-level variables as instruments for current changes in these variables. The firm's history provides intuitive instruments which are likely to be valid since: first, past performance and past realizations of other firm-specific variables are likely to be correlated with current governance, based on optimal governance theories (see, for example, Coles, Lemmon, and Meschke (2006)) and several empirical studies (see, for example, Gompers, Ishii, and Metrick (2003) and Lehn, Patro, and Zhao (2006)); second, although our variables are persistent, lags likely capture the influence of the firm's past on the present and insure that the firm's far history (beyond a certain number of lags) can be considered exogenous with respect to current shocks. Technically, for our GMM estimates to be consistent, we need the following orthogonality conditions to hold: $E(y_{i,t-k}\varepsilon_{i,t}) = E(ATP_{i,t-k}\varepsilon_{i,t}) = E(X_{i,t-k}\varepsilon_{i,t}) = 0$, $\forall k > p$. An important feature of our approach is that we can test the validity of our instruments by using the conventional test of overidentifying restrictions proposed by Sargan (1958).

There is one last important concern with our specification that needs to be addressed: ATPs vary significantly across firms but are quite stable over time for any given firm (1,049 out of 2,302 firms in our sample display the same value of ATPs for all years in the sample). In other words, the bulk (more than 87 per cent) of the variation in ATPs is cross-sectional, whereas the explanatory power of time dummies is less than 1 per cent. Thus, by including firm fixed-effect or taking first differences, we are losing most of the variation in the data, which may exacerbate the bias due to measurement errors in variables by decreasing the signal-to-noise ratio (see Griliches and Hausman, 1986). The fact that ATPs are very persistent is also likely to give rise to a weak-instrument problem.[5] Therefore, an econometric technique that exploits the cross-sectional variation in ATPs would be preferable in order to improve the precision of the estimated coefficients.

[5] Statistically, Alonso-Borrego and Arellano (1996) and Blundell and Bond (1998) show that in the case of persistent explanatory variables, lagged levels of these variables are weak instruments for the regression equation in differences. This influences the asymptotic and small-sample performance of the difference estimator. Asymptotically, the variance of the coefficients rises. In small samples, Monte Carlo experiments show that the weakness of the instruments can produce biased coefficients.

To address this issue and, thus, reduce the potential biases and imprecision associated with the difference estimator, we estimate (1) using a method that combines in a system the regression in differences with the regression in levels (Arellano and Bover (1995) and Blundell and Bond (1998); see Appendix for details). Analogously to the regression in differences, we use historical values of variables as instruments (lagged differences as instruments for the corresponding variable levels). These additional instruments are valid if there is no correlation between lagged differences of the explanatory variables and firm-specific effects - i.e., although the specific effect may be correlated with the explanatory variables, the correlation is supposed to be constant over time. This assumption is plausible if the firm-specific effects proxy for factors such as managerial ability. An important feature of our approach is that we can also test the validity of these additional instruments by using the difference Sargan test proposed by Blundell and Bond (1998).

In summary, we employ the system GMM estimator to generate consistent and efficient parameter estimates of equation (1). Moreover, by splitting our sample into two sub-samples based on whether firms have relatively high or low idiosyncratic volatility, we can test whether the effect of ATPs is heterogeneous across firms with high vs. low idiosyncratic volatility, and, thus, identify our risk-taking channel.

Estimation We estimate equation (1) using the system GMM procedure developed by Blundell and Bond (1998) for dynamic panel models with lagged dependent variables. We treat all right-hand side variables as potentially endogenous and use lagged variables dated t-3 and t-4 as instruments. The standard errors are corrected for the well-known downward bias in small samples (e.g., Arellano and Bond (1991) and Windmeijer (2005)). Moreover, the standard errors are robust to heteroskedasticity and any arbitrary pattern of within-firm serial correlation (Petersen (2006)). The instruments must be lagged at least three periods if the error term follows a firm-specific MA(1) process (see Bond and Van Reenen (2007)).

The consistency of the GMM estimator depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments. To address these issues we use three specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The first test examines the hypothesis that the error term ε_{it} is not serially correlated. We test whether the differenced error term is second-order serially correlated (by construction, the differenced error term is probably first-order serially correlated even if the original error term is not). The second is a Sargan test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. Failure to reject the null hypotheses of both tests gives support to our model. The third test is the Difference Sargan test that evaluates the validity of the additional orthogonality condition in the system GMM.

3 Sample and Data Construction

Our main data on firm-level governance, idiosyncratic volatility of returns, and firm policies and valuation is drawn from the Investor Responsibility Research Center (IRRC) database, the Center for Research in Security Prices (CRSP), and Compustat. We collect these data, combine them into our dataset, and complement them with a variety of additional firm characteristics, which we use as controls. This section provides details on the dataset and on the construction of our variables. Additional details on definition and sources for all variables are in Appendix A.

Our main dataset consists of all firms with governance information from the Investor Responsibility Research Center (IRRC) database between 1990 and 2006. We exclude firms in financial (SIC 6000-6999) and regulated (SIC 4900-4999) industries and firms with dual-class status. We combine governance data from IRRC with firm characteristics, such as our idiosyncratic volatility, Tobin's Q, and size. Idiosyncratic volatility is measured using daily returns from CRSP. Firm value, policy, and control variables are calculated from Compustat. This leaves us with a total of 18,125 firm-year observations. For all variables, we remove outliers by winsorizing the extreme observations in the one-percent left or right tail of the distribution.

3.1 Governance Measures

We experiment with a variety of firm governance indices which have been employed in the empirical literature on takeover threats as a source of external governance. Thus, our proxies of external governance aim at measuring the extent to which a firm is protected against a takeover. We use three firm-specific proxies, which are all based on information from IRRC for the years 1990 to 2006. These IRRC data are assembled and reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, 2006). As is standard in the literature, we assume that the index remains unchanged for the years in which IRRC does not report scores.[6]

Our first governance proxy is the GIM-index constructed by Gompers, Ishii, and Metrick (2003). The GIM-index is the sum of all antitakeover provisions in a firm's charter[7] that varies between 0 and 24, with higher values of the index corresponding to more ATPs and, thus, weaker governance. Our second proxy is the E-index constructed by Bebchuk, Cohen, and Ferrell (2004), who argue that not all of the 24 provisions in the GIM index are effective antitakeover measures and construct their index using only six provisions: staggered boards, limits to shareholder by-law amendments, limits to shareholder charter amendments, supermajority requirements for mergers, poison pills, and golden parachutes.

[6] Although both measures show little within firm change from point to point, our results do not depend on the assumption that the value of the antitakeover provision index in-between survey years is unchanged. In unreported results based solely on data from the survey years, we replicate the reported results.

[7] A detailed description of takeover defenses included in the GIM-index can be found in GIM, Appendix A.

Our third proxy is the SB&P-index, which is based on the sum of staggered board and poison pill provisions and, thus, ranges from 0 to 2. This index is motivated by the argument in Bebchuk, Coates and Subramanian (2002) and M&A practitioners that staggered (classified) boards constitute the most significant barrier to hostile acquisitions, especially when combined with a poison pill.

3.2 Firm Risk and Idiosyncratic Volatility

We use data from CRSP to construct idiosyncratic volatility measure for each firm in the IRRC sample, which we estimate for each month using daily return data. We use the one-month Treasury bill rate from Ibboson Associates as the risk-free rate and take CRSP's value-weighted returns of all stocks as the market portfolio.

For each firm i in the sample, our measure of idiosyncratic volatility is based on a projection of the firm's excess return, r_{it}, on the market's excess return, r_{mt}. We first obtain estimates of each stock's monthly market β, denoted $\hat{\beta}$, individual stock volatility σ, denoted $\hat{\sigma}$, and market return volatility σ, denoted $\hat{\sigma}$, from the basic market model using daily data. Denoting $\tilde{r}_{id}$ the demeaned excess return of stock i and on day d and $\tilde{r}_{md}$ the demeaned market excess return on day d, we estimate $\hat{\beta}_i = \frac{\sum \tilde{r}_{id}\tilde{r}_{md}}{\sum \tilde{r}_{md}^2}$, $\hat{\sigma}_i = \sqrt{\frac{1}{T}\sum \tilde{r}_{id}^2}$, and $\hat{\sigma}_m = \sqrt{\frac{1}{T}\sum \tilde{r}_{md}^2}$, where T is the number of trading days in a month. Using these estimates, we can express idiosyncratic volatility as $\hat{\sigma}_{i\varepsilon} = \sqrt{\hat{\sigma}_i^2 - \hat{\beta}_i^2 \hat{\sigma}_m^2}$. Although our measure of idiosyncratic volatility is estimated using the market model, we later examine the robustness of our results to alternative models of idiosyncratic volatility that use the Fama and French (1992) three-factor model and an industry model.

3.3 Firm Investment and Valuation Measures

In order to examine the relation between governance and firm policies and value, we supplement the IRRC data set with various items from the COMPUSTAT and CRSP. We consider two investment policy variables: physical investment, measured as the ratio of capital expenditures to assets; R&D, measured as the ratio of research and development expenditures to assets. As a proxy for firm valuation, we use Tobin's Q, which is the ratio of market value of assets to book value of assets. Market value of assets is defined as book value of assets plus market equity minus the sum of book equity and balance sheet deferred taxes (Kaplan and Zingales (1997)).

In our analysis of diversifying acquisitions, we consider two ex-ante diversification measures based on a sample of 960 corporate acquisitions announced and successfully completed between January 1, 1990 and December 31, 2006. Our acquisitions are from Securities Data Corporation's (SDC) U.S. Mergers and Acquisitions database and are selected using standard criteria (see, for example, Masulis, Wang, and Xie (2006)).[8] Our two measures of diversification are based on May (1995) and are: 1) the ex-ante covariance of equity returns between bidding and the target firms, measured as the 60-month covariance between the bidder and the target's monthly equity returns prior to the acquisition announcement; and 2) the implied change in bidders' equity variance resulting from the acquisition, measured as the variance of the two-asset (bidder and target) portfolio (weighted by the equity value of each firm) less the variance of the bidder prior to the acquisition. For each of these diversification proxies, the lower the value, the more diversifying the acquisition.

[8] To be included in the sample, we require that an acquisition is material to the acquirer and, thus, we limit the sample to deals whose value is at least $1 million and at least 1% of the market value of the assets of the acquirer. Results are reported for the 1% threshold, but they also hold for the more restrictive 5% and 10% thresholds. Also, we require that the necessary data on acquirer characteristics is available from Compustat and CRSP, that the acquirer is included in the IRRC database, and that the necessary information on ATPs is available. Finally, we require that the target is a U.S. public firm and that the acquirer controls less than 50% of the shares of the target prior to the acquisition announcement and obtains 100% of the target shares as a result of the transaction.

Our list of controls includes standard firm characteristics, such as, for example, size, cash flow, and leverage, whose relationship with investment decisions and firm value has been documented in previous studies. A complete list and detailed definitions of these controls are in the Appendix and in the respective tables.

Table 1 presents summary statistics for our sample. Consistent with previous studies, our median firm scores values of 9 for the GIM-index, 2 for the E-index, and 1 for the SB&P index. Mean idiosyncratic volatility, $\sigma^2_{i\varepsilon}$ (annualized), over our sample period is 0.19, which is higher than that found in previous studies of idiosyncratic volatility that use the entire CRSP sample (e.g., Campbell, Lettau, Malkiel, and Xu (2001)), but in line with other studies that focus on the IRRC sample (e.g., Ferreira and Laux (2007)). Other firm characteristics are largely in line with previous studies such as Gompers, Ishii, and Metrick (2003). Table 2 reports the top and bottom volatility firms in our sample and their respective (4-SIC) industries.

4 Corporate Governance, Risk-Taking, and Investment Decisions

This section examines the relation between corporate governance (ATPs) and corporate investment decisions using the dynamic panel GMM approach described in Section 2. In particular, we study the relation between ATPs and capital expenditures and R&D expenditures. We also offer evidence on ATPs and diversifying acquisitions decisions from a sample of 960 corporate acquisitions announced and successfully completed between 1990 and 2006. An important feature of our GMM approach is that we can rigorously examine the validity of the instrument set that we use in the dynamic GMM estimation; i.e., we can examine the strength and exogeneity of using the firm's history as instrument for current governance.

4.1 Capital Expenditures

A first important way in which managers can tilt the risk profile of their firm toward safer projects is through excess investment in tangible assets, such as capital expenditures. Table 3 presents two-step GMM coefficient estimates and standard errors for dynamic investment equations described in (1) for IRRC firms in the 1990 to 2006 period. Columns (1)-(3) report results for the entire sample. Columns (4)-(6) and (7)-(9) report results for the two sub-samples of high and low idiosyncratic risk firm. This sample split, we have argued, allows us to identify the risk-taking channel.

Before discussing the coefficient estimates, it is important to test of the validity of our specification and set of instruments. If the assumptions of our specification are valid, by construction the residuals in first differences should be correlated, but there should be no serial correlation in second differences. The p-values for the m1 and m2 statistics confirm that this is the case regardless of whether we consider the entire sample or sample splits. The second test is a Sargan test of over-identification. The dynamic panel GMM estimator uses multiple lags as instruments. This means that our system is over-identified and provides us with an opportunity to carry out the test of over-identification. The p-values for this test show that we cannot reject the validity of the instruments and this is the case both for the entire sample and the sample splits. Finally, the p-value for our Difference-Sargan test implies that we cannot reject the hypothesis that the additional subset of instruments used in the system GMM estimates is indeed exogenous. Thus, overall our specification tests provide empirical support for the validity of our specification and instruments.

Moving on to consider the coefficient estimates of ATPs, columns (1)-(3) show that regardless of the ATP index used, ATPs do not have a statistically significant effect on capital expenditures in the entire sample. Among controls that are standard in the literature, we find expected coefficient signs: (lagged) gross cash flow has a statistically significant positive effect and investment adjustment costs have a statistically significant negative effect.

However, our dynamic GMM estimates offer strong evidence in support of our risk-taking channel. In fact, as can be seen by contrasting columns (4)-(6) with columns (7)-(9), the results indicate a significant positive impact of ATPs on capital expenditures which is robust across ATP indices, but only for firms with relatively high idiosyncratic volatility. The coefficient estimate on ATPs implies that, for firms with relatively high idiosyncratic volatility, the effect of ATPs on capital expenditures is economically significant. For example, looking at the E index (column 6), moving a firm from the lowest (0 provisions) to the highest (6 provisions) level of takeover protection leads to an increase in capital expenditures of about 2% of assets - an increase which is about 40% the median capital expenditure investment rate in our sample (5%). By contrast, for firms with low idiosyncratic volatility, ATPs do not have a statistically significant effect on capital expenditures.

4.2 R&D

A second important way in which managers can tilt the risk profile of their firm toward safer projects is by reducing investment in intangible assets, such as R&D. Table 3 presents two-step GMM coefficient estimates and standard errors for dynamic R&D equations described in (1) for IRRC firms in the 1990 to 2006 period. Columns (1)-(3) report results for the entire sample. Columns (4)-(6) and (7)-(9) report results for the two sub-samples of high and low idiosyncratic risk firm. This sample split, we have argued, allows us to identify the risk-taking channel.

Before discussing the coefficient estimates, we discuss the results of the tests of the validity of our specification and set of instruments. The p-values for the m1 and m2 statistics confirm the validity of our specification both for the entire sample and the sample splits. The p-value of the Sargan and Difference-Sargan tests, however, show that we cannot reject the validity of the instruments only for the sample splits regressions. Our interpretation of these results is that they support our risk-taking channel, since a specification that allows for the risk taking channel - i.e., for heterogenous effects of ATPs on R&D between low vs. high idiosyncratic volatility firms - is clearly superior.

Moving on to consider the coefficient estimates of ATPs, our dynamic GMM estimates offer strong evidence in support of the risk-taking channel. In fact, as can be seen by contrasting columns (4)-(6) with columns (7)-(9), the results indicate a significant negative impact of ATPs on capital expenditures which is robust across ATP indices, but only for firms with relatively high idiosyncratic volatility. The coefficient estimate on ATPs implies that, for firms with relatively high idiosyncratic volatility, the effect of ATPs on R&D is economically significant. For example, looking at the E index (column 6), moving a firm from the lowest (0 provisions) to the highest (6 provisions) level of takeover protection leads to a drop in R&D of about 9% of sales - a drop which is about as large as the mean R&D expenditure rate in our sample. By contrast, for firms with low idiosyncratic volatility, depending on which index is considered, ATPs either do not have a statistically significant effect on R&D (for SB&P and E indices) or have a small and only marginally significant effect (GIM index).

4.2.1 Diversifying Acquisitions

A third important way in which managers can lower the risk profile of their firm is by changing the level of diversification. To test this hypothesis, we use a sample of 960 corporate acquisitions announced and successfully completed between 1990 and 2006. We use the following two ex-ante diversification measures to capture the extent to which a given acquisition can implement diversification in the portfolio sense: 1) the ex-ante covariance of equity returns between the acquirer and the target firms; and 2) the implied change in acquirers' equity variance resulting from the acquisition. For each of these diversification proxies, the lower the value, the more diversifying the acquisition.

Table 5 presents results from multivariate regressions of the ex-ante proxies for diversification on ATP indices. Panels A and B report results for the first (covariance of equity returns) and second (implied change in variance) proxy, respectively. For each panel, columns (1)-(3) report results for the entire sample. Columns (4)-(6) and (7)-(9) report results for the two sub-samples of high and low idiosyncratic risk firm. This sample split, we have argued, allows us to identify the risk-taking channel.

The coefficient estimates of ATPs offer further evidence of a link between weak corporate governance and managerial conservatism. In fact, robustly across different ATP indices and for both proxies of diversification, ATPs increase the likelihood of diversifying acquisitions. Moreover, the negative positive between ATPs and diversification is concentrated among high idiosyncratic volatility firms. The coefficient estimate on ATPs implies that, for firms with relatively high idiosyncratic volatility, the effect of ATPs on diversification is economically significant. Looking at the E index (column 6), moving a firm from the lowest (0 provisions) to the highest (6 provisions) level of takeover protection leads to a drop in (monthly) equity covariance of about 1% - a drop which is about as large as the mean level of diversification in our sample (0.9%). By contrast, for firms with low idiosyncratic volatility, depending on which index is considered, ATPs either do not have a statistically significant effect on R&D (for SB&P and E indices) or have a small and marginally significant effect (GIM index).

Overall, these results provide further support for our risk-taking channel, according to which ATPs lead to conservative investment decisions among managers exposed to high firm-specific risk.

5 Corporate Governance, Risk-Taking, and Firm Value

These results show that ATPs lead to managerial conservatism. However, they leave open the question of whether entrenched managers take too few risks in their investment decisions or unentrenched managers take too many risks. In other words, as Tirole (2003, p.307) puts it, do managers take too many risks when their jobs are endangered or are they too conservative when their jobs are relatively secure? Our dynamic valuation (Tobin's Q) regressions address this important question. While the relation between firm-level ATP indices and value has been previously studied in the literature (Gompers, Ishii, and Metrick (2003), Bebchuk, Cohen, and Ferrell (2004), Bebchuk and Cohen (2005), and Cremers and Nair (2003)),[9] our GMM approach allows us to identify the effect of ATPs on value within a setting that addresses potential endogeneity concerns with OLS estimates in Tobin's Q-regressions (see Bertrand and Mullainathan (2003) for a different identification strategy). Our risk-taking channel implies that there are risk-related agency problems and, thus, based on our results from investment decisions, we expect that the negative valuation effect of ATPs should be concentrated among high idiosyncratic volatility firms - i.e., the firms for which ATP-induced conservatism is more pronounced.

Table 6 presents two-step GMM coefficient estimates and standard errors for dynamic Tobin's Q equations described in (1) for IRRC firms in the 1990 to 2006 period. Columns (1)-(3) report results for the entire sample. Columns (4)-(6) and (7)-(9) report results for the two sub-samples of high and low idiosyncratic risk firm.

Before discussing the coefficient estimates, we discuss the results of the tests of the validity of our specification and set of instruments. The p-values for the m1 and m2 statistics confirm

[9] There is also a broader empirical literature on the association between corporate arrangements and firm value (see, for example, Bebchuk and Cohen (2005), Demsetz and Lehn (1985), Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), Lang and Stulz (1994), Yermack (1996)).

the validity of our specification both for the entire sample and the sample splits. The p-value of the Sargan test, however, show that we cannot reject the validity of the instruments only for the sample splits regressions. Our interpretation of these results is that they support our risk-taking channel, since a specification that allows for the risk taking channel - i.e., for valuation effects of ATPs that are heterogeneous between low vs. high idiosyncratic volatility firms - is clearly superior.

Moving on to consider the coefficient estimates of ATPs, our dynamic GMM estimates offer strong evidence in support of the risk-taking channel. In fact, as can be seen by contrasting columns (4)-(6) with columns (7)-(9), the results indicate a significant negative impact of ATPs on firm value which is robust across ATP indices, but only for firms with relatively high idiosyncratic volatility. The coefficient estimate on ATPs implies that, for firms with relatively high idiosyncratic volatility, the valuation effect of ATPs is economically significant. For example, looking at the E index (column 6), moving a firm from the lowest (0 provisions) to the highest (6 provisions) level of takeover protection leads to a drop in Tobin's Q of about .69 - a drop which is about 35% of the mean Tobin's Q in our sample. By contrast, for firms with low idiosyncratic volatility, robustly across different indices, ATPs do not have a statistically significant effect on firm value.

Overall, these results provide strong support for our risk-taking channel, and suggest that ATPs lead to excess managerial conservatism. Thus, by curbing managers' tendency to avoid value-enhancing risks, corporate governance reforms can create value for shareholders.

6 Conclusion

(TBA)

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Appendix A. Variable Definitions

The variables used in this paper are extracted from four major data sources: IRRC, COMPUSTAT, CRSP, and SDC Platinum. For each data item, we indicate the relevant source in square brackets. The specific variables used in the analysis are defined as follows:

- Governance Measures (Higher index values correspond to more entrenchment) [IRRC]
  - GIM-index is the sum of all antitakeover provisions in a firm's charter that varies between 0 and 24.
  - SB&P-index is the sum of the staggered board and poison pill indicators that ranges from 0 to 2.
  - E-index is the sum of six provisions: staggered boards, limits to shareholder bylaw amendments, limits to shareholder charter amendments, supermajority requirements for mergers, poison pills, and golden parachutes.

- Idiosyncratic volatility is calculated for each month as a projection of each firm's daily excess return, r_{it}, on the daily market's excess return, r_{mt}. The estimated idiosyncratic volatility is $\hat{\sigma}_{i\varepsilon} = \sqrt{\hat{\sigma}_i^2 - \hat{\beta}_i^2 \hat{\sigma}_m^2}$, where $\hat{\beta}_i = \frac{\sum \tilde{r}_{id}\tilde{r}_{md}}{\sum \tilde{r}_{md}^2}$, $\hat{\sigma}_i = \sqrt{\frac{1}{T}\sum \tilde{r}_{id}^2}$, $\hat{\sigma}_m = \sqrt{\frac{1}{T}\sum \tilde{r}_{md}^2}$, T is the number of trading days in a month, $\tilde{r}_{id}$ denotes the demeaned excess return of stock i and on day d, and $\tilde{r}_{md}$ denotes the demeaned market excess return on day d. We use the one-month Treasury bill rate from Ibboson Associates as the risk-free rate and take CRSP's value-weighted returns of all stocks as the market portfolio. For our panel IRRC sample, which is at annual frequency, we calculate the mean of annualized monthly volatilities for each year. [CRSP]

- Outcome measures:
  - Investment is capital expenditures (item 128) over total assets at the beginning of the fiscal year (item 6). [Compustat]
  - R&D is the ratio of R&D expenditures (item 46, or 0 is missing) over lagged sales (item 12). [Compustat]
  - Covariance between acquirer and target's stock returns 60 months before the date of the first bid for acquisitions made by firms for which governance index data is available from the IRRC database. [SDC Platinum and CRSP]
  - Implied change in bidder's equity variance resulting from the acquisition is measured as the variance of the two-asset (bidder and target) portfolio (weighted by the equity value of each firm) less the variance of the bidder prior to the acquisition. [SDC Platinum and CRSP]
  - Tobin's Q is defined as the market value of assets divided by the book value of assets (item 6), where the market value of assets equals the book value of assets plus the market value of common equity less the sum of the book value of common equity (item 60) and balance sheet deferred taxes (item 74). [Compustat]

- Controls:

- Size is log of the book value of assets (item 6), deflated by CPI in 1990. [Compustat]
- Leverage is defined as long term debt (item 9) plus debt in current liabilities (item 34) over the sum of long term debt (item 9) plus debt in current liabilities (item 34) plus market value of equity (item 25*item199). [Compustat]
- Return on assets (ROA) is the ratio of operating income after depreciation (item 178) over lagged total assets (item 6). [Compustat]
- Advertising is the ratio of advertising expenditures (item 45, or 0 if missing) over lagged total sales (item 12). [Compustat]
- Cashflow is defined as the sum of earnings before extraordinary items (item 18) and depreciation (item 14) over net property, plant and equipment at the beginning of the fiscal year (item 8). [Compustat]
- Delaware incorporation is a dummy that takes the value of 1 for firms incorporated in Delaware. [IRRC]

Appendix B. Empirical Specification - Details

A basic version of the dynamic model we estimate is:

$$y_{it} = \alpha y_{it-1} + \beta' X_{it} + \eta_i + \varepsilon_{it}$$

Arellano and Bond (1991) propose to difference equation (1):

$$(y_{it} - y_{it-1}) = \alpha (y_{it-1} - y_{it-2}) + \beta' (X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1})$$

While differencing eliminates the country-specific effect, it introduces a new bias; by construction the new error term, $(\varepsilon_{it} - \varepsilon_{it-1})$ is correlated with the lagged dependent variable, $(y_{it-1} - y_{it-2})$. Under the assumptions that (a) the error term, ε, is not serially correlated, and (b) the explanatory variables, X, are weakly exogenous (i.e., the explanatory variables are assumed to be uncorrelated with future realizations of the error term), Arellano and Bond propose the following moment conditions

$$\begin{aligned} E\left[y_{it-s} \cdot (\varepsilon_{it} - \varepsilon_{it-1})\right] &= 0 \; for \; s \geq 2, \; t = 3, ..., T \\ E\left[X_{it-s} \cdot (\varepsilon_{it} - \varepsilon_{it-1})\right] &= 0 \; for \; s \geq 2, \; t = 3, ..., T \end{aligned}$$

Using these moment conditions, Arellano and Bond (1991) propose a two-step GMM estimator. In the first step the error terms are assumed to be independent and homoskedastic across countries and over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. The two-step estimator is thus asymptotically more efficient relative to the first-step estimator. We refer to the GMM estimator based on these conditions as the difference estimator. This is the estimator that Rousseau and Wachtel (2000) use with annual data to examine the relationship between stock markets, banks, and economic growth.

To reduce the potential biases and imprecision associated with the difference estimator, we use an estimator that combines in a system the regression in differences with the regression in levels [Arellano and Bover, 1995 and Blundell and Bond, 1998]. The instruments for the regression in differences are the same as above. The instruments for the regression in levels are the lagged differences of the corresponding variables. These are appropriate instruments under the following additional assumption: although there may be correlation between the levels of the right-hand side variables and the country-specific effect in equation (1), there is no correlation between the differences of these variables and the country-specific effect. Given that lagged levels are used as instruments in the regression in differences, only the most recent difference is used as an instrument in the regression in levels. Using additional lagged differences would result in redundant moment conditions (Arellano and Bover, 1995). Thus, additional moment conditions for the second part of the system (the regression in levels) are:

$$\begin{aligned} E\left[(y_{it-s} - y_{it-s-1}) \cdot (\eta_i + \varepsilon_{it})\right] &= 0 \; for \; s = 1 \\ E\left[(X_{it-s} - X_{it-s-1}) \cdot (\eta_i + \varepsilon_{it})\right] &= 0 \; for \; s = 1 \end{aligned}$$

Thus, we use the moment conditions presented in equations (3) – (6) and employ the system panel estimator to generate consistent and efficient parameter estimates.

Appendix C. Tables

Table 1: Summary Statistics

The sample consists of 2302 firms from IRRC in the 1990 to 2006 period. Definitions for all variables are in Appendix A.

Variable	Observations	Mean	Median	Standard Deviation
GIM	18125	9.20	9	2.71
SB&P	18125	1.21	1	0.76
E	18125	2.20	2	1.29
Idiosyncratic return volatility	18125	0.19	0.11	0.21
Investment	17437	0.06	0.05	0.05
R&D	9220	0.09	0.04	0.17
Number of segments (log)	8122	0.45	0	0.56
Number of segments (log, multisegment firms only)	3859	0.96	1.10	0.41
Herfindald of Sales	8122	0.78	1	0.27
Herfindald of Sales (multisegment firms only)	3859	0.53	0.51	0.19
Tobin's Q (industry-adjusted)	16290	0.31	0.02	1.34
ROA	17451	0.13	0.14	0.12
Delaware	18125	0.59	1	0.49
Size	17686	15.81	15.65	1.48
Advertising	5772	0.03	0.02	0.03
Leverage	17617	0.24	0.22	0.19
Cashflow	17501	0.09	0.10	0.13

Table 2: Examples of Firms and Industries with High and Low Idiosyncratic Volatility

This table reports the top twelve (Panel A) and the bottom twelve (Panel B) firms and (4SIC) industries by idiosyncratic variance of stock market returns in the sample of 2302 firms from IRRC in the 1990 to 2006 period. Details on the construction of idiosyncratic volatility measure are in Appendix A.

Panel A: Firms and Industries with Highest Idiosyncratic Volatility

Firm	Industry Code (4SIC)	Industry Name	Idiosyncratic Volatility
Genta Incorporated	2836	Biological Products, Exc Diagnostic Substances	0.968
Neurocrine Biosciences	2836	Biological Products, Exc Diagnostic Substances	0.730
NPS Pharmaceuticals Inc	2836	Biological Products, Exc Diagnostic Substances	0.509
Amkor Technology Inc	3674	Semiconductors and Related Devices	0.406
ESS Technology Inc	3674	Semiconductors and Related Devices	0.331
Zoran Corp	3674	Semiconductors and Related Devices	0.309
Conexant Systems Inc	3674	Semiconductors and Related Devices	0.284
Skyworks Solutions Inc	3674	Semiconductors and Related Devices	0.273
Red Hat Inc	7372	Prepackaged Software	0.328
Openwave Systems Inc	7372	Prepackaged Software	0.292
Phoenix Technologies Ltd	7372	Prepackaged Software	0.271
Take Two Interactive Software	7372	Prepackaged Software	0.255

Panel B: Firms and Industries with Lowest Idiosyncratic Volatility

Firm	Industry Code (4SIC)	Industry Name	Idiosyncratic Volatility
The Coca Cola Company	2080	Beverages	0.016
Pepsico Inc	2080	Beverages	0.016
Avery Dennison Corp	2670	Converted Paper And Paperboard Products	0.017
Bemis Co	2670	Converted Paper And Paperboard Products	0.019
Johnson & Johnson	2834	Pharmaceutical Preparations	0.016
Eli Lilly & Co	2834	Pharmaceutical Preparations	0.016
Abbott Laboratories	2834	Pharmaceutical Preparations	0.022
Wyeth	2834	Pharmaceutical Preparations	0.021
Commonwealth Telephone Ent	4813	Telephone Communications, Exc Radiotelephone	0.019
AT&T Inc	4813	Telephone Communications, Exc Radiotelephon	0.021
Honeywell International Inc	3728	Aircraft Parts And Auxiliary Equipment, Nec	0.021
Rockwell Collins Inc	3728	Aircraft Parts And Auxiliary Equipment, Nec	0.022

Table 3: Dynamic Regressions of Governance and Investment

This table reports dynamic investment regressions estimated with two-step GMM in first differences in the sample of 2302 firms from IRRC in the 1990 to 2006 period. The dependent variable is the ratio of capital expenditures to total assets. Governance is measured by GIM, SB&P, and E indices. Columns (1)-(3) report results for all firms. Columns (4)-(6) and (7)-(9) report results when the sample is split between firms with high (above sample mean) and low (below sample mean) values of idiosyncratic risk, respectively. Lagged variables dated t-3 and t-4 are used as instruments. Controls include log of total assets, cashflow, Tobin's Q, and lagged squared capital expenditures. Year dummies are included in all regressions. Standard errors robust to heteroskedasticity and within-firm serial correlation appear below point estimates. The statistics m1 and m2 test the null of no first- and second-order autocorrelation in the first-differenced residuals. Sargan is a test of the null that the overidentifying restrictions are valid. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1% respectively. All variable definitions are in Appendix A.

	Dependent Variable: Capex								
	All			High Volatility			Low Volatility		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIM_t	0.001			0.002**			0.000		
	(0.001)			(0.001)			(0.001)		
$SB\&P_t$		0.002			0.004*			0.000	
		(0.003)			(0.002)			(0.002)	
E_t			0.002			0.003**			0.002
			(0.001)			(0.001)			(0.002)
$Capex_{t-1}$	0.492***	0.486***	0.489***	0.475***	0.482***	0.471***	0.519***	0.525***	0.518***
	(0.032)	(0.032)	(0.031)	(0.037)	(0.036)	(0.037)	(0.049)	(0.047)	(0.049)
$Capex_{t-2}$	-0.006	-0.011	-0.010	0.013	0.012	0.010	0.016	0.016	0.014
	(0.011)	(0.011)	(0.011)	(0.015)	(0.016)	(0.016)	(0.014)	(0.014)	(0.014)
$Capex^2_{t-1}$	-0.671***	-0.663***	-0.666***	-0.601***	-0.609***	-0.590***	-0.926***	-0.939***	-0.915***
	(0.094)	(0.095)	(0.091)	(0.097)	(0.094)	(0.087)	(0.157)	(0.155)	(0.155)
Tobin's Q_t	0.002	0.002	0.002	0.003**	0.003**	0.003*	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Tobin's Q_{t-1}	-0.000	-0.000	-0.000	-0.001	-0.001	-0.001	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cash $Flow_t$	0.024	0.028*	0.028*	0.013	0.013	0.016	0.031	0.025	0.025
	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.015)	(0.028)	(0.027)	(0.028)
Cash $Flow_{t-1}$	0.015***	0.014***	0.014***	0.014***	0.014***	0.013***	0.014**	0.012*	0.014**
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
$Size_t$	0.001	0.001	0.002	0.002	0.003	0.006	-0.001	0.001	-0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
$Size_{t-1}$	-0.001	-0.001	-0.002	-0.002	-0.002	-0.006	0.000	-0.002	0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m2 (p-value)	0.346	0.304	0.351	0.234	0.233	0.238	0.252	0.252	0.249
Sargan (p-value)	0.183	0.255	0.190	0.231	0.189	0.202	0.485	0.392	0.449
Diff-Sargan (p-value)	0.724	0.772	0.789	0.909	0.915	0.987	0.742	0.228	0.551
Observations	11768	11768	11768	6456	6456	6456	5227	5227	5227

Table 4: Dynamic Regressions of Governance and R&D

This table reports dynamic R&D regressions estimated with two-step GMM in first differences in the sample of 2302 firms from IRRC in the 1990 to 2006 period. The dependent variable is the ratio of R&D expenditures to sales. Governance is measured by GIM, SB&P, and E indices. Columns (1)-(3) report results for all firms. Columns (4)-(6) and (7)-(9) report results when the sample is split between firms with high (above sample mean) and low (below sample mean) values of idiosyncratic risk, respectively. Lagged variables dated t-3 and t-4 are used as instruments. Controls include log of total assets, cashflow, and Tobin's Q. Year dummies are included in all regressions. Standard errors robust to heteroskedasticity and within-firm serial correlation appear below point estimates. The statistics m1 and m2 test the null of no first- and second-order autocorrelation in the first-differenced residuals. Sargan is a test of the null that the overidentifying restrictions are valid. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1% respectively. All variable definitions are in Appendix A.

	Dependent Variable: R&D								
	All			High Volatility			Low Volatility		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIM_t	-0.005**			-0.007**			-0.002*		
	(0.002)			(0.003)			(0.001)		
$SB\&P_t$		-0.012*			-0.020***			-0.003	
		(0.006)			(0.009)			(0.005)	
E_t			-0.010***			-0.015***			-0.005
			(0.004)			(0.004)			(0.004)
$R\&D_{t-1}$	0.560***	0.573***	0.565***	0.605***	0.607***	0.599***	0.277***	0.293***	0.279***
	(0.064)	(0.052)	(0.053)	(0.063)	(0.062)	(0.063)	(0.083)	(0.073)	(0.081)
$R\&D_{t-2}$	0.167*	0.178***	0.170***	0.154***	0.164***	0.154***	0.283***	0.287***	0.286***
	(0.093)	(0.045)	(0.036)	(0.045)	(0.045)	(0.044)	(0.075)	(0.072)	(0.073)
Tobin's Q_t	0.366	0.475	0.377	0.103	0.163	0.108	0.248	0.355	0.508
	(0.498)	(0.488)	(0.464)	(0.364)	(0.372)	(0.377)	(0.579)	(0.654)	(0.653)
Tobin's Q_{t-1}	-0.318	-0.295	-0.334*	-0.035	-0.014	-0.065	-0.107	-0.214	-0.294
	(0.272)	(0.651)	(0.194)	(0.203)	(0.200)	(0.184)	(0.398)	(0.401)	(0.464)
Cash $Flow_t$	-0.266***	-0.274**	-0.267***	-0.186**	-0.172**	-0.178**	-0.660***	-0.698***	-0.698***
	(0.101)	(0.140)	(0.074)	(0.075)	(0.075)	(0.069)	(0.188)	(0.201)	(0.190)
Cash $Flow_{t-1}$	0.002	0.009	0.005	0.005	0.011	0.009	0.047	0.052	0.037
	(0.042)	(0.025)	(0.022)	(0.030)	(0.031)	(0.029)	(0.032)	(0.033)	(0.035)
$Size_t$	0.047*	0.050**	0.045**	0.054**	0.055**	0.049**	0.081***	0.084***	0.083***
	(0.026)	(0.025)	(0.022)	(0.023)	(0.023)	(0.025)	(0.029)	(0.026)	(0.030)
$Size_{t-1}$	-0.045	-0.050**	-0.045*	-0.050**	-0.053**	-0.048*	-0.086***	-0.091***	-0.092***
	(0.028)	(0.022)	(0.023)	(0.024)	(0.023)	(0.025)	(0.030)	(0.027)	(0.031)
m1 (p-value)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
m2 (p-value)	0.886	0.834	0.875	0.200	0.195	0.195	0.336	0.366	0.342
Sargan (p-value)	0.080	0.096	0.097	0.665	0.436	0.496	0.338	0.225	0.425
Diff-Sargan (p-value)	0.004	0.002	0.002	0.425	0.205	0.171	0.246	0.263	0.221
Observations	6060	6060	6060	3352	3352	3352	2689	2689	2689

Table 5: Governance and Diversifying Acquisitions (Event Study)

The sample is based on 960 acquisition announcement by firms from IRRC in the 1990 to 2006 period. The table reports OLS regressions of the ex-ante covariance of equity returns between bidding and the target firms (Panel A) and the implied change in bidders' equity variance resulting from the acquisition (Panel B) on measures of governance and firm characteristics. For each of the dependent variables, lower value is associated with more diversifying acquisitions. Governance is measured by GIM, SB&P, and E indices. In both panels, Columns (1)-(3) report results for all firms, and columns (4)-(6) and (7)-(9) report results when the sample is split between firms with high (above sample mean) and low (below sample mean) values of idiosyncratic risk, respectively. Controls include log of total assets, cashflow, and the ratio of long-term debt to assets. Year dummies are included in all regressions. Standard errors robust to heteroskedasticity and within-firm serial correlation appear below point estimates. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1% respectively. All variable definitions are in Appendix A.

Panel A: Equity Return Covariance

	Dependent Variable: Equity Return Covariance between Acquirer and Target (%)								
	All			High Volatility			Low Volatility		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIM_t	-0.047***			-0.066***			-0.011*		
	(0.011)			(0.020)			(0.006)		
$SB\&P_t$		-0.093**			-0.134***			0.001	
		(0.059)			(0.041)			(0.012)	
E_t			-0.084***			-0.174***			-0.001
			(0.022)			(0.068)			(0.021)
$Size_{t-1}$	-0.080***	-0.091***	-0.097***	-0.095**	-0.125***	-0.121***	0.024**	0.026**	0.026**
	(0.020)	(0.020)	(0.020)	(0.039)	(0.039)	(0.040)	(0.012)	(0.013)	(0.012)
$Leverage_{t-1}$	-0.945***	-0.993***	-0.914***	-1.344***	-1.258***	-1.362***	-0.191	-0.225*	-0.222*
	(0.192)	(0.192)	(0.196)	(0.312)	(0.323)	(0.321)	(0.127)	(0.127)	(0.127)
Cash $Flow_{t-1}$	-2.722***	-2.794***	-2.969***	-3.067***	-3.426***	-3.354***	-0.892***	-0.866***	-0.870***
	(0.376)	(0.378)	(0.384)	(0.581)	(0.599)	(0.601)	(0.288)	(0.289)	(0.288)
R^2	0.25	0.24	0.24	0.22	0.22	0.21	0.15	0.15	0.15
Observations	960	960	960	496	496	496	463	463	463

Panel B: Implied Change in Acquirer's Variance

	Dependent Variable: Implied Change in Acquirer Variance (%)								
	All			High Volatility			Low Volatility		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIM_t	-0.089***			-0.095***			-0.030**		
	(0.017)			(0.025)			(0.015)		
$SB\&P_t$		-0.158**			-0.156***			-0.003	
		(0.068)			(0.058)			(0.021)	
E_t			-0.125***			-0.186*			-0.042
			(0.038)			(0.100)			(0.045)
$Size_{t-1}$	-0.302***	-0.321***	-0.307***	-0.363***	-0.364***	-0.402***	-0.039**	-0.031	-0.037*
	(0.038)	(0.039)	(0.035)	(0.068)	(0.059)	(0.067)	(0.015)	(0.020)	(0.020)
$Leverage_{t-1}$	-1.395***	-1.533***	-1.446***	-2.214***	-2.161***	-2.341***	-0.023	-0.112	-0.078
	(0.436)	(0.434)	(0.435)	(0.532)	(0.519)	(0.525)	(0.395)	(0.401)	(0.398)
Cash $Flow_{t-1}$	-5.883***	-6.041***	-6.339***	-7.166***	-7.861***	-7.312***	-0.992	-0.980	-1.001
	(1.126)	(1.145)	(1.184)	(1.423)	(1.485)	(1.444)	(0.630)	(0.601)	(0.626)
R^2	0.37	0.35	0.37	0.34	0.36	0.33	0.15	0.14	0.14
Observations	960	960	960	496	496	496	463	463	463

Table 6: Dynamic Regressions of Governance and Firm Value

This table reports dynamic regressions of industry-adjusted Tobin's Q on measures of governance and firm characteristics in the sample of 2302 firms from IRRC in the 1990 to 2006 period. The dynamic regressions are estimated with two-step system GMM in first differences to eliminate firm fixed effects. Tobin's Q is the market value of assets over the book value of assets, winsorized at 1% and adjusted for median Tobin's Q in the industry. Industry is defined by three-digit SIC code. Governance is measured by GIM, SB&P, and E indices. Columns (1)-(3) report results for all firms. Columns (4)-(6) and (7)-(9) report results when the sample is split between firms with high (above sample mean) and low (below sample mean) values of idiosyncratic risk, respectively. Lagged variables dated t-3 and t-4 are used as instruments. Controls include log of total assets, the ratio of capital expenditures to assets, the ratio of R&D expenditures to sales,the ratio of advertising and sales expense to sales, the ratio of long-term debt to assets, and the (log) number of segments. Year dummies are included in all regressions. Standard errors robust to heteroskedasticity and within-firm serial correlation appear below point estimates. The statistics m1 and m2 test the null of no first- and second-order autocorrelation in the first-differenced residuals. Sargan is a test of the null that the overidentifying restrictions are valid. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1% respectively. All variable definitions are in Appendix A.

	Dependent Variable: Tobin's Q								
	All			High Volatility			Low Volatility		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GIM_t	-0.028			-0.063**			0.006		
	(0.029)			(0.029)			(0.021)		
$SB\&P_t$		-0.095			-0.188**			-0.015	
		(0.058)			(0.079)			(0.044)	
E_t			-0.076			-0.115**			-0.002
			(0.047)			(0.047)			(0.027)
Tobin's Q_{t-1}	0.483***	0.485***	0.485***	0.419***	0.417***	0.418***	0.849***	0.851***	0.847***
	(0.042)	(0.043)	(0.042)	(0.040)	(0.041)	(0.041)	(0.090)	(0.090)	(0.087)
$Investment_t$	1.764	2.927*	3.429**	3.889*	3.296*	3.564*	-0.847	-0.820	-0.510
	(1.908)	(1.763)	(1.722)	(2.093)	(2.002)	(2.036)	(1.707)	(1.390)	(1.212)
$Investment_{t-1}$	-1.149	-1.605*	-1.701*	-1.920	-1.763	-1.715	0.089	0.135	0.064
	(0.972)	(0.934)	(0.933)	(1.222)	(1.084)	(1.112)	(1.119)	(0.999)	(0.985)
$R\&D_t$	-0.913	-1.147	-1.301*	-1.190*	-1.097*	-1.206*	1.791*	1.918*	1.971*
	(0.726)	(0.709)	(0.721)	(0.722)	(0.660)	(0.699)	(1.077)	(1.049)	(1.047)
$R\&D_{t-1}$	0.549	0.635	0.646	0.703	0.747	0.663	-1.232	-1.021	-1.136
	(0.563)	(0.634)	(0.633)	(0.619)	(0.572)	(0.591)	(1.022)	(0.985)	(1.051)
$Advertising_t$	6.717*	7.786**	7.700**	4.961	5.292	4.831	10.017**	10.779**	10.888**
	(3.434)	(3.723)	(3.742)	(4.849)	(4.629)	(4.783)	(4.811)	(5.033)	(4.951)
$Advertising_{t-1}$	-5.534*	-5.337	-5.559*	-3.108	-3.333	-3.144	-5.201	-6.484*	-6.029*
	(2.990)	(3.260)	(3.172)	(4.692)	(4.377)	(4.288)	(3.433)	(3.817)	(3.541)
(Log) # $Segments_t$	-0.866	-0.285	-0.335	-0.915*	-1.025*	-0.995**	-0.783*	-0.857**	-1.011**
	(0.702)	(0.644)	(0.624)	(0.538)	(0.587)	(0.485)	(0.461)	(0.427)	(0.455)
(Log) # $Segments_{t-1}$	0.647	0.293	0.337	0.941*	0.909	0.942*	0.908**	1.015**	1.164***
	(0.651)	(0.603)	(0.600)	(0.554)	(0.610)	(0.506)	(0.432)	(0.414)	(0.417)
Leverage	-0.087	0.104	0.099	0.077	0.052	0.019	-0.048	0.009	0.024
	(0.107)	(0.117)	(0.117)	(0.146)	(0.148)	(0.120)	(0.168)	(0.179)	(0.169)
$Leverage_{t-1}$	0.056	-0.194*	-0.181*	-0.161	-0.144	-0.143	-0.042	-0.047	-0.059
	(0.096)	(0.104)	(0.101)	(0.120)	(0.126)	(0.109)	(0.167)	(0.176)	(0.171)
$Size_t$	0.129	0.096	0.022	-0.026	0.049	-0.055	-0.213	-0.239	-0.183
	(0.219)	(0.251)	(0.253)	(0.182)	(0.191)	(0.183)	(0.219)	(0.233)	(0.186)
$Size_{t-1}$	-0.082	-0.076	0.008	0.112	0.023	0.133	0.231	0.250	0.198
	(0.236)	(0.277)	(0.278)	(0.203)	(0.205)	(0.198)	(0.231)	(0.252)	(0.207)
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m2 (p-value)	0.981	0.971	0.986	0.656	0.729	0.651	0.465	0.479	0.465
Sargan (p-value)	0.048	0.056	0.034	0.458	0.305	0.356	0.121	0.273	0.225
Diff-Sargan (p-value)	0.183	0.383	0.186	0.694	0.339	0.597	0.169	0.317	0.284
Observations	12477	12477	12477	6509	6509	6509	5968	5968	5968