Board Independence, Corporate Spending, and Cash Holdings*

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Abstract

We examine the effect of board independence on cash holdings and spending using the 2003 NYSE and NASDAQ board independence requirements as an exogenous shock. Noncompliant firms that are forced to raise board independence increase their cash holdings, especially when the firms are transparent. Part of the cash increase comes from a reduction in acquisition spending, and the market responds more favorably to the announcements of deals that survive the spending cut. Moreover, the increase in board independence causes the market to place a greater value on cash holdings. Our results suggest that greater board independence improves decisions related to the spending and accumulation of cash.

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The last decades have witnessed a dramatic growth in corporate cash holdings among US public firms. By the beginning of 2016, the S&P 500 non-financial firms held a record $1.347 trillion in cash, almost the GDP of Canada. The vastness of these cash holdings underscores the need to understand why firms accumulate cash and whether managers manage it prudently. Of particular interest is the role of corporate governance, as the main mechanism by which shareholders affect managerial behavior.

Economic intuition provides an equivocal prediction of the effect of corporate governance on cash holdings. On the one hand, Opler et al. (1999) argue that self-interested managers seek to accumulate cash, because managers are risk averse and want flexibility to pursue personal objectives. On the other hand, Jensen (1986) argues that managers are inclined to spend the firms' cash reserves, because even negative NPV projects can increase managerial utility. For example, acquisitions improve managers' job security (Shleifer and Vishny (1989)), diversify managers' human capital risks (Morck, Shleifer, and Vishny (1990)), and enhance executive compensation (Grinstein and Hribar (2004); Harford and Li (2007)). Negating Jensen's spending argument, however, is the propensity for self-interested managers to hold back certain types of spending, especially on R&D, because of its adverse effect on short-term earnings (Bushee (1998) and Graham, Harvey, and Rajgopal (2005)).

The empirical literature is also divided on the effects of governance on cash holdings. Bates, Kahle, and Stulz (2009) find no evidence that entrenched firms, as measured by the G-index of Gompers, Ishii, and Metrick (2003), carry more cash, nor that entrenchment explains the secular increase in cash holdings. But Harford, Mansi, and Maxwell (2008) find that entrenched firms are more likely to dissipate excess cash through acquisitions and capital expenditures, and Dittmar and Mahrt-Smith (2007) find that entrenched firms reduce excess cash more quickly than other firms. Conversely, Faleye (2004) finds evidence that targets of proxy fights have excessive cash, which they reduce in response to the proxy fights, suggesting that external pressure alleviates excessive cash accumulation. Furthermore, Yun (2009) finds that the validation of poison pills by Delaware courts in 1995 prompted firms to increase cash holdings, suggesting that entrenchment induces greater cash holdings.

There are several possible reasons for the mixed evidence on governance and cash holdings. First, endogeneity plagues the empirical governance literature. Karpoff, Schonlau, and Wehrly (2015) show that the G-index is unrelated to acquisition likelihood in tests that disregard

endogeneity, thus complicating interpretation of results based on the index. Moreover, Heron and Lie (2015) find no evidence to suggest that the 1995 Delaware court rulings affect the use or effect of poison pills, thus challenging the use of these rulings for identification purposes.

A second reason for the mixed evidence is that the effectiveness of various governance mechanisms depends on the specific circumstances. For example, whereas executive compensation can encourage both observable and non-observable behavior that maximizes long-term shareholder value, the corporate control market is likely more effective in disciplining problems that are both visible and sufficiently large to justify intervention costs. Indeed, Jensen (1986) argues that "value increasing takeovers occur in response to breakdowns of internal control processes" (p. 328) and Fama and Jensen (1983) refer to the takeover market as "an external court of last resort for protection of residual claimants" (pp. 313–314), suggesting that internal and external governance mechanisms are complementary.

A third reason is that it is unclear whether certain provisions imply better or worse governance. For example, golden parachutes can either foster takeovers by encouraging executives to facilitate a sale or hinder takeovers by raising the effective takeover premium (Machlin, Choe, and Miles (1993)). Of particular concern, Karpoff, Schonlau, and Wehrly (2015) show that several of the provisions in the G-index have the opposite effect on takeover likelihood than its calculation presumes.

We revisit the effect of corporate governance on cash holdings and spending. As the measure of governance, we focus on board independence. Jensen (1993) views the board as the apex of the internal control system, and Institutional Shareholder Services (ISS) recommends that a majority of the directors be independent.[1] Moreover, numerous studies, including Knyazeva, Knyazeva, and Masulis (2013), Armstrong, Core, and Guay (2014), and Guo and Masulis (2015) provide evidence that a greater proportion of independent directors improve monitoring and the internal governance system.

We use an exogenous shock to corporate board independence to solve the endogeneity problem. In response to widespread corporate scandals, the New York Stock Exchange (NYSE) and the National Association of Securities Dealers (NASD) proposed new listing requirements in 2002, which were approved by the Securities and Exchange Commission (SEC) in 2003. The

[1] See ISS's 2016 U.S. Summary Proxy Voting Guidelines at https://www.issgovernance.com/file/policy/2016-us-summary-voting-guidelines-23-feb-2016.pdf.

exchanges require listing firms to have a majority of independent directors. Firms that did not already comply had to increase their board independence and, thus, comprise our treatment group, while firms that already had a majority of independent directors comprise our control group.

Using the difference-in-difference (DID) approach, we find that the exogenous increase in board independence leads to an increase in cash holdings. Specifically, the treatment firms increase their cash ratio by 11.7% more than the control firms. Thus, greater board independence leads to greater cash holdings, consistent with the notion that independent directors reign in net corporate spending and allow cash to accumulate.

Next, we examine whether the documented effect is more pronounced in cases in which the increase in independent directors likely constitutes a greater governance improvement. Independent directors have limited access to firm-specific information, and Jensen (1993) argues that "this limitation on information severely hinders the ability of even highly talented board members to contribute effectively to the monitoring and evaluation of the CEO and the company's strategy." Raheja (2005), Adams and Ferreira (2007), and Harris and Raviv (2008) develop theoretical models that formalize this view, and Duchin, Matsusaka, and Ozbas (2010) report empirical evidence that independent directors are more effective when their cost of acquiring firm-specific information is low. Consistent with these views, we report that the increase in board independence spurs a greater increase in cash holdings when information asymmetry is low.

We also examine changes in corporate spending, which might explain the cash increase. We find that increased board independence results in less spending on mergers and acquisitions (M&A), and this accounts for part of the cash increase. Furthermore, the market reaction to announcements of acquisitions that survive the spending cut is more favorable. Combined, these results suggest that the increased board independence reduces value-destroying (or the least value-increasing) acquisition activity. Conversely, we find that increased board independence *increases* research and development (R&D) spending, thus offsetting the general increase in cash holdings. This is consistent with the notion that good governance mitigates myopic behavior, in which self-interested managers curb spending that hurts short-term earnings (Stein (1989)).

The documented effects on M&A activity and the associated value creation are more pronounced when information asymmetry is low, suggesting that independent directors are more inclined to correct spending behavior if they are informed. Uninformed independent directors appear to favor a less discriminate approach. In particular, we show that increased board

independence results in higher dividends when information asymmetry is high. This is consistent with the general argument of La Porta et al. (2000) that dividends are the product of good governance, but suggests that the effect is constrained to opaque firms. Interestingly, however, any secondary effect that the higher dividends have on reducing investments or cash balances is too scattered or weak to discern in the data.

Finally, we examine how the market values the cash holdings. We show that increased board independence enhances the valuation of cash holdings when information asymmetry is low. This finding suggests that the market recognizes the positive impact that director independence has on cash policy and spending.

Our study is novel in that we focus on the effect of an internal governance mechanism, namely the composition of the board, on spending and cash holdings, and we employ an identification strategy that effectively addresses the endogeneity concerns that afflict the literature. The outcome is that we obtain results that contradict many of those in earlier studies, including those reported in Faleye (2004) and Yun (2009), both of whom focus on the effect of external governance mechanisms. More importantly, our results speak to board effectiveness. In particular, our results show that changing the board from having a minority to a majority of independent directors significantly affects corporate spending decisions and cash holdings in ways that enhance value. Yet independence is not enough; the benefits of adding independent directors depend on their access to firm-specific information. In transparent firms, independent directors can more readily influence specific investment decisions to correct tendencies to over- and under-investments, and, thus, permit greater cash holdings, while in opaque firms, independent directors merely push for higher payouts in the hope that this will mitigate overinvestment.

I. Literature Review

A. Cash holdings and governance

Bates, Kahle, and Stulz (2009), Almeida et al. (2014), and Graham and Leary (2016) review the extensive literature on cash holdings. We only review the part of the literature that also relates to corporate governance.

Numerous studies examine the effect of governance on cash holdings, and the evidence is mixed. Opler et al. (1999) and Bates, Kahle, and Stulz (2009) find no evidence that agency conflicts contribute to an increase in cash holdings. However, an array of studies find evidence

that better governance has the effect of reducing cash holdings. Faleye (2004) documents that firms with excess cash are more likely to be targets of proxy fights, and firms reduce cash holdings following such proxy fights. Dittmar and Mahrt-Smith (2007) and Kalcheva and Lins (2007) use international evidence to show that better shareholder protection is associated with lower cash holdings. Yun (2009) reports that firms increase cash relative to credit lines when the threat of takeovers weakens (which is generally interpreted as an indication of a decline in monitoring and governance). Chen et al. (2012) document a significant decrease in cash holdings in Chinese-listed firms after the Chinese regulators permitted previously non-tradable shares held by controlling shareholders to be freely tradable on exchanges. Gao, Harford, and Li (2013) find that public firms have higher agency costs and therefore higher cash holdings than private firms. Nikolov and Whited (2014) use the structural estimation of a dynamic model to show that limited managerial ownership, compensation based on firm size, and managerial perquisite consumption affect cash holdings. In particular, they find that low managerial ownership contributes to the secular upward trend in cash holdings.

By contrast, Jensen (1986), Harford (1999), and Harford, Mansi, and Maxwell (2008) argue that managers subject to weak governance are more inclined to spend cash. Consequently, Harford, Mansi, and Maxwell (2008) conjecture that firms with weak governance end up with lower cash reserves than those with strong governance, and their empirical results support their conjecture. Lending further support, Dittmar and Mahrt-Smith (2007) find that poorly governed firms dissipate cash more quickly than well-governed firms. However, the spending argument might not pertain to all types of corporate spending. While Jensen (1986) and others suggest that executives have an inherent incentive to undertake acquisitions and grow their companies to boost executive power and compensation, models of myopic behavior like that of Stein (1989) suggest that executives have an incentive to curb spending to boost short-term earnings. Such myopic decisions are more likely to afflict investments and expenses with the most detrimental impact on short-term earnings, including R&D expenditures.[2] Indeed, Bushee (1998) finds evidence that executives withhold R&D as a mechanism to boost short-term earnings when monitoring (as measured by institutional ownership) is poor.

[2] R&D expenditures are fully expensed in the year in which they incur. In comparison, capital expenditures are recorded as assets for accounting purposes. As such, they are not charged immediately as expenses, but rather over their useful life in the form of deprecation.

Some studies also examine how governance affects the valuation of cash holdings, and the vast majority of these suggest that good governance enhances cash value. Employing the methodology of Faulkender and Wang (2006), Dittmar and Mahrt-Smith (2007) show that good governance, as measured by the G-index, favorably affects the value of cash. Harford, Mansi, and Maxwell (2008) find a more negative relation between the G-index and market-to-book ratio in the presence of excess cash. Pinkowitz, Stulz, and Williamson (2006) report that shareholders value cash less in countries with weaker investor protection than in other countries. Frésard and Salva (2010) find that foreign firms listed on US exchanges have higher value of cash than their domestic peers, perhaps because a US cross listing facilitates better disclosure and monitoring. Chen, Harford, and Lin (2015) document that an exogenous decrease in analyst coverage reduces the value of cash. A potential outlier among this set of studies is Fich, Harford, and Yore (2016), who show that the value of cash increases following the adoption of antitakeover laws.

B. Board independence

Corporate boards serve as both monitors and advisors. In that regard, inside directors and independent directors have different strengths. Several studies assume or argue that inside directors have better access to information, which is necessary for the boards to fulfill both the monitory and advisory roles, while outside directors are less conflicted, making them more effective monitors. On this backdrop, Fama and Jensen (1983) argue that independent board members perform tasks that are more susceptible to agency problems (e.g., set executive compensation and search for executive replacements), Hermalin and Weisbach (1998) predict that CEO turnover is more sensitive to performance when the board is independent, Raheja (2005) predict that firms in which it is easy for outsiders to gauge the quality of projects should have greater board independence, Adams and Ferreira (2007) predict that the reduced information flow associated with board independence could destroy shareholder value, and Harris and Raviv (2008) show that insiders on the board are especially valuable when they possess important inside information and the agency costs are low.

Empirical studies on corporate boards generally examine the determinants of board structure and the effect of board structure on performance. Hermalin and Weisbach (1988) report that poorly performing firms are more likely to add independent directors, perhaps because greater monitoring is required. Rosenstein and Wyatt (1990) document an average positive stock market

reaction to appointments of independent directors, suggesting that, on average, independent directors are more valuable than inside directors. Similarly, Chhaochharia and Grinstein (2007) find that firms that are noncompliant with the board independence rules outperform their peers during the announcement of board independence listing requirements. Masulis and Mobbs (2011) argue that the labor market for directorships also plays a role, and report that firms with inside directors who hold more outside directorships make better acquisition decisions, hold more cash, and exhibit superior operating performance. Armstrong, Core, and Guay (2014) report that exogenous increases in board independence lead to greater corporate transparency, and they suggest that board structure and transparency are jointly determined.

To tackle the endogeneity of board structure, Wintoki, Linck, and Netter (2012) employ a dynamic panel GMM, and find no causal relation between board structure and current firm performance. Knyazeva, Knyazeva, and Masulis (2013) reach a different conclusion. They first show that proximity to larger pools of local director pool increases board independence. Using the size of the local director pool as an instrumental variable, they find a positive relation between board independence and firm value. Like Armstrong, Core, and Guay (2014) and this study, Guo and Masulis (2015) make use of the NYSE and NASDAQ board independence requirements as an exogenous shock. They report that the sensitivity of CEO turnover to performance increases among noncompliant firms that are forced to increase board independence, suggesting that board independence improves CEO monitoring and discipline.

III. Methodology

In 2002, Congress passed the Sarbanes-Oxley Act in response to a number of corporate accounting scandals while NYSE and NASD proposed changes to the board independence requirements for listed firms. The SEC approved the proposed listing requirements in November 2003. The new requirements are somewhat convoluted, but in short they call for the majority of the directors to be "independent," defined by NYSE as having "no material relationship" with the company and by NASD as having a relationship that does not interfere with the exercise of independent judgment. In addition, NYSE requires audit, nominating/corporate governance, and compensation committees to be composed entirely of independent directors, while NASD requires audit committees to be composed entirely of independent directors.

The deadline for compliance with the listing requirements was October 2004 for firms with non-classified boards and December 2005 for firms with classified boards, and many firms started to adjust their board structure in 2002 and 2003. Therefore, 2001 is the last year that was unaffected by the listing requirement. We classify a firm to the treatment group ($Treat_i = 1$) if it had less than 50% independent directors in 2001; otherwise it is a control firm ($Treat_i = 0$). Following Guo and Masulis (2015), we define 2005 to 2009 as the post treatment period ($Post_t = 1$), and 1996 to 2004 as the non-post treatment period ($Post_t = 0$). But because some treatment firms adjusted their board independence before 2005, we set $Post_t = 1$ for years 2003 and 2004 if the treatment firm met the board independence requirement in the previous year. With the definitions of $Treat_i$ and $Post_t$, we can compute their interaction $Treat_i \times Post_t$, which is our variable of interest.

To capture the impact of the shock to the board independence on cash holdings, we use a difference in difference (DID) setup as follows:

$$\frac{CashHoldings_{i,t}}{TotalAsset_{i,t}} = \gamma_0 + \gamma_1 Post_t + \gamma_2 Post_t \times Treat_i + \boldsymbol{\gamma}'\mathbf{x} + c_i + \lambda_t + \epsilon_{i,t}$$

where the dependent variable is the cash holdings scaled by total assets, **x** represents a vector of control variables, c_i captures the firm fixed effects, and λ_t is the year fixed effects. The coefficient of interest is γ_2, which measures the treatment effect of an increase in the board independence on cash holdings. We use the same basic procedure for gauging the effect of board independence on other variables of interest.

II. Data

We obtain the corporate board data from Institutional Shareholder Services (ISS, formerly RiskMetrics). Because ISS data collection started in 1996, our sample also starts in 1996. We need to observe the treatment firms for several years after the listing requirement went into effect, while keeping the post treatment period relatively short to avoid confounding effects. Hence, our sample period is 1996-2009, the same as in Guo and Masulis (2015). Our main results hold if we end the sample period before the financial crisis. We get firm financial data from Compustat, stock return data from the Center for Research in Security Prices (CRSP), and financial analyst data from Institutional Brokers' Estimate System (IBES). We exclude financial firms (SIC codes 6000–6999)

and regulated utilities (SIC codes 4900–4999). In addition, we require the firms to be listed on NYSE or NASDAQ and have board independence data, IBES data, positive total assets, and nonnegative cash holdings. Our sample comprises 10,576 firm-year observations and 951 unique firms. To reduce the impact of outliers, we winsorize all variables at the 1st and 99th percentiles.

Table I presents summary statistics for the firm-years. Panel A shows that the average book value of assets is $6.6 billion. Further, the average cash ratio is 16%, while acquisitions, CAPEX, and R&D, on average, represent 3%, 6%, and 4%, respectively, of assets. The average board size is 9 directors, and the average fraction of independent directors is 65%.

DID assumes parallel trends for the outcome variable for treatment and control firms during the pre-treatment period. Following the recommendation of Roberts and Whited (2013), we conduct paired sample *t*-tests of the growth rates for outcome variables across the treatment and control groups. Panel B of Table I present both levels and growth rates based on data from 1998 to 2001 before the treatment for the two groups. While we are not concerned about any differences in levels for the purpose of the DID analysis, we note that the treatment firms spend more on acquisitions and less on R&D and payouts than control firms, consistent with independent directors curbing acquisitions and inducing R&D and payouts. But potential endogeneity prevents us from drawing strong inferences from these simple comparisons.

More importantly, for acquisitions, investments, R&D, dividends, and repurchases, the differences in the growth rate between treatment and control firms are statistically and economically insignificant, suggesting that the parallel trends assumption is satisfied. For cash holdings, the growth rate is lower for treatment firms than for control firms, and the difference is statistically significant at the 0.10 level. Thus, the pre-treatment trends might induce bias against finding an increase in cash holdings for the treatment firms.

IV. Board independence and cash holdings

A. Main results

We first investigate the effect of board independence on cash holdings across all firm-types. Table II reports the results. In model (1), we choose control variables according to Sufi (2009) and Yun (2009). In model (2), we choose control variables based on Opler et al. (1999) and Bates, Kahle, and Stulz (2009). Model (3) roughly combines model (1) and model (2). In model (4), we

simplify model (3) by dropping the payout and spending variables. The dependent variable, *Post*, and *Treat* all refer to period t, while the control variables are lagged to mitigate reverse causality.

The coefficient of $Post \times Treat$ is positive and statistically significant at the 0.01 level in all models, suggesting that an increase in board independence leads to an increase in cash holdings. Given the magnitude of the coefficient of about 0.019 and the sample average cash/asset ratio is 0.162, the treatment firms increase their cash/asset ratio by 11.7% relative to the control firms.[3] We interpret these initial results as evidence that changing a board from being dependent (a minority of directors are independent) to independent (a majority of directors are independent) results in greater corporate cash holdings.

B. Information asymmetry

The benefit of employing independent directors hinges on a continuous flow of information from the company to independent directors (Fama and Jensen (1983), Hermalin and Weisbach (1998), Raheja (2005), Adams and Ferreira (2007), Harris and Raviv (2008)). In this section, we examine whether the effect of board independence on cash holdings varies across measures for information asymmetry between the company and outsiders. We conjecture that board independence has a more positive effect on cash holdings when independent directors have ready access to information about the company, and, thus, can better control how the cash is spent.

Extant literature establishes that information asymmetry is increasing in analyst forecast errors and forecast standard deviations. Following Krishnaswami and Subramaniam (1999) and Duchin, Matsusaka, and Ozbas (2010), we measure the forecast error by the absolute difference between actual quarterly earnings per share and the latest average forecast, scaled by the stock price per share at the beginning of the month. Based on Krishnaswami and Subramaniam (1999), we define the forecast standard deviation as the standard deviation of the earnings forecast of the earnings at the end of the fiscal year, scaled by the stock price per share at the beginning of the month.[4] We examine how board independence affects cash holdings given a level of information

[3] We interpret the coefficient following Melzer (2011); an increase of 0.019 over an average of 0.162 leads to an 11.7% increase.

[4] The number of analysts following a firm is another common measure of information asymmetry. We do not use that measure, because firm opacity ostensibly attracts analysts. For example, Lehavy, Li, and Merkley (2011) contend that lower readability of 10-K filings increases the demand for analyst services, and they document a negative relationship between the number of analyst covering one firm and 10-K readability. This endogeneity of the number of analysts interferes with the interpretation of results based on number of analysts as an independent variable.

asymmetry. Thus, we measure information asymmetry in the year 2001, before the change of board independence could affect information asymmetry (Armstrong, Core, and Guay (2014)). Incidentally, the correlation coefficient between forecasts errors and forecast standard deviations is 0.44, suggesting that these two variables capture a lot of the same firm characteristics.

Table III partitions the regression specification in Model (4) of Table II by the proxies for information asymmetry. The partitioning of the regression results by information asymmetry shows that an increase in board independence significantly raises the cash holdings if information asymmetry is low, but not if information asymmetry is high. For example, treatment firms increase their cash ratio by 18.51% (0.03/0.162) more than the control firms if they exhibit low information asymmetry as measured by analyst forecast errors, and this is increase is statistically significant at the one percent level. In comparison, the estimated cash ratio increase is only 3.70% (0.006/0.162) for firms with high information asymmetry, which is not statistically significant at the one percent level.

The results in Table III suggest that greater board independence leads to higher corporate cash holdings, but only when the firms are relatively transparent. Conversely, if the firms are opaque, changes in board independence have no discernible effect. We interpret these results to mean that independent directors of with ready access to information significantly influence corporate decisions that, in turn, affect corporate cash holdings. Given that the net effect on cash holdings is positive, it is reasonable to conjecture that independent directors tend to hold back spending. We examine this next.

V. Corporate spending

Our evidence thus far suggests that greater board independence results in greater cash holdings. Based on the argument of Jensen (1986) and Harford, Mansi, and Maxwell (2008) that managers subject to a weak governance structure are more inclined to spend cash, we examine three possible sources for the documented increase in cash holdings: reduced spending on M&A, capital expenditures, or R&D. In addition, based on the possibility that disbursements to shareholders might be the outcome of good governance (La Porta et al. (2000)), we examine the effect of greater board independence on dividends and share repurchases.

A. Spending on M&A

Corporate acquisitions are burdened with agency problems. Jensen (1986) argues that acquisitions might increase managerial utility even if they destroy shareholder wealth. The utility boost stems from greater power, greater compensation (Grinstein and Hribar (2004); Harford and Li (2007)), greater job security (Shleifer and Vishny (1989)), and diversified human capital (Morck, Shleifer, and Vishny (1990)). Thus, in the absence of strong governance mechanisms, executives are inclined to make more acquisitions than what is in the interest of shareholders, and these acquisitions could drain cash holdings. The implication is that an improvement in corporate governance curbs acquisition activity. A further implication, which we will revisit in a later section, is that the remaining activity should create more value, on average, for shareholders.

To examine the effect of board independence on M&A spending, we adopt a similar regression specification as we used for analyzing the effect on cash holdings, but with M&A spending as the dependent variable. Harford, Mansi, and Maxwell (2008) argue that time-varying industry effects drive merger and acquisition decisions. Thus, following Gormley and Matsa (2014), we control for the unobserved industry-specific heterogeneity by including industry × year fixed effects, where industry classification is based on the 12 Fama-French industries. We also control for standard financial variables motivated by Comment and Schwert (1995) and Harford, Mansi, and Maxwell (2008).

Panel A of Table IV presents the results. The regression for the whole sample shows that the increase in board independence results in a statistically significant decrease in M&A spending. The coefficient of *Post* × *Treat* of −0.010 suggests that a change in board structure from a majority of insiders to a majority of independent directors decreases M&A spending as a fraction of assets by one percent more than the control firms. Based on an average fraction of M&A spending of three percent, the decrease represents one-third, which we view to be highly economically significant.

Partitioning the regressions by information asymmetry reveals that the reduction in M&A as a result of greater board independence is more pronounced for transparent firms. For example, based on the average coefficients across the two information asymmetry measures, treatment firms cut their acquisition/asset ratio by 38% (((−0.009−0.014)/2)/0.030) more than the control firms if they are transparent, while the analogous cut is 22% (((−0.008−0.005)/2)/0.030) for opaque firms. Thus, independent directors hold back more back acquisition activity if the firms are transparent.

We interpret this as evidence that board independence represents an effective governance mechanism that reigns in wasteful spending, provided that the independent directors are equipped with sufficient information. But even with limited information, they might be reluctant to approve acquisitions.

The results for M&A spending complement the results for cash holdings. The coefficient of *Post* × *Treat* for the whole sample in the cash regressions is +0.019, while it is −0.010 for the M&A spending regressions, suggesting that the average cash holding increase for the treatment firms largely stems from reduction in M&A spending.[5] Furthermore, in both regression sets, the results are more pronounced among transparent firms. Thus, the documented cash holding increase is largely, or perhaps entirely, attributable to new independent directors curtailing M&A activity. The rest of the cash holding increase, if any, might be spread across many possible categories, and we examine a couple of those possibilities next.

B. Capital expenditures

While not necessarily fraught with the same types and magnitude of agency problems as acquisitions, capital expenditures represent another source of conflict between executives and shareholders. That is, executives might resort to capital expenditures to grow the company and their power at the expense of shareholders (McConnell and Muscarella (1985) and Titman, Wei, and Xie (2004)). Moreover, Malmendier and Tate (2005) argue that overconfident executives overestimate returns to investment projects and, thus, overinvest when they have abundant cash holdings. On the other hand, Stein (1989) develops a model of myopic behavior in which executives forego value-enhancing projects to boost current earnings. Thus, we do not have a clear prediction of the effect of corporate governance quality on capital expenditures.

Panel B of Table IV presents regressions of capital expenditures. None of the coefficients of *Post* × *Treat* differ statistically from zero at conventional levels, not even in the subsamples of transparent firms. Thus, there is no evidence to suggest that greater board independence affects capital expenditures. This also means that the documented effect that board independence has on cash holdings cannot be explained by changes in capital expenditures. The evidence on capital expenditures does not refute the argument of Jensen (1986) and Harford, Mansi, and Maxwell

[5] Note, however, that the M&A spending refers to an annual figure, while the cash holdings refer to a cumulative figure, so the coefficients are not directly comparable.

(2008) that executives subject to weak governance are more inclined to spend cash; rather, it suggests that the effect of governance on corporate spending predominantly appears in non-capex spending (such as M&A spending) or is too fragile to discern.

C. R&D

R&D differ in important ways from M&A and other investments, especially as it relates to corporate governance. Consequently, greater board independence might trigger the opposite pattern for spending on R&D than for M&A.

If executives seek to maximize shareholder value, they should make decisions that consider both current and future cash flow. But because the short-term cash-flow and earnings are readily observable, whereas the long-term performance is not evident until time has passed, executives might be tempted to overemphasize short-term metrics in their decision-making. Executive compensation that ties bonuses and pensions to recent earnings exacerbates this temptation. Consequently, executives might rationally forsake shareholder value for a temporary boost in cash flow or earnings. Withholding R&D expenses is particularly powerful for this purpose, because they hit both cash flow and earnings immediately while their benefits typically accrue years thereafter. An obvious implication is that executives might temporarily boost current cash flow or earnings, e.g., by withhold R&D expenses, in the absence of an effective governance structure. Graham, Campbell, and Rajgopal (2005, p. 67) reach precisely this conclusion based on their survey evidence: "The majority of CFOs admit to sacrificing long-term economic value to hit a target or to smooth short-term earnings. Such actions suggest a flaw in corporate governance practices." On this basis, we expect that increased board independence leads to greater R&D expenses, even though this would counter the net effect that we observe for cash holdings.

Panel C of Table IV presents the results from the R&D regressions. The coefficient of *Post* × *Treat* is positive in all models. It is statistically significant at the 0.10 level for the whole sample. Furthermore, while the coefficient is highest for the subsamples with low information asymmetry, it is statistically insignificant for all subsamples, likely due to low statistical power. This suggests that greater board independence spurs more R&D, possibly because executives are inclined to hold back R&D in the absence of strong monitoring. This also suggests that the effect of board independence on cash holdings occurs *despite* changes in R&D, not *because* of changes in R&D.

D. Dividends

Shareholder payouts, including dividends and share repurchases, can mitigate the agency problem between managers and shareholders by reducing funds available for wasteful spending. For example, Easterbrook (1984) concludes that "dividends may keep firms in the capital market, where monitoring of managers is available at lower cost" (pp. 657–658). This suggests that dividends are particularly useful in reducing agency problems when information asymmetry is high such that the need for monitoring is great.

However, as emphasized by La Porta et al. (2000), it is unclear how shareholders actually get firms to pay out funds and, more generally, whether payouts and corporate governance are substitutes or complements. Consistent with the latter, i.e., that payouts and governance are complementary, La Porta et al. find that firms in countries with better protection of minority shareholders pay higher dividends, suggesting that investors in those countries use their legal powers to extract dividends from firms.

Extending the arguments and findings of La Porta et al., we conjecture that it is especially independent directors who push for higher dividends to curb potential overinvestment. If so, we expect to see that an increase in board independence induces an increase in payouts. Furthermore, if payouts are more useful in reducing agency problems in the presence of information asymmetry, we expect that the induced payout increase is greater when information asymmetry is high.

We first examine the effect of board independence on dividends. Panel D of Table IV presents the results from the dividend regressions. The coefficient of *Post* × *Treat* is positive in all models, and it is statistically significant at the 0.05 level for the two subsamples with high information asymmetry. This suggests that greater board independence leads to greater dividend payments for opaque firms, consistent with the notion that the new independent directors promote higher dividends when it is difficult to monitor executives' investment decisions.

E. Share repurchases

Whereas dividends implicitly commit firms to future payouts, share repurchases are inherently very flexible (Jagannathan, Stephens, and Weisbach (2000)). As such, share repurchases might be less effective than dividends in curbing overinvestment. But repurchases come with tax advantages (Lie and Lie (1999); Grullon and Michaely (2002)), so it is conceivable that independent directors advocate repurchases in place of, or in addition to, dividends.

Panel D of Table IV presents the results from the repurchase regressions. The coefficient of *Post* × *Treat* is negative in the subsamples of transparent firms and positive in the subsamples of opaque firms, but none of the coefficients differ statistically from zero. Thus, there is statistically weak evidence that new independent directors promote lower repurchases when they can readily monitor executives' investment decisions and higher repurchases otherwise.

F. The acquirer abnormal returns

Our results show that greater board independence has a dampening effect on acquisitions. This is consistent with independent directors restraining value-destroying acquisitions that executives wish to pursue to enhance their utility. If so, the acquisitions that survive the intensified scrutiny of independent directors should create more value, on average, than acquisitions that executives otherwise would pursue. To test this, we examine whether greater board independence raises acquirers' abnormal returns around announcement dates.

We obtain deal data from SDC Platinum's Mergers and Acquisitions database. The sample contains 2,859 takeovers by U.S. acquirers. Following Masulis, Wang, and Xie (2007) and Harford, Humphery-Jenner, and Powell (2012), we require that (i) the acquisition was completed, (ii) the acquirer owned less than 50% of the target before the acquisition and 100% after, and (iii) the transaction value exceeds $1 million. In addition, we require that the acquirer's firm-year observations are in our main sample described in Table I.

Table V presents the deal characteristics. Two-thirds of the acquisitions involve a private target, and a couple of percent involve a subsidiary target. The average transaction value is $673 million, and the average transaction value scaled by the acquirer's market capitalization is about 10%. The average abnormal stock return for the acquirer from day −3 to +3 relative to the announcement is 0.2%.

Table VI presents regressions of the abnormal return for the acquirer around the announcements. As before, we focus on the coefficient of *Post* × *Treat*. But we also control for firm and deal characteristics and industry × year fixed effects, none of which are tabulated for brevity. As expected, the coefficient of *Post* × *Treat* is positive for the whole sample, but it is not statistically significant at the 0.10 level. In subsamples of transparent firms, the coefficient hovers around 0.01, and, depending on the proxy used for information asymmetry, it is statistically significant at either the 0.01 or 0.05 level. These results suggest that, if the information asymmetry

is low, greater board independence leads to an average increase in treated acquirer announcement returns of about one percent more than those for control firms.

Combined, the results on M&A spending and announcement suggests that the increase in board independence causes firms to weed out some deals with the least potential to create value. We are also inclined to conclude that this enhances shareholder value.

VI. The value of cash

The evidence presented thus far suggests that greater board independence has a favorable effect on cash policy and spending. In our final analysis, we examine whether greater board independence affects how the capital market values corporate cash holdings.

Other studies reviewed earlier have examined the same general issue. Most prominently, Dittmar and Mahrt-Smith (2007) document that an improved governance, as measured by the G-index, inflates the market's valuation of cash holdings. However, as noted before, the G-index suffers from endogeneity problems and issues with interpretation.[6] Dittmar and Mahrt-Smith (2007) recognize the endogeneity problem, but argue that the use of an interaction between cash and the G-index is less susceptible to endogeneity than the G-index itself. In addition, they attempt to address endogeneity by using the initial value of the G-index, which they argue is more exogenous than the updated G-index.

We use the exogenous shock to board independence to test the relationship between governance and value of cash. In particular, building on Faulkender and Wang (2006), we run the following regression:

$$\begin{aligned}\ln\left(r_{i,t}-R_{i,t}^{B}\right)=\gamma_0+\gamma_1\frac{\Delta C_{i,t}}{M_{i,t-1}}+\gamma_2\frac{\Delta E_{i,t}}{M_{i,t-1}}+\gamma_3\frac{\Delta NA_{i,t}}{M_{i,t-1}}+\gamma_4\frac{\Delta RD_{i,t}}{M_{i,t-1}}\\ +\gamma_5\frac{\Delta I_{i,t}}{M_{i,t-1}}+\gamma_6\frac{\Delta D_{i,t}}{M_{i,t-1}}+\gamma_7\frac{C_{i,t-1}}{M_{i,t-1}}+\gamma_8 L_{i,t}+\gamma_9\frac{NF_{i,t}}{M_{i,t-1}}\\ +\gamma_{10}\frac{C_{i,t-1}}{M_{i,t-1}}\frac{\Delta C_{i,t}}{M_{i,t-1}}+\gamma_{11}L_{i,t}\frac{\Delta C_{i,t}}{M_{i,t-1}}+\gamma_{12}Post_t\times\frac{\Delta C_{i,t}}{M_{i,t-1}}\\ +\gamma_{13}Treat_i\times\frac{\Delta C_{i,t}}{M_{i,t-1}}+\gamma_{14}Post_t\times Treat_i\times\frac{\Delta C_{i,t}}{M_{i,t-1}}+\epsilon_{i,t}\end{aligned}\quad(1)$$

[6] In robustness tests, they also use the entrenchment index (which is a subcomponent of the G-index), block holdings and pension fund holdings. These measures suffer from similar endogeneity problems as the G-index.

where $\Delta X_t \equiv X_t - X_{t-1}$ denotes the one-year change in X, and the scaling variable $M_{i,t-1}$ is the lagged market equity. The dependent variable is the natural logarithmic excess returns, $\ln(r_{i,t} - R^B_{i,t})$, where $r_{i,t}$ is the stock returns for firm i in fiscal year t, and $R^B_{i,t}$ is the return on size and book-to-market matched portfolios in fiscal year t. Because the excess returns, $r_{i,t} - R^B_{i,t}$, are skewed, we use the log returns to make sure the distribution is reasonably normal and the t test is suitable for gauging statistical significance. The independent variables include the sum of cash and short-term investments ($C_{i,t}$), earnings before interest and extraordinary items ($E_{i,t}$), net assets ($NA_{i,t}$), R&D expenditure ($RD_{i,t}$), interest expense ($I_{i,t}$), total dividends ($D_{i,t}$), leverage $L_{i,t}$, and net financing during fiscal year t ($NF_{i,t}$). The coefficient on $Post_t \times Treat_i \times \Delta C_{i,t} / M_{i,t-1}$ (i.e., γ_{14}) captures the treatment effect of the change in board independence on the excess returns.

Panel A of Table VII shows the regression results. The coefficient of interest, γ_{14}, is positive for the whole sample, but it is not statistically different from zero at the 0.10 level. However, as we dissect the sample, we find that the coefficient is positive and statistically significant at the 0.05 level in one of the subsamples of transparent firms. Conversely, the coefficient is statistically insignificant in the subsamples of opaque firms. The results suggest that greater board independence has a favorable effect on the valuation of cash in cases where the independent directors have sufficient information to effectively counsel and monitor executives.

Gormley and Matsa (2014) show that the use of size and B/M adjusted returns as dependent variables could bias the estimates. They propose the use of fixed effects as a solution. In our case, we could control for the time-varying portfolio fixed effects. However, doing so assumes that the unobservable heterogeneity of portfolios is driving the stock returns. Sorting portfolios by size and B/M assumes that these two observable characteristics help explain the cross-section of stock returns. So instead of controlling for unobservable heterogeneity at the portfolio level, we directly control for the observable characteristics at the firm level. This approach is widely used in the literature. Haugen and Baker (1996), Fama and French (2006), Lewellen (2015), and Bessembinder, Cooper, and Zhang (2015) all directly link firm characteristics to stock returns. In essence, Faulkender and Wang (2006) are using the same approach to study the relationship between cash holdings and stock returns. Therefore, we modify equation (1) to get the following:

$$\ln\left(r_{i,t}\right) = \gamma_0 + \gamma_1 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_2 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \gamma_3 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \gamma_4 \frac{\Delta RD_{i,t}}{M_{i,t-1}}$$
$$+\gamma_5 \frac{\Delta I_{i,t}}{M_{i,t-1}} + \gamma_6 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \gamma_7 \frac{C_{i,t-1}}{M_{i,t-1}} + \gamma_8 L_{i,t} + \gamma_9 \frac{NF_{i,t}}{M_{i,t-1}}$$
$$+\gamma_{10} \frac{C_{i,t-1}}{M_{i,t-1}} \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{11} L_{i,t} \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{12} Post_t \times \frac{\Delta C_{i,t}}{M_{i,t-1}}$$
$$+\gamma_{13} Treat_i \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{14} Post_t \times Treat_i \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{15} \ln\left(M_{i,t-1}\right) + \gamma_{16} \frac{B_{i,t-1}}{M_{i,t-1}} + \epsilon_{i,t} \quad (2)$$

where the dependent variable ($\ln(r_{i,t})$) is the log returns for firm *i* in fiscal year *t*, and log of lagged market equity, $\ln(M_{i,t-1})$, and lagged book-to-market ratio, $B_{i,t-1} / M_{i,t-1}$ are added. Panel B of Table VII presents the results from this modified regression specification. In general, the results are similar to those in panel A. However, the statistical significance for the whole sample and the subsamples of transparent firms is stronger in Panel B. This corroborates and strengthens our earlier interpretation.

VII. Conclusion

Using the 2003 NYSE and NASDAQ listing requirement on board composition, we examine the effect of board independence on cash policy and spending. We find that an increase in board independence results in less spending on acquisitions and more spending on R&D spending, suggesting that independent directors mitigate the tendency for self-interested executives to overinvest in acquisitions and underinvest in R&D. Upon the curtailment in acquisition activity, the average value creation of acquisitions increases. The net result of the changes in these and other corporate decisions is to increase both the level and value of cash holdings.

There are two important caveats to our study. First, we report evidence that greater board independence is not universally beneficial. Our results, especially those for the level and value of cash holdings, are generally stronger for transparent firms, and several of the effects are absent among opaque firms. We interpret these results to mean that the effectiveness and benefit of independent directors increase with their access to relevant information about the firm and its projects. That is, independent directors have to be informed to serve effectively as advisors and

monitors. But we also report evidence that independent directors with limited information have influence, primarily by inducing firms to increase dividend payments.

The second caveat is that our study focuses on changes from a minority to majority of independent directors, which we document to be beneficial. We cannot generalize to the effect of, say, increasing the fraction of independence directors from 90% to 100%. The literature reviewed earlier suggests that inside directors have certain advantages, especially in their knowledge about the many aspects of the firm. Thus, having at least one inside director could be strictly better than none. But we venture to conclude that independent directors generally improve decision-making in firms that also have a few inside directors, and the optimal fraction of independent directors exceeds one half.

REFERENCES

Adams, Renée B., and Daniel Ferreira, 2007, A theory of friendly boards, *Journal of Finance* 62, 217–250.

Almeida, Heitor, Murillo Campello, Igor Cunha, and Michael S. Weisbach, 2014, Corporate liquidity management: A conceptual framework and survey, *Annual Review of Financial Economics* 6, 135–162.

Armstrong, Christopher S., John E. Core, and Wayne R. Guay, 2014, Do independent directors cause improvements in firm transparency?, *Journal of Financial Economics* 113, 383–403.

Bates, Thomas W, Kathleen M Kahle, and René M Stulz, 2009, Why do US firms hold so much more cash than they used to?, *Journal of Finance* 64, 1985–2021.

Bessembinder, Hendrik, Michael J. Cooper, and Feng Zhang, 2015, Characteristic-based expected returns and corporate events, *Working paper*.

Bushee, Brian J., 1998, The influence of institutional investors on myopic R&D investment behavior, *Accounting Review* 73, 305–333.

Cen, Ling, Sudipto Dasgupta, and Rik Sen, 2015, Discipline or Disruption? Stakeholder relationships and the effect of takeover threat, *Management Science,* forthcoming.

Chen, Q., X. Chen, K. Schipper, Y. Xu, and J. Xue, 2012, The sensitivity of corporate cash holdings to corporate governance, *Review of Financial Studies* 25, 3610–3644.

Chen, Tao, Jarrad Harford, and Chen Lin, 2015, Do analysts matter for governance? Evidence from natural experiments, *Journal of Financial Economics* 115, 383–410.

Chhaochharia, Vidhi, and Yaniv Grinstein, 2007, Corporate governance and firm value: The impact of the 2002 governance rules, *Journal of Finance* 62, 1789–1825.

Comment, Robert, and G.William Schwert, 1995, Poison or placebo? Evidence on the deterrence and wealth effects of modern antitakeover measures, *Journal of Financial Economics* 39, 3–43.

Cremers, Martijn, Lubomir P. Litov, and Simone M. Sepe, 2016, Staggered boards and firm value, revisited, *Working paper*.

Dittmar, Amy, and Jan Mahrt-Smith, 2007, Corporate governance and the value of cash holdings,

Journal of Financial Economics 83, 599–634.

Duchin, Ran, John G. Matsusaka, and Oguzhan Ozbas, 2010, When are outside directors effective?, *Journal of Financial Economics* 96, 195–214.

Easterbrook, Frank H., 1984, Two agency-cost explanations of dividends, *American Economic Review* 74, 650–659.

Faleye, Olubunmi, 2004, Cash and corporate control, *Journal of Finance* 59, 2041–2060.

Fama, Eugene F, and Kenneth R French, 1998, Taxes, financing decisions, and firm value, *Journal of Finance* 53, 819–843.

Fama, Eugene F, and Michael C Jensen, 1983, Separation of ownership and control, *Journal of Law & Economics* 26, 301–325.

Fama, Eugene F., and Kenneth R. French, 2006, Profitability, investment and average returns, *Journal of Financial Economics* 82, 491–518.

Faulkender, Michael, and Rong Wang, 2006, Corporate financial policy and the value of cash, *Journal of Finance* 61, 1957–1990.

Fich, Eliezer M., Jarrad Harford, and Adam S. Yore, 2016, The effect of takeover protection on the value of cash: Evidence from a natural experiment, *Working paper*.

Frésard, Laurent, and Carolina Salva, 2010, The value of excess cash and corporate governance: Evidence from US cross-listings, *Journal of Financial Economics* 98, 359–384.

Gao, Huasheng, Jarrad Harford, and Kai Li, 2013, Determinants of corporate cash policy: Insights from private firms, *Journal of Financial Economics* 109, 623–639.

Gompers, Paul, Joy Ishii, and Andrew Metrick, 2003, Corporate governance and equity prices, *The Quarterly Journal of Economics* 118, 107–155.

Gormley, TA, and DA Matsa, 2014, Common errors: How to (and not to) control for unobserved heterogeneity, *Review of Financial Studies* 27, 617–661.

Graham, John R., Harvey, Campbell R. and Rajgopal, Shiva, 2005, The economic implications of corporate financial reporting, *Journal of Accounting and Economics* 40, 3–73.

Graham, John R., and Mark T. Leary, 2016, The evolution of corporate cash, *Working paper*.

Grinstein, Yaniv, and Paul Hribar, 2004, CEO compensation and incentives: Evidence from M&A

bonuses, *Journal of Financial Economics* 73, 119–143.

Grullon, Gustavo, and Roni Michaely, 2002, Dividends, share repurchases, and the substitution hypothesis, *Journal of Finance* 57, 1649–1684.

Guo, Lixiong, and Ronald W. Masulis, 2015, Board structure and monitoring: New evidence from CEO turnovers, *Review of Financial Studies* 28, 2770–2811.

Harford, Jarrad, 1999, Corporate cash reserves and acquisitions, *Journal of Finance* 54, 1969–1997.

Harford, Jarrad, Mark Humphery-Jenner, and Ronan Powell, 2012, The sources of value destruction in acquisitions by entrenched managers, *Journal of Financial Economics* 106, 247–261.

Harford, Jarrad, and Kai Li, 2007, Decoupling CEO wealth and firm performance: The case of acquiring CEOs, *Journal of Finance* 62, 917–949.

Harford, Jarrad, Sattar A Mansi, and William F Maxwell, 2008, Corporate governance and firm cash holdings in the US, *Journal of Financial Economics* 87, 535–555.

Harris, Milton, and Artur Raviv, 2008, A theory of board control and size, *Review of Financial Studies* 21, 1797–1832.

Haugen, Robert A., and Nardin L. Baker, 1996, Commonality in the determinants of expected stock returns, *Journal of Financial Economics* 41, 401–439.

Hermalin, Benjamin E, and Michael S. Weisbach, 1988, The determinants of board composition, *RAND Journal of Economics* 19, 589–606.

Hermalin, Benjamin E, and Michael S Weisbach, 1998, Endogenously chosen boards of directors and their monitoring of the CEO, *American Economic Review* 88, 96–118.

Heron, Randall A., and Erik Lie, 2015, The effect of poison pill adoptions and court rulings on firm entrenchment, *Journal of Corporate Finance* 35, 286–296.

Jagannathan, Murali, Clifford P. Stephens, and Michael S. Weisbach, 2000, Financial flexibility and the choice between dividends and stock repurchases, *Journal of Financial Economics* 57, 335–384.

Jensen, Michael C, 1986, Agency costs of free cash flow, corporate finance, and takeovers,

American Economic Review 76, 323–329.

Jensen, Michael C, 1993, The modern industrial revolution, exit, and the failure of internal control systems, *Journal of Finance* 48, 831–880.

Johnson, William C., Jonathan M. Karpoff, and Sangho Yi, 2015, The bonding hypothesis of takeover defenses: Evidence from IPO firms, *Journal of Financial Economics* 117, 307–332.

Kalcheva, I, and Karl V. Lins, 2007, International evidence on cash holdings and expected managerial agency problems, *Review of Financial Studies* 20, 1087–1112.

Karpoff, Jonathan M., Robert J. Schonlau, and Eric W Wehrly, 2015, Do takeover defenses deter takeovers?, *Working paper*.

Knyazeva, Anzhela, Diana Knyazeva, and Ronald W. Masulis, 2013, The supply of corporate directors and board independence, *Review of Financial Studies* 26, 1561–1605.

Krishnaswami, Sudha, and Venkat Subramaniam, 1999, Information asymmetry, valuation, and the corporate spin-off decision, *Journal of Financial Economics* 53, 73–112.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Schleifer, and Robert W. Vishny, 2000, Agency problems and dividend policies around the world, *Journal of Finance* 55, 1–33.

Lehavy, Reuven, Feng Li, and Kenneth Merkley, 2011, The effect of annual report readability on analyst following and the properties of their earnings forecasts, *Accounting Review* 86, 1087–1115.

Lewellen, Jonathan, 2015, The cross section of expected stock returns, *Critical Finance Review* 4, 1–44.

Lie, Erik, and Heidi Lie, 1999, The role of personal taxes in corporate decisions: An empirical analysis of share repurchases and dividends, *Journal of Financial and Quantitative Analysis* 34, 533–552.

Machlin, Judith C., Hyuk Choe, and James A. Miles, 1993, The effects of golden parachutes on takeover activity, *Journal of Law and Economics* 36, 861–876.

Masulis, Ronald W., and Shawn Mobbs, 2011, Are all inside directors the same? Evidence from the external directorship market, *Journal of Finance* 66, 823–872.

Masulis, Ronald W., Cong Wang, and Fei Xie, 2007, Corporate governance and acquirer returns,

Journal of Finance 62, 1851–1889.

Malmendier, Ulrike, and Geoffrey Tate, 2005, CEO overconfidence and corporate investment, *Journal of Finance* 60, 2661–2700.

McConnell, John J., and Chris J. Muscarella, 1985, Corporate capital expenditure decisions and the market value of the firm, *Journal of Financial Economics* 14, 399–342.

Melzer, B. T., 2011, The Real Costs of Credit Access: Evidence from the payday lending market, *Quarterly Journal of Economics* 126, 517–555.

Morck, Randall, Andrei Shleifer, and Robert W Vishny, 1990, Do managerial objectives drive bad acquisitions?, *Journal of Finance* 45, 31–48.

Nikolov, Boris, and Toni M Whited, 2014, Agency conflicts and cash: Estimates from a dynamic model, *Journal of Finance* 69, 1883–1921.

Opler, Tim, Lee Pinkowitz, René Stulz, and Rohan Williamson, 1999, The determinants and implications of corporate cash holdings, *Journal of Financial Economics* 52, 3–46.

Pinkowitz, Lee, René Stulz, and Rohan Williamson, 2006, Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis, *Journal of Finance* 61, 2725–2751.

Raheja, Charu G., 2005, Determinants of board size and composition: A theory of corporate boards, *Journal of Financial and Quantitative Analysis* 40, 283–306.

Roberts, Michael R., and Toni M. Whited, 2013, Endogeneity in Empirical Corporate Finance, in George Constantinides, in Milton Harris, and in René Stulz ed.: Handbook of the Economics of Finance (North Holland, Amsterdam).

Rosenstein, Stuart, and Jeffrey G Wyatt, 1990, Outside directors, board independence, and shareholder wealth, *Journal of Financial Economics* 26, 175–191.

Shleifer, Andrei, and Robert W. Vishny, 1989, Management entrenchment: The case of manager-specific investments, *Journal of Financial Economics* 25, 123–139.

Smith, Erin E., 2015, Do shareholders want less governance?, *Working paper*.

Stein, Jeremy, 1989, Efficient capital markets, inefficient firms: a model of myopic corporate behavior, *Quarterly Journal of Economics* 104, 655–669

Sufi, Amir, 2009, Bank lines of credit in corporate finance: An empirical analysis, *Review of Financial Studies* 22, 1057–1088.

Titman, Sheridan, K. C. John Wei, Feixue Xie, 2004, Capital investments and stock returns, *Journal of Financial and Quantitative Analysis* 39, 677-700.

Wintoki, M. Babajide, James S. Linck, and Jeffry M. Netter, 2012, Endogeneity and the dynamics of internal corporate governance, *Journal of Financial Economics* 105, 581–606.

Yun, Hayong, 2009, The choice of corporate liquidity and corporate governance, *Review of Financial Studies* 22, 1447–1475.

Table I: Sample statistics

Panel A of this table presents summary statistics for the sample of 10,576 firm-years from 1996 to 2009. Assets are the total book value of assets. Leverage is the book value of total debt divided by the sum of the book value of debt and the market value of equity. Cash flow is the earnings after interest, dividends, and taxes, but before depreciation. The market-to-book ratio is the market value of assets (the book value of assets less the book value of equity plus the market value of equity) divided by the book value of assets. Cash is the sum of cash and short-term investments. Tangible assets are net property, plant and equipment. For each firm-year, we compute the standard deviation of the cash flow to assets for the past ten years. Industry cash flow volatility is the average cash flow standard deviation for firms in the same industry based on the two-digit SIC code. Industry sales volatility is the median of the within-year standard deviation of sales for all firms in the same industry based on the three-digit SIC code. Board size is the total number of directors on the board. Panel B compares treatment and control firms from 1998 to 2001. A firm is assigned to the treatment group if it had less than 50% independent directors in 2001; otherwise it belongs to the control group. There are 587 treatment firm-years and 2,417 control firm-years. We compute the differences in the means and the *t*-statistic of the difference.

Panel A: Summary statistics of the whole sample

	Mean	Median	Std. dev.
Assets, $ million	6,626	1,439	27,811
Net sales, $ million	6,042	1,385	19,246
Leverage	0.137	0.108	0.134
Cash flow/Assets	0.086	0.090	0.090
Market-to-book	2.302	1.751	2.050
Cash/Assets	0.162	0.087	0.185
Tangible assets/Assets	0.270	0.212	0.208
Industry cash flow volatility	0.133	0.125	0.067
Industry sales volatility	0.041	0.032	0.032
Acquisitions/Assets	0.030	0.002	0.063
Capx/Assets	0.057	0.041	0.053
R&D/Assets	0.040	0.009	0.068
Fraction independent directors	0.651	0.667	0.173
Board size	9.283	9.000	2.508

Panel B: Comparison of the treatment and control firms before the treatment.

	Treatment	Control	Treatment−Control	*t*-statistic
Assets, $ million	5,744	4,371	1,373	0.921
Cash/Assets	0.143	0.154	−0.011	−1.227
Acquisitions/Assets	0.044	0.034	0.010***	2.627
Capx/Assets	0.073	0.067	0.006*	1.928
R&D/Assets	0.030	0.044	−0.014***	−4.840
Dividend/Assets	0.007	0.011	−0.004***	−6.237
Repurchase/Assets	0.011	0.023	−0.012***	−4.486
Δ(Cash/Assets)	−0.006	0.002	−0.007*	−1.668
Δ(Acquisitions/Assets)	−0.001	−0.001	0.001	0.111
Δ(Capx/Assets)	−0.007	−0.005	−0.002	−0.981
Δ(R&D/Assets)	−0.005	−0.004	−0.001	−0.449
Δ(Dividend/Assets)	0.000	−0.001	0.000	1.030
Δ(Repurchase/Assets)	0.003	0.008	−0.005	−1.276

Table II: Board independence and cash holdings

The table presents the effect of board independence on cash holdings. The dependent variable is cash holdings scaled by total assets. A firm is assigned to the treatment group (*Treat*=1) if it had less than 50% independent directors in 2001; otherwise *Treat*=0. We define 2005-2009 to be the post treatment period (*Post*=1), and 1996-2004 as the prior period (*Post*=0). However, because some treatment firms completed the board independence adjustment before 2005, we set $Post = 1$ for years 2003 and 2004 if the treatment firm met the board independence requirement the previous year. The control variables are lagged one period. The regressions include firm and year fixed effects, along with intercepts. R-squared is computed without fixed effects. *t*-statistics based on standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Post	−0.013	−0.010	−0.010	−0.013
	(−1.44)	(−1.01)	(−1.08)	(−1.48)
Post × Treat	0.019***	0.020***	0.019***	0.019***
	(3.00)	(2.73)	(2.94)	(2.97)
Log(Assets)	−0.023***	−0.030***	−0.021***	−0.024***
	(−5.43)	(−6.36)	(−4.55)	(−5.41)
Market-to-book	0.000	0.003**	0.000	−0.000
	(0.05)	(2.34)	(0.05)	(−0.09)
Cash flow/Assets	−0.059*	−0.071**	−0.045	−0.040
	(−1.70)	(−2.00)	(−1.27)	(−1.15)
Net working capital/Assets		−0.156***	−0.023	−0.009
		(−5.48)	(−0.85)	(−0.31)
Leverage	−0.260***	−0.116***	−0.266***	−0.260***
	(−12.02)	(−5.46)	(−11.03)	(−11.19)
Industry cash flow volatility		0.012	−0.016	−0.042
		(0.15)	(−0.24)	(−0.63)
Dividend dummy		−0.014***		
		(−2.59)		
Capx/Assets		−0.348***	−0.162***	
		(−8.40)	(−4.62)	
R&D/Assets		−0.066	−0.018	
		(−0.92)	(−0.24)	
Acquisitions/Assets		−0.134***	−0.117***	
		(−8.97)	(−8.41)	
Tangible assets/Assets	−0.206***		−0.179***	−0.213***
	(−7.82)		(−6.43)	(−7.93)
Industry sales volatility	0.145*			
	(1.88)			
Net worth/Assets	−0.201***		−0.193***	−0.196***
	(−12.32)		(−10.93)	(−11.28)
Rating dummy	0.003		0.002	0.003
	(0.49)		(0.44)	(0.57)
Dividend/Assets			−0.213**	
			(−2.29)	
Repurchase/Assets			−0.081***	
			(−2.82)	
Observations	10,428	9,385	9,361	10,142
R-squared	0.178	0.112	0.190	0.177

Table III: Information asymmetry

The table presents the effect of board independence on cash holdings partitioned by proxies for information asymmetry. The regression specifications are the same as Model (4) of Table II. Proxies for information asymmetry include forecast errors or forecast standard deviations as of 2001. Firms are divided into two groups based on these two proxies. Forecast error is the absolute difference between actual quarterly earnings per share and the latest average forecast, scaled by the stock price per share at the beginning of the month. Forecast standard deviation is the standard deviation of the forecasted earnings at the end of the fiscal year, scaled by the stock price per share at the beginning of the month. The regressions include firm and year fixed effects, along with intercepts. R-squared is computed without fixed effects. *t*-statistics based on standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

		Forecast error		Forecast std. dev.	
	All	Low	High	Low	High
Post × Treat	0.019***	0.038***	−0.005	0.032***	0.006
	(2.97)	(4.11)	(−0.61)	(3.48)	(0.68)
Observations	10,142	4,845	4,738	4,554	4,586
R-squared	0.177	0.211	0.175	0.231	0.166

Table IV: Board independence and corporate spending

This table presents the effects of board independence on spending of acquisitions, capital expenditures, and R&D. In panel A, the dependent variable is the spending on acquisitions scaled by total assets. In panel B, the dependent variable is the capital expenditures scaled by total assets. In panel C, the dependent variable is R&D spending scaled by total assets. We control for *Post*, log of total assets, net working capital, leverage, market-to-book ratio, cash flow to asset ratio, cash to total assets ratio, and net financing to total assets ratio. The financial variables are lagged to avoid reverse causality. *Post* and *Treat* are defined in Table II. Forecast error and forecast standard deviation are defined in Table III. All regressions include intercepts, firm fixed effects, and industry × year fixed effects. Industry classification is based on the 12 Fama-French industry classifications. R-squared is computed without fixed effects. *t*-statistics based on standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

		Forecast error		Forecast std. dev.	
	All	Low	High	Low	High
		Panel A: Acquisitions			
Post × Treat	−0.010***	−0.009*	−0.008	−0.014***	−0.005
	(−2.69)	(−1.81)	(−1.32)	(−2.82)	(−0.88)
Observations	9,485	4,436	4,513	4,210	4,306
R-squared	0.088	0.090	0.120	0.097	0.124
		Panel B: Capital expenditures			
Post × Treat	−0.003	−0.003	−0.001	0.001	−0.004
	(−1.13)	(−1.03)	(−0.28)	(0.26)	(−0.97)
Observations	10,086	4,815	4,710	4,531	4,558
R-squared	0.272	0.285	0.298	0.296	0.301
		Panel C: R&D			
Post × Treat	0.004*	0.005	0.003	0.004	0.003
	(1.95)	(1.58)	(0.95)	(1.11)	(0.97)
Observations	10,168	4,855	4,751	4,567	4,594
R-squared	0.113	0.143	0.156	0.163	0.166
		Panel D: Dividends			
Post × Treat	0.002	0.000	0.004**	0.000	0.004**
	(1.48)	(−0.02)	(2.50)	(0.12)	(2.05)
Observations	10,168	4,855	4,751	4,567	4,594
R-squared	0.064	0.105	0.090	0.106	0.089
		Panel E: Share repurchases			
Post × Treat	−0.004	−0.007	0.003	−0.008	0.005
	(−0.87)	(−1.26)	(0.42)	(−1.44)	(0.65)
Observations	10,168	4,855	4,751	4,567	4,594
R-squared	0.167	0.233	0.141	0.228	0.162

Table V: Deal characteristics

The table reports the characteristics of 2,859 M&A deals. Panel A presents the number and proportions of deals in which the attitude or recommendation of the target company's management or board of directors toward the transaction is friendly (Friendly), cash is the method of payment (All cash), stock is the method of payment (All stock), the target is private (Private), the target is a subsidiary (Subsidiary), the deal is competed (Competed), the deal is a cross-border deal (Cross-border), and the target and the acquirer are in different Fama-French 48 industries (Diversifying). Panel B presents descriptive statistics for the deal value, relative size (the deal value scaled by the acquirer's market capitalization 11 days before the announcement date), and the stock run-up (acquirer buy-and-hold-abnormal return during the 200 days ending 11 days before the announcement date using the CRSP value-weighted index as the market return). The acquirer announcement return is the cumulative abnormal return for the acquirer over the seven-day event window (CAR[−3, +3]) around the announcement based on the market model, where the market model is estimated over days [−210, −11].

Panel A: Number of deals and proportions		
	Number of deals	Proportion
Friendly	2,816	0.985
All cash	1,043	0.365
All stock	558	0.195
Private	1,914	0.670
Subsidiary	71	0.025
Competed	54	0.019
Cross-border	541	0.189
Diversifying	1,258	0.440

Panel B: Summary statistics			
	Mean	Median	Std. dev.
Deal value, $ million	673	80	3,539
Relative size	0.098	0.027	0.195
Stock price run-up	0.124	0.042	0.454
Acquirer announcement return	0.002	0.002	0.083

Table VI: Board independence and M&A announcement returns

The table reports results from regressions of M&A announcement returns. The dependent variable is the cumulative abnormal return for the acquirer over the seven-day event window (CAR[−3, +3]) around the announcement based on the market model, where the market model is estimated over days [−210, −11]. *Post* and *Treat* are defined in Table II. Forecast error and forecast standard deviation are defined in Table III. Control variables include the lagged financial characteristics of the acquirers (assets, market-to-book, leverage, and cash flows as defined in Table I) and deal characteristics (friendly dummy, all cash dummy, private dummy, subsidiary dummy, competed dummy, cross border dummy, diversifying dummy, relative size, and stock run-up as defined in Table V). All regressions include intercepts and industry × year fixed effects. Industry classification is based on the 12 Fama-French industry classifications. R-squared is computed without fixed effects. *t*-statistics based on standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

		Forecast error		Forecast std. dev.	
	All	Low	High	Low	High
Post × Treat	0.004	0.010***	−0.006	0.009**	0.001
	(0.95)	(3.71)	(−0.74)	(2.18)	(0.10)
Observations	2,809	1,349	1,337	1,288	1,325
R-squared	0.061	0.112	0.129	0.107	0.117

Table VIII: Board independence and the value of cash

This table reports the effect of board independence on the value of cash. The dependent variable in panel A is the natural logarithmic excess returns, $\ln(r_{i,t} - R^B_{i,t})$, where $r_{i,t}$ is the stock returns for firm *i* in fiscal year *t*, and $R^B_{i,t}$ is the return on size and book-to-market matched portfolios in fiscal year *t*. The control variables are specified in equation (1). The dependent variable in panel B is $\ln(r_{i,t})$, the log returns for firm *i* in fiscal year *t*. The control variables are specified in equation (2). *Post* and *Treat* are defined in Table II. Forecast error and forecast standard deviation are defined in Table III. Δ*C*/*M* is the change in cash holdings scaled by lagged market equity. The regressions include firm and industry × year fixed effects, along with intercepts. R-squared is computed without fixed effects. *t*-statistics based on standard errors clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

		Forecast error		Forecast std. dev.	
	All	Low	High	Low	High
Panel A: Dependent variable is $\ln(r_{i,t} - R^B_{i,t})$					
Post × Treat	0.314	0.352	0.215	0.911**	−0.268
× ΔC/M	(1.37)	(0.77)	(0.74)	(2.20)	(−1.01)
Observations	10,394	4,936	4,914	4,712	4,680
R-squared	0.303	0.319	0.324	0.305	0.368
Panel B: Dependent variable is $\ln(r_{i,t})$					
Post × Treat	0.399*	1.085**	0.075	1.433***	−0.307
× ΔC/M	(1.68)	(2.00)	(0.30)	(2.88)	(−1.23)
Observations	10,391	4,935	4,912	4,710	4,679
R-squared	0.571	0.557	0.593	0.553	0.610