Corporate Governance and the Cash ‘Puzzle’

Abstract

We propose and empirically test an agency explanation of the corporate ‘cash’ puzzle. We document that after an exogenous increase in corporate governance measured by a staggered passage of state Majority Voting laws, there is a decrease in total cash holdings. The result is entirely driven by the decrease in the risky component of cash, while the safe component is unchanged. We find similar results using two other exogenous shocks to governance – staggered adoption of state antitakeover laws and a state takeover index. The negative relation between strong corporate governance and corporate cash is driven entirely by hi-tech firms whose ‘cash’ policies are widely recognized as a key contributor to the ‘cash’ puzzle.

JEL classification: G34, G31

Keywords: corporate cash, agency, corporate governance, board of directors, hi-tech, R&D, hostile takeover
1. Introduction

The rising cash stockpiles at U.S. public firms since 1980 have been widely covered in the media, among policymakers, and in the academia (Bates et al., 2009). This trend has attracted such widespread attention primarily because of a view that ‘cash’ hoarding is inefficient, i.e. that the economy is losing out on valuable investment opportunities (Harris and Raviv, 2017). This view is consistent with the agency motive to hold cash, which says that entrenched managers would rather accumulate ‘cash’ in the absence of good investment opportunities than return ‘cash’ to shareholders (Jensen, 1986). Despite attracting the most attention, the agency theory based explanation of the corporate ‘cash’ puzzle received relatively little empirical support compared to the transactions (Azar et al., 2017), tax (Foley et al., 2007; Faulkender et al., 2017), and precautionary theories (Bates et al., 2009; Graham and Leary, 2018).

In this paper, we aim to fill this gap in the literature. Specifically, we hypothesize that the absence of supportive evidence on the relation between agency problems and the ‘cash’ puzzle may be, on the one hand, due to the difficulties in establishing a causal link from agency to ‘cash’ holdings and, on the other hand, due to the confusion regarding what financial assets constitute ‘cash’ holdings. Indeed, corporate governance indices based on firm-level variables such as the G-Index, which were utilized in a seminal Bates et al. (2009) study, have been criticized for endogeneity concerns (e.g., Core et al., 2006; Bhagat et al., 2008; Brickley and Zimmerman, 2010). Additionally, there is growing evidence that financial assets that constitute traditional proxies\(^3\) for


\(^3\) The traditional proxy for cash in Compustat is the item CHE.
‘cash’, are not homogeneous and have different determinants (Duchin et al., 2017; Cardella et al., 2018; Ysmailov, 2019).

We address these empirical challenges in the following ways. To address the endogeneity concerns, we exploit three quasi-exogenous proxies for corporate governance: (i) the staggered passage of state-level majority voting (MV) laws, which increase the reelection pressure of the members of the board of directors and thereby strengthen their monitoring efforts; (ii) the staggered passage of five types of anti-takeover laws (ATLs), which decrease the threat of hostile takeovers and thereby lessen the disciplining by the hostile takeover market; and (iii) the firm-level anti-takeover index of Cain et al. (2017), which in addition to the legal environment surrounding hostile takeovers takes into account certain firm- and macro-level variables.

To address the ambiguity of the composition of ‘cash’, we break down the traditional proxy for corporate ‘cash’, Compustat item CHE, into its two key components: ‘Cash and Cash Equivalents’, or CH in Compustat, and ‘Short-Term Investments’, or IVST in Compustat. In line with prior literature, we posit that the primary distinction between IVST and CH is in the former being subject to more risk (e.g., credit or interest rate risk) than the latter (Duchin et al., 2017). As we discuss below, our main premise is that managers’ agency motives are revealed through their holdings of risky financial assets, or short-term investments, rather than through their holdings of cash.

The key theoretical framework behind our hypotheses and analyses is the agency theory (e.g. Jensen and Meckling, 1976). Top managers may derive disproportionate benefits from managing risky assets and not bare enough of the cost. Therefore, when corporate governance is weaker, these private benefits of control will be higher and we will see greater investment in risky cash equivalents.
Furthermore, the model of Duchin et al. (2017) shows that risky financial assets are concentrated in financially unconstrained firms with large financial portfolios due to these firms’ indifference towards investing in risky assets. The indifference arises because the change in the firm’s cost of capital is exactly offset by the benefit from earning the risk premium. Duchin et al. (2017) show that even if firms are indifferent, because of private benefits of control, managers will invest in risky financial assets. The authors argue that “such a private benefit would arise if gaining experience in managing multi-asset portfolios is valued in the asset management labor market. Such human-capital building, leading to higher external salaries, decouples the manager’s future salary and the returns to investors (Holmstrom, 1999), thereby lessening the incentives from ex-post settling up the labor market (Fama, 1980).” Hence, we hypothesize that following an improvement in corporate governance, firms will decrease their holdings of risky financial assets, for which we proxy by using short-term investments.

We also conjecture that risky financial investments within total cash holdings (CHE) are a novel conduit for managerial agency problems due to career concerns, i.e. due to managers’ preference towards investing effort and human capital in more routine projects with quicker returns but with lower overall value. As pointed out by Chen and Duchin (2018), “compared with traditional real assets, financial assets are more liquid, easier to access, and carry substantially lower transaction costs. Furthermore, trading in risky financial assets is less visible, does not require an upfront investment in physical or human capital, and can generate immediate/accelerated payoffs. Finally, financing contracts such as debt covenants that are used to counter managerial agency typically restrict real investment and payout (Chava et al., 2010); however, they do not restrict nor consider financial investments.”
Our second main hypothesis is that hi-tech firms are especially vulnerable to the agency problems as reflected in their holdings of short-term investments. On the one hand, Duchin et al. (2017) document in their empirical analyses that risky financial assets are concentrated in the hi-tech sectors. On the other hand, other streams of literature document that the run-up in the average ‘cash’ ratios since 1980 was primarily driven by the changing composition of U.S. public firms towards hi-tech firms (Begenau and Palazzo, 2017; Graham and Leary, 2018). Hence, taken together, these findings may imply that hi-tech firms, being the primary drivers of the ‘cash’ puzzle and, at the same time, the primary holders of short-term investments, have accumulated short-term investments for agency reasons. Another way to look at this argument, from a theoretical perspective, is to invoke the prediction of Duchin et al.’s (2017) theoretical model that the allocation to risky financial assets grows with the size of the firm’s financial portfolio. Given that the average size of hi-tech firms’ financial portfolios is orders of magnitude larger than the size of lo-tech firms’ financial portfolios (Begenau and Palazzo, 2017; Graham and Leary, 2018; and confirmed in our analysis), we expect that the agency reasons to hold short-term investments are more pronounced for hi-tech firms.

The importance of breaking down total cash holdings (CHE) into their two key components when studying the corporate ‘cash’ puzzle is further underscored by the findings of Ysmailov (2019) who shows that the transactions motive based explanations of the ‘cash’ puzzle (Azar et al., 2018; Boileau and Moyen, 2016) are not robust when ‘cash’ is proxied by CHE. He also shows that once total cash holdings CHE is broken down into cash (CH) and short-term investment (IVST), the predictions of the transactions model of liquidity management go through.

Using a panel of 5,634 U.S. firms over the 2003 to 2017 period and a difference-in-differences methodology, we find that firms incorporated in states that exogenously reduce
managerial private benefits by passing a Majority Voting law decrease their short-term investments after the law is passed relative to otherwise similar firms incorporated in states that do not pass such a law. We control for firm characteristics such as size, leverage, firm age, cash flow level and volatility, R&D intensity, among others. We also control for time-invariant unobservable (e.g., management quality) and observable (e.g., the presence of poison pills) firm characteristics through firm fixed effects, and economy-wide shocks through time fixed effects. The results are statistically as well as economically significant. The average firm incorporated in a state that passes a Majority Voting law experiences a 19.7% reduction in short-term investments relative to an otherwise similar firm incorporated in a state that does not pass a Majority Voting law. For robustness, instead of the firm fixed effects, we use state of incorporation fixed effects and find similar results. The inclusion of state of incorporation fixed effects allows the specification to assign firms in a state that does not pass a Majority Voting law to act as control for firms in states where a Majority Voting law passed. Also, in another robustness check, we include both firm and state of headquarters by year fixed effects to control for economic and other shocks to the states of headquarters and obtain estimates consistent with our main findings.

Noteworthy, we find that firms incorporated in states that pass a Majority Voting law do not change their holdings of cash, or CH, after the law is passed. We also find that total cash holdings (CHE) decrease but not as much as short-term investments. This finding is consistent with the previous two findings as total cash holdings are the sum of net cash holdings (CH) and short-term investments (IVST). When one of its two components (i.e., short-term investments) decreases, and the other (i.e., cash) stays constant, the magnitude of total cash holdings’ decrease is smaller in relative magnitude to short-term investments.
We repeat our analysis by using alternative measures of governance, as Majority Voting laws may not fully capture the extend of change in corporate governance or may not have a strong effect on managerial behavior for some firms. Similarly to our main results above, we find that following the enactment of state antitakeover laws that weaken corporate governance, firms increase their short-term investments (IVST) but do not change their cash holdings (CH). We also find that greater susceptibility to a hostile takeover as proxied by the greater values of the Takeover Index of Cain et al (2017) results in a reduction in short-term investments but no change in cash.

Next, we turn to the cross-sectional analysis. The extant literature documents that the run-up in the average ‘cash’ ratios since 1980 was primarily driven by the changing composition of the U.S. public firms towards hi-tech (Begenau and Palazzo, 2017; Graham and Leary, 2018). We utilize the fact that the shift in the composition of U.S. public firms has been largely completed by the early 2000s (Graham and Leary, 2018) and hence our MV legislation analysis applies to new economy firms in the post sample composition change period, when the average ‘cash’ ratios have largely stopped growing and stabilized at the higher level. Our goal is to examine if a significant portion of ‘cash’ holdings of hi-tech firms in the 2003-2017 period is related to the strength of corporate governance. We find that hi-tech firms significantly decrease the level of their total financial assets after an enactment of a Majority Voting law. The decrease is driven entirely by the reduction in short-term investments as opposed to cash. The estimates for lo-tech firms are statistically insignificant. This result implies that the negative relation between strong corporate governance and short-term investments is driven entirely by hi-tech firms whose ‘cash’ policies are widely recognized as a key contributor to the ‘cash’ puzzle.

We next investigate the channel through which the reduction in CHE and IVST among hi-tech firms takes place by examining their investment and payout policies. We find that hi-tech
firms do not increase payouts (repurchases, dividends, or their sum) but substantially increase their intangible investment as proxied by R&D expenditures.

The rest of the paper is organized as follows. Section 2 details data sources and variable construction procedure. Section 3 presents the results. Section 4 links our ‘cash’-governance results and the corporate ‘cash’ puzzle. Section 5 concludes.
2. Data and Variable Construction

The main sample includes all firm-year observations in the Compustat-CRSP database from 2003 to 2017 with non-missing values of states of incorporation in Compustat. We exclude firms with non-positive values of assets and sales as well as utilities and financial firms. We are left with 44,425 firm-years based on 5,634 firms that have data for all variables described below. Cuñat et al. (2018) list the states and years in which Majority Voting laws are enacted, which are shown in Table I. Further, we obtain the states and years in which antitakeover laws were enacted from Karpoff and Wittry (2018) and the data on the Takeover Index from Cain et al. (2017). In tests using the antitakeover laws we expand the sample period to 1983-2015 and in tests using the Takeover Index we expand the sample period to 1971-2014. The states of incorporation (and the states of headquarters used in additional tests) for each firm come from Compustat.

Most of our analysis focuses on the impact of Majority Voting legislation on firms’ corporate ‘cash’ saving decisions as opposed to antitakeover laws and the Takeover Index. We do so because prior literature documents that the run-up in the average ‘cash’ ratios since 1980 was primarily driven by the changing composition of the U.S. public firms towards hi-tech (Begenau and Palazzo, 2017; Graham and Leary, 2018). We utilize the fact that the shift in the composition of U.S. public firms has been largely completed by the early 2000s (Graham and Leary, 2018) and hence our MV legislation analysis applies to new economy firms in the post sample composition change period, when the average ‘cash’ ratios have largely stopped growing and stabilized at a high level. If we can show that a significant portion of ‘cash’ holdings of hi-tech firms in the 2003-2017 period is due to agency problems then we have contributed to the ‘cash puzzle’ debate, which is our primary goal.
In contrast, the susceptibility to a hostile takeover as measured by the Takeover Index of Cain et al. (2017) has peaked in early 1970s and most second-generation anti-takeover laws were passed in the second half of 1980s. The relevance of these corporate governance proxies for the study of the ‘cash puzzle’ is therefore limited.

2.1 Majority Voting Legislation

The election of directors to the board in the U.S. is conducted under one of the following two standards – a plurality voting (PV) standard and a majority voting (MV) standard. Under plurality voting, the candidate with the most “for” votes is elected. This means that in uncontested elections under the plurality voting standard one vote “for” is sufficient for the nominee to be elected, irrespective of the number of votes withheld. Policymakers, the media and the academia have all raised concerns that voting in uncontested elections has little effect. For example, Bebchuk (2003) and Kahan and Rock (2011) argue that director election process is broken.

Starting in 2004, shareholder activists began submitting non-binding shareholder proposals under rule 14a-8 calling for firms’ adoption of a majority voting standard. Under this standard, a director is not elected, even in uncontested election, unless the majority of votes cast are in his favor. By the end of 2007, about two-thirds of the S&P 500 companies had adopted some form of MV (Allen, 2007) and, as of January 2014, almost 90 percent of S&P 500 companies had done so (Gerber, 2014). There are three key types of majority voting (Ertimur et al., 2015). The first is “plurality plus” (plurality plus mandatory resignation) whereby a director failing to win a majority vote is elected but must resign, with the board deciding whether to accept the resignation. The second type is “majority plus” (majority plus mandatory resignation) whereby a director failing to
win a majority vote is not elected and must also tender his resignation, which the board may or may not accept. Finally, the third type is “true majority” whereby a director is not elected, even in uncontested election, unless the majority of votes cast are in his favor.

Cai et al. (2013) point out that early adopters included “plurality plus” provisions in corporate governance guidelines, which are (i) not legally binding and (ii) can be removed or modified by management without shareholder approval. Some firms included the mandatory resignation policy (the “plus” in “plurality plus”) in a bylaw and, hence, making it more binding given that management cannot remove such bylaws without shareholder or board approval. The “true majority” mechanisms are generally included in a bylaw or a charter.

Shareholder proposals involving amendments to bylaws that introduce the MV standard into director elections have become binding in some states due to recent law changes. Two major legislative amendments in 2006, the Delaware General Corporation Law (DGCL) and the Model Business Corporation Act (MBCA), allowed an opt-out of the default plurality-voting system through bylaw amendment and prevented boards from repealing such amendments made by shareholders. Additionally, a bylaw amendment that requires directors elected in PV to serve for no more than 90 days if the director receives more “against” votes than “for” votes may not be repealed or amended by the board of directors. Hence, shareholder proposals calling for firms’ adoption of a majority voting standard have become binding in Delaware in 2006. Several other states where MBCA serves as basis for their state corporation laws followed suit. Table 1 presents states that enacted MV legislation in the period from 2006 to 2017.

With respect to the staggered legislative change, Cuñat et al. (2018) find that the enactment of MV laws is followed by a 40% increase in the submission of management-initiated majority
voting proposals. Given that management initiated as opposed to shareholder initiated MV proposals are non-binding, management retains control over future amendments of voting rules.

With respect to the actual adoption of MV proposals at the firm level (rather than the adoption of MV legislation at the state level), Cuñat et al. (2018) find that managers resist the implementation of MV standards in those firms where it would be more value-destroying. Choi et al. (2016) find that early adopters of majority voting were more shareholder responsive than other firms, even before they adopted majority voting, and the adoption made little difference in their responsiveness to shareholders going forward. However, late adopters were not more shareholder responsive than other firms before they adopted majority voting but become more responsive after adoption. Ertimur et al. (2015) document positive abnormal returns around annual meeting dates where shareholder proposals to adopt MV are voted upon and an increase in boards’ responsiveness to shareholders at MV firms. Cai et al. (2013) argue that majority voting is a paper tiger, amounting to form over substance particularly since many adoptions are non-binding. They document little change in director elections, turnover, and subsequent firm performance.

2.2 Antitakeover Laws and a Takeover Index

Antitakeover laws shifted the power from shareholders to managers and thus decreased shareholder monitoring (Bertrand and Mullainathan, 2003). The institutional, political-economy, and historical context behind these laws is rich and complex as summarized by Karpoff and Wittry (2018). In this paper, we focus on the five major types of second-generation state antitakeover laws that have been enacted from 1983 to 2015: business combination law (BC); poison pill law (PP); control share acquisition law (CS); directors’ duties law (DD); and fair price law (FP).
Although the bulk of the literature argues that business combination laws increased managerial entrenchment the most, in our tests, we include all five types of antitakeover laws to avoid the omitted variable bias (Karpoff and Wittry, 2018).

An alternative way to capture the threat of hostile takeovers was proposed by Cain et al. (2017) who construct a Takeover Index that varies due to changes in the legal environment, aggregate capital liquidity, and firm age and is plausibly exogenous. Specifically, it is based on the passage of 13 different types of state anti-takeover laws, one federal statute and three state standards of review. Higher values of the index indicate a higher threat of hostile takeovers and, thus, better governance. While the index is available from 1965, we start the sample period in 1971 due to broad availability of control variables commonly used in the corporate ‘cash’ literature.

2.3 Proxies for Cash and Non-Cash Financial Assets

The traditional definition of ‘cash’ is as the sum of ‘Cash and Cash Equivalents’ (Compustat item CH) and ‘Short-Term Investments’ (Compustat item IVST), or Compustat item CHE. Several recent studies document that financial assets within CHE are not homogeneous and have different determinants.\(^4\) Two representative studies in this area, Duchin et al. (2017) and Cardella et al. (2018), employ different approaches to study the variety of financial assets that firms invest in. Duchin et al. (2017) hand-collect data from the footnotes of 10-K reports on fair values of firms’ all financial assets for the period from 2009-2012 for industrial S&P 500 firms. In contrast, Cardella et al. (2018) use Compustat data and examine firms’ portfolio allocation decisions across

\(^4\) See, e.g., Duchin et al. (2017); Cardella et al. (2018); Chen and Duchin (2018); Fairhurst and Nam (2018); and Ysmailov (2018).
two broad liquid asset ‘classes’: CH and IVST. Although each approach has its own advantages and disadvantages, in this paper, we take the latter approach for the following two reasons.

First, Duchin et al. (2017) utilize the implementation of Statement of Financial Accounting Standards (SFAS) No. 157 in 2009, which requires firms to report the fair value of major asset classes on their balance sheet. Since our main sample period starts in 2003 (and sample periods in additional tests start as early as 1971), we would have had to discard a significant portion of our sample if we were to hand-collect data from the footnotes of 10-K reports. Second, we argue that the costs of hand-collecting data from the footnotes of 10-K reports outweigh the benefits. Cardella et al. (2018) hand-collect data from the footnotes of 10-K reports on the composition of ‘Short-Term Investments’ balance sheet account (Compustat item IVST) for the period from 1997-2015 for a random sample of firms and find that they are primarily held in corporate, municipal and U.S. government debt securities. Hence, IVST is subject to more risk (credit or interest rate risk in the case of fixed income securities) than CH.

In this paper, we proxy for cash using ‘Cash and Cash Equivalents’ (Compustat item CH) and for non-cash financial assets using ‘Short-Term Investments’ (Compustat item IVST) and we refer to their sum as total liquid assets or ‘cash’ (Compustat item CHE).

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5 The advantage of hand-collecting data is the ability to classify each individual asset class (such as corporate bonds, Treasuries, mortgage-backed securities) into risky versus safe class. When using CH and IVST as proxies, such distinction is not possible. We acknowledge the measurement error arising as a result but we argue that it is less severe than treating CH and IVST as homogeneous – the traditional approach in the corporate ‘cash’ literature.
2.4 Model

We use a difference-in-differences methodology similar to Bertrand and Mullainathan (2003) and Atanassov (2013). Specifically, we estimate the following model:

\[ y_{ikst} = \alpha_t + \beta_i + \gamma MV_{st} + \delta X_{iskt} + \varepsilon_{iskt}, \]

where \( i \) indexes firms, \( s \) indexes the state of incorporation, \( k \) indexes the state of location, \( t \) indexes time, \( y_{ikst} \) is the dependent variable, which is CHE, CH, or IVST scaled by total book assets. The variable \( MV_{st} \) is a dummy equal to one if a majority voting law has been enacted by time \( t \) in state \( s \), and \( X_{iskt} \) is a vector of control variables including R&D expenditures, negative cash flow dummy (Denis and McKeon, 2018), cash flow volatility, market to book, real book assets, cash flow, net working capital, capital expenditures, leverage, dividend dummy, acquisitions, and tax cost of repatriating earnings. Detailed variable definitions are provided in the Appendix. We control for time-invariant unobservable firm characteristics by using firm fixed effects, \( \beta_i \). Year indicator variables \( \alpha_t \) control for economy-wide shocks. Standard errors are clustered at the state of incorporation level because that is the level of treatment.
3. Results

3.1 Descriptive Statistics

Table 2 presents summary statistics. Panel A of Table 2 compares firms that have no short-term investments to firms that have positive short-term investments in a given year. Compared to firms that do not hold IVST, on average firms that hold IVST are somewhat larger (real book assets of $3.7 billion vs. $2.3 billion), have more R&D expenditures as a percent of total book assets (.096 vs. 0.061), and have lower leverage (0.173 vs. 0.251). The proportion of firms incorporated in a state that has enacted a Majority Voting law is higher for firms that hold IVST (0.594 vs. 0.552).

Panel B of Table 2 examines two subsamples based on whether a firm-year belongs to a state that has enacted a Majority Voting law. Firms in states with Majority Voting laws hold more ‘cash’ as a percent of total book assets (0.259 vs. 0.214) but hold the same proportion of ‘cash’ in IVST (0.161). Additionally, firms in states with Majority Voting laws are larger (real book assets of $3.2 billion vs. $2.6 billion), have more R&D expenditures as a percent of total book assets (0.09 vs. 0.06), and have higher leverage (0.225 vs. 0.205).

In Figure 1, we plot the data to determine whether there is an obvious visual change in the composition of corporate liquid assets around the adoption of the Majority Voting law. We see that there is a drastic decline in the average IVST/Assets ratio following the event year in the treated group of firms. The validity of a difference-in-difference test requires the assumption of parallel trends in the treated and control groups. The visual inspection of Panel B of Figure 1 does not reveal any obvious differential pre-trends in the composition of corporate liquid assets across the treated and control firms. We plot the average CHE/Assets ratio in Panel A of Figure 1. There appears to be decline in the average CHE/Assets ratio (although not as drastic) following the event
year in the treated group of firms. Importantly, there are once again no obvious differential pre-
trends in the level of corporate liquid assets across the treated and control firms.

3.2 Multivariate Analysis

In Table 3, we estimate equation (1). The dependent variables are CHE/Assets, CH/Assets, IVST/Assets in columns (1) through (3), respectively. The coefficient of interest in all columns is MV. All regressions include year and firm fixed effects. We control for serial correlation by clustering standard errors at the state of incorporation level because the treatment (i.e., the passage of MV laws) is at the state of incorporation level. Column (1) of Table 3 shows that after the passage of MV laws affected firms decrease their ratio of CHE per dollar of book assets by 0.8 cents, which represents a 3.3% decrease relative to the sample mean for CHE/Assets of 0.24. Columns (2) and (3) of Table 3 show that after the passage of MV laws affected firms do not change their holdings of CH but significantly reduce their holdings of IVST. The decrease in IVST amounts to 19.7% relative to the sample mean for IVST/Assets of 0.066. These results suggest that following the adoption of MV laws firms decreased their holdings of IVST and shrank the size of their portfolios.

In Table 4, we report the results from estimating a variant of model (1) but with five types of antitakeover laws instead of the majority voting law as the key explanatory variables. The sample period in this table is from 1983 to 2015. Unlike the Majority Voting laws, which strengthen corporate governance by increasing directors’ reelection pressure and thereby their monitoring efforts, antitakeover laws weaken corporate governance by decreasing the threat of hostile takeovers and thereby the disciplining by the hostile takeover market. Hence, unlike in
Table 3, we expect the coefficients on the key explanatory variables in Table 4 to be of positive sign. The estimates indicate that firms did not increase CH following the adoptions of any antitakeover laws but did increase their holdings of IVST following the adoption of the fair price law. This latter effect has not translated to a statistically significant increase in CHE. The only antitakeover law to results in a statistically significant increase in CHE is the control share acquisition law.

In Table 5, we use our final proxy for the strength of corporate governance, the Takeover Index of Cain et al. (2017). Higher values of the index are associated with greater takeover susceptibility and, hence, stronger corporate governance. We therefore expect a negative coefficient on the index. Note that the sample period in Table 5 is from 1971 to 2014. The results show that an increase in takeover susceptibility results in a decrease in IVST and, as in the case of majority voting laws, a decrease in CHE but no change in CH.

As discussed above, the main focus of our analysis is the effects of majority voting laws on the corporate ‘cash’ saving decisions of firms. Accordingly, in Table 6 we provide two robustness tests of our main findings in Table 3 above. First, in Panel A of Table 6, we replace firm fixed effects with state of incorporation fixed effects. This specification allows us to assign firms in a state that does not pass a Majority Voting law to act as control for firms in states where a Majority Voting law passed. The coefficient on MV retains its statistical and economic significance in column (3) of Table 6 where the dependent variable is IVST/Assets. In Panel B of Table 6, we incorporate state of headquarters by year fixed effects in addition to firm fixed effects to our regression model. This allows us to control for economic and other shocks to the states of headquarters, specifically, for firms whose states of incorporation and headquarters are different. The estimates indicate a statistically and economically significant coefficient on the MV dummy.
in columns (1) and (3) where the dependent variables are CHE/Assets and IVST/Assets, respectively.

Taken together, the results in this section show that following an increase in monitoring either by the board of directors or the takeover market, firms decrease their short-term investments and, to a lesser extent, their total liquid assets but do not change their cash holdings. Our main result is that firms incorporated in states that pass an MV law decrease short-term investments and, to a lesser extent, total liquid assets after the law is passed relative to otherwise similar firms incorporated in states that do not pass such a law.

3.3 Additional Endogeneity Tests

We conduct an additional test to further alleviate potential endogeneity concerns with respect to our MV results following Bertrand and Mullainathan (2001, 2003) and Atanassov (2013). To check for pre-existing trends in a multivariate setting, we estimate the following equation:

$$y_{ikt} = \alpha + \beta_i + \gamma X_{iskt} + \delta_1 Before_{st}^{-2} + \delta_2 Before_{st}^{-1} + \delta_3 Current_{st}^0 + \delta_4 After_{st}^{+1} + \delta_5 After_{st}^{+2} + \delta_6 After_{st}^{+3} + \epsilon_{iskt},$$

(2)

where $Before_{st}^{-2}$ is a dummy variable equal to one if it is 2 years ($t - 2$) before a majority voting law is passed (at time $t$ in state $s$), $Before_{st}^{-1}$ is a dummy variable equal to one if it is 1 years ($t - 1$) before a majority voting law is passed in state $s$, $Current_{st}^0$ is a dummy variable equal to one if it is the year ($t$) when the majority voting law is passed in state $s$, $After_{st}^{+1}$ is a dummy variable equal to one if it is 1 year after a majority voting law is passed in state $s$, $After_{st}^{+2}$ is a dummy variable equal to one if it is 2 years after a majority voting law is passed in state $s$, and $After_{st}^{+3}$
is a dummy variable equal to one if it is 3 or more years after a majority voting law is passed in state $s$.

The results are presented in Table 7. The dependent variables are CHE/Assets, CH/Assets, and IVST/Assets in columns (1) through (3), respectively. We see that there were neither the trend of declining short-term investments nor the trend of increasing cash before the majority voting laws were enacted. For example, column (3), where the dependent variable is IVST/Assets, shows small and insignificant coefficients on $Before_{st}^1$ and $Current_{st}^0$. The coefficients on $After_{st}^{+1}$, $After_{st}^{+2}$, and $After_{st}^{2+3}$ are statistically significant and are at least three times as large as the coefficient on $Current_{st}^0$. 
4. MV Legislation and the Cash ‘Puzzle’: The Case of Hi-Tech Firms

As mentioned in the introduction, our second main hypothesis is that hi-tech firms are especially vulnerable to the agency problems as reflected in their holdings of IVST. Two pieces of empirical evidence and one theoretical argument lead us to this conjecture. First, Duchin et al. (2017) document in their empirical analyses that risky financial assets are concentrated in the hi-tech sector. Second, prior literature documents that the run-up in the average ‘cash’ ratios since 1980 was primarily driven by the changing composition of the U.S. public firms towards hi-tech firms (Begenau and Palazzo, 2017; Graham and Leary, 2018). Hence, taken together, these findings may imply that hi-tech firms – the primary drivers of the ‘cash’ puzzle and, at the same time, the primary holders of short-term investments – accumulated IVST for agency reasons. Another way to look at this argument, from a theoretical perspective, is to invoke the prediction of Duchin et al.’s (2017) theoretical model that the allocation to risky financial assets grows with the size of the firm’s financial portfolio. Given that the average size of hi-tech firms’ financial portfolios is orders of magnitude larger than the size of lo-tech firms’ financial portfolios (Begenau and Palazzo, 2017; Graham and Leary, 2018; and confirmed in our analysis), we expect the agency motive to hold IVST to be more pronounced for the former type of firm.

The overall goal of this section is to establish a link between our ‘cash’-governance results and the corporate ‘cash’ puzzle. We do so by utilizing the fact that the shift in the composition of U.S. public firms has largely completed by the early 2000s (Graham and Leary, 2018) and hence our MV legislation analysis applies to new economy firms in the post sample composition change period. If we can show that a significant portion of ‘cash’ holdings of hi-tech firms in the 2003-2017 period is due to agency problems then we have contributed to the ‘cash puzzle’ debate.
4.1 MV Laws and Hi-Tech Firms: CHE, CH and IVST

We define hi-tech firms as those that belong to an industry (using the three digit level SIC code) that has an average R&D to assets ratio of at least 2% (Begenau and Palazzo, 2017). To conduct our subsample test, we complement our baseline regression model (1) with a hi-tech indicator variable and the interaction term between hi-tech indicator and MV dummy. Given that our model includes firm fixed effects, the coefficient on hi-tech is not identified.

Before presenting the results from our multivariate analysis, we first independently confirm that both the amount of total liquid assets and the amount of short-term investments are orders of magnitude higher among hi-tech firms than among lo-tech firms. The top and bottom panels of Figure 2 plot the average CHE/Assets and the average IVST/Assets, respectively, for the subsamples of hi- and lo-tech firms. We find evidence consistent with the existing literature. For example, in 2004, the average CHE/Assets ratio for the hi-tech subsample was 33% versus 13% for the lo-tech subsample and the average IVST/Assets ratio for the hi-tech subsample was 12% versus 3% for the lo-tech subsample. The magnitudes of the differences between the two subsamples have stayed relatively constant throughout the sample period.

The multivariate results are presented in Table 8. Column (1) of Table 8 shows that after the passage of MV laws hi-tech firms decrease their ratio of CHE per dollar of book assets by 2.3 cents, which represents a 9.6% decrease relative to the sample mean for CHE/Assets of 0.24. The coefficient on the key interaction term between MV and hi-tech in column (1) is statistically significant at the 1% level. Columns (2) and (3) of Table 8 show that after the passage of MV laws hi-tech firms do not change their holdings of CH but significantly (both statistically at the 1% level and economically) reduce their holdings of IVST. The decrease in IVST amounts to 42.4% relative to the sample mean for IVST/Assets of 0.066. These results suggest that hi-tech firms rebalanced
their portfolios towards safe financial assets following the adoption of MV laws by decreasing their holdings of IVST and, overall, shrinking the size of their portfolios.

These results suggest that although prior literature attributed ‘cash’ stockpiles of hi-tech firms to their precautionary demand, a significant portion of their ‘cash’ is held as a result of agency problems. In the next set of analyses, we investigate the channel through which hi-tech firms reduce their ‘cash’ holdings.

### 4.2 MV Laws and Hi-Tech Firms: Payouts and Investment

In Table 9, the dependent variables are dividends, repurchases, and their sum scaled by total book assets in columns 1-2, 3-4, and 5-6, respectively. The key explanatory variable is an interaction term between hi-tech indicator and MV dummy. The OLS model includes year and firm fixed effects, the standard errors are clustered at the state of incorporation level. Columns 2, 4, and 6 include the following control variables: return on assets, \( \ln(\text{Real Assets}) \), and market to book. The results in columns 1 and 2 show that hi-tech firms decrease their dividend, but the relation is both statistically and economically weak. The results in the remaining columns show an insignificant effect of MV laws on both repurchases and total payout. We conclude that payouts are not the primary channel through which hi-tech firms get rid of ‘cash’ following increased monitoring by the board of directors in our setting.

In Table 10, we estimate an OLS regression similar to the one in Table 8 with R&D to assets (a proxy for intangible investment) and Capex to assets (a proxy for tangible investment) as dependent variables in columns 1-2 and 3-4, respectively. We include cash flow to assets as an additional control variable. The results show that hi-tech firms significantly increase their R&D
expenditures following the adoption of MV legislation, the coefficient on the interaction term is statistically significant at the 1% level. In terms of economic significance, the coefficient in column 2 implies a 12.5% increase in R&D to assets relative to the sample mean of 0.077. We also document an increase in capital expenditures although the effect is relatively small compared to the effect on R&D. Specifically, the coefficient in column 4 implies a 1% \[=(0.0027-0.0022)/0.047\] increase in capex to assets. The dominance of the effect on R&D over capex is not surprising given that hi-tech firms are engaged primarily in intangible investment.
5. Conclusion

In this paper, we show that firms incorporated in states that pass majority voting legislation reduce their ‘cash’ holdings with the reduction being primarily driven by the risky (as opposed to safe) financial assets. The results are particularly pronounced for hi-tech firms, the ‘cash’ holdings of which were the primary driver of the ‘corporate cash puzzle’. Further, we find that hi-tech firms decrease their ‘cash’ holdings by ramping up intangible investment while holding their payout policy largely constant. Finally, we link the reduction in risky financial assets to firm value by showing that risky financial assets are discounted by the stock market among hi-tech (but not lo-tech) firms. This means that increased monitoring by the board of directors following the adoption of the majority voting legislation has a positive effect on firm value.

We contribute to at least the following two strands of literature. First, we contribute to the literature studying the ‘corporate cash puzzle’ (Bates, Kahle and Stulz, 2009; Graham and Leary, 2018). As mentioned in the introduction, despite attracting the most attention, the agency explanation of the corporate ‘cash’ puzzle received relatively little empirical support. We address two challenges facing studies on the relation between ‘cash’ and agency problems: (i) we utilize a quasi-natural experiment in an attempt to establish causality and (ii) we address the measurement error in the traditional proxy for ‘cash’ by breaking it into safe and risky components. Our findings suggest that a significant portion ‘cash’ reserves of hi-tech firms, the primary drivers of the run-up in ‘cash’, is due to agency problems. Second, we contribute to the emerging literature that recognizes the variety of financial assets firms hold in their portfolios (Duchin et al., 2017; Cardella et al., 2018). Consistent with the theoretical and empirical findings of Duchin et al. (2017), we show that agency motives are an important determinant of firms’ risky financial asset holdings.
References


### Appendix A

#### Table A1. Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition (Compustat data items in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV</td>
<td>an indicator variable that equals one if the state of incorporation has adopted MV legislation</td>
</tr>
<tr>
<td>BC, PP, CS, DD, FP</td>
<td>an indicator variable that equals one if the state of incorporation has adopted one of the five types of antitakeover legislation from Karpoff and Wittry (2018)</td>
</tr>
<tr>
<td>Takeover Index</td>
<td>antitakeover index from Cain et al. (2017)</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>ratio of acquisitions ($aqc$) to total book assets ($at$)</td>
</tr>
<tr>
<td>Capex/Assets</td>
<td>ratio of capital expenditures ($capx$) to total book assets ($at$)</td>
</tr>
<tr>
<td>CH/Assets</td>
<td>ratio of cash and cash equivalents ($ch$) to total book assets ($at$)</td>
</tr>
<tr>
<td>IVST/Assets</td>
<td>ratio of short-term investments ($ivst$) to total book assets ($at$)</td>
</tr>
<tr>
<td>CHE/Assets</td>
<td>ratio of total liquid assets ($che$) to total book assets ($at$)</td>
</tr>
<tr>
<td>IVST/CHE</td>
<td>ratio of short-term investments ($ivst$) to total book assets ($at$)</td>
</tr>
<tr>
<td>Cash flow/Assets</td>
<td>ratio of operating cash flow ($oancf$) to total book assets ($at$)</td>
</tr>
<tr>
<td>Negative CF dummy</td>
<td>an indicator variable equal to one if a firm has negative operating cash flow ($oancf &lt; 0$), and zero otherwise.</td>
</tr>
<tr>
<td>ln(Real assets)</td>
<td>the natural logarithm of total real book assets ($at$)</td>
</tr>
<tr>
<td>Market to book</td>
<td>the market value of assets ($prcc_f^*csho + at - ceq$) divided by the book value of assets ($at$)</td>
</tr>
<tr>
<td>Leverage</td>
<td>the book value of long-term debt ($dlit$) plus debt in current liabilities ($dlc$) divided by book value of assets ($at$)</td>
</tr>
<tr>
<td>NWC/Assets</td>
<td>ratio of net working capital, net of cash and short-term investments ($wcap - che$), to total book assets ($at$)</td>
</tr>
<tr>
<td>CF Volatility</td>
<td>the standard deviation of a firm's Cash Flow/Assets over the previous five years. Firms must have at least three observed Cash Flow/Assets over the previous five years to be counted.</td>
</tr>
<tr>
<td>Dividend dummy</td>
<td>an indicator variable equal to one if a firm pays common dividends ($dvc$), and zero otherwise.</td>
</tr>
<tr>
<td>Dividends/Assets</td>
<td>ratio of dividends ($dvc$) to total book assets ($at$).</td>
</tr>
<tr>
<td>Repurchases/Assets</td>
<td>ratio of repurchases ($prstkc$) to total book assets ($at$).</td>
</tr>
<tr>
<td>Total Payout/Assets</td>
<td>ratio of the sum of dividends ($dvc$) and repurchases ($prstkc$) to total book assets ($at$).</td>
</tr>
<tr>
<td>Return on assets</td>
<td>ratio of net income ($ni$) to total book assets ($at$).</td>
</tr>
<tr>
<td>R&amp;D/Assets</td>
<td>ratio of R&amp;D expenditures ($xrd$) to total book assets ($at$). When missing from Compustat, R&amp;D is set equal to 0.</td>
</tr>
<tr>
<td>Hi-tech</td>
<td>an indicator variable equal to one if a firm has R&amp;D/Assets greater than 0.02, and zero otherwise.</td>
</tr>
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</table>
Figure 1. Portfolio Allocation to IVST Surrounding MV Laws. This figure depicts average CHE/Assets (Panel A) and IVST/Assets (Panel B) for two groups of firms. Treated is defined as incorporation in states that passed MV legislation from Table 1, and Control is all other firms. Event time zero corresponds to the passage of MV laws.
Figure 2. IVST Holdings of Hi-Tech and Lo-Tech Firms. This figure depicts average CHE/Assets (Panel A) and IVST/Assets (Panel B) for two groups of firms. Hi-tech firms are defined as those that belong to an industry (using the three digit level SIC code) that has an average R&D to assets ratio of at least 2%. Otherwise, a firm-year is classified as lo-tech.
Table 1. State MV Legislation

This table reports the years in which MV legislation is passed.

<table>
<thead>
<tr>
<th>State</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware</td>
<td>2006</td>
</tr>
<tr>
<td>California</td>
<td>2006</td>
</tr>
<tr>
<td>Florida</td>
<td>2006</td>
</tr>
<tr>
<td>Washington</td>
<td>2007</td>
</tr>
<tr>
<td>Utah</td>
<td>2008</td>
</tr>
<tr>
<td>Hawaii</td>
<td>2009</td>
</tr>
<tr>
<td>Indiana</td>
<td>2010</td>
</tr>
<tr>
<td>Wyoming</td>
<td>2010</td>
</tr>
<tr>
<td>Connecticut</td>
<td>2011</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>2012</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>2013</td>
</tr>
</tbody>
</table>
Table 2. Summary Statistics

The sample includes all firm-year observations in the Compustat-CRSP database from 2003 to 2017. We exclude firms with non-positive values of assets and sales as well as utilities and financial firms. Variable definitions are provided in Appendix A. Panel A presents information for firm-years with (columns 4-6) and without (columns 1-3) short-term investments (Compustat item IVST). Panel B presents information for firm-years for which MV = 0 (columns 1-3) or MV = 1 (columns 4-6), where MV is an indicator variable that takes the value of one if there is a Majority Voting law passed in the state of incorporation for a given firm in that year, and zero otherwise.

<table>
<thead>
<tr>
<th></th>
<th>IVST = 0 (24,564 firm-years)</th>
<th>IVST &gt; 0 (19,861 firm-years)</th>
<th>All firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>CHE/Assets</td>
<td>0.161</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CH/Assets</td>
<td>0.161</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>IVST/Assets</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IVST/CHE</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MV</td>
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<td>0</td>
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<td>Real book assets</td>
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<td>323030</td>
<td>0.001</td>
</tr>
<tr>
<td>R&amp;D/Assets</td>
<td>0.061</td>
<td>1.122</td>
<td>0</td>
</tr>
<tr>
<td>Hi-tech dummy</td>
<td>0.493</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Market to book</td>
<td>2.320</td>
<td>18.11</td>
<td>0.589</td>
</tr>
<tr>
<td>CF volatility</td>
<td>0.126</td>
<td>1.796</td>
<td>0.007</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>0.026</td>
<td>0.367</td>
<td>-0.005</td>
</tr>
<tr>
<td>Capex/Assets</td>
<td>0.050</td>
<td>0.358</td>
<td>0</td>
</tr>
<tr>
<td>NWC/Assets</td>
<td>0.032</td>
<td>0.519</td>
<td>-2.085</td>
</tr>
<tr>
<td>CF/Assets</td>
<td>-0.004</td>
<td>0.363</td>
<td>-1.998</td>
</tr>
<tr>
<td>Negative CF dummy</td>
<td>0.235</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Dividend dummy</td>
<td>0.317</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.251</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 2 - Continued

| Panel B: Firm Characteristics for Firms Incorporated in States with or without MV Laws |
|---------------------------------|---------------------------------|---------------------------------|
| MV = 0 (19,086 firm-years)       | MV = 1 (25,339 firm-years)       | All firms                      |
| Mean   | Max   | Min   | Mean   | Max   | Min   | Mean   |
| (1)    | (2)   | (3)   | (4)    | (5)   | (6)   | (7)    |
| CHE/Assets | 0.214 | 1     | 0      | 0.259 | 1     | 0      | 0.240  |
| CH/Assets | 0.155 | 1     | 0      | 0.189 | 1     | 0      | 0.174  |
| IVST/Assets | 0.059 | 0.981 | 0      | 0.070 | 0.997 | 0      | 0.066  |
| IVST/CHE | 0.161 | 1     | 0      | 0.161 | 1     | 0      | 0.161  |
| MV | 0.423 | 1     | 0      | 0.465 | 1     | 0      | 0.447  |
| Real book assets | 2665 | 340840 | 0.001 | 3216 | 411414 | 0.001 | 2979  |
| R&D/Assets | 0.060 | 1.122 | 0      | 0.090 | 1.122 | 0      | 0.077  |
| Hi-tech dummy | 0.544 | 1     | 0      | 0.594 | 1     | 0      | 0.573  |
| Market to book | 2.361 | 18.11 | 0.589 | 2.401 | 18.11 | 0.589 | 2.384  |
| CF volatility | 0.117 | 1.796 | 0.007 | 0.128 | 1.796 | 0.007 | 0.123  |
| Acquisitions | 0.022 | 0.367 | -0.005 | 0.025 | 0.367 | -0.005 | 0.024  |
| Capex/Assets | 0.047 | 0.358 | 0      | 0.046 | 0.358 | 0      | 0.047  |
| NWC/Assets | 0.034 | 0.519 | -2.085 | 0      | 0.519 | -2.085 | 0.015  |
| CF/Assets | 0.011 | 0.363 | -1.998 | -0.014 | 0.363 | -1.998 | -0.003 |
| Negative CF dummy | 0.252 | 1     | 0      | 0.270 | 1     | 0      | 0.262  |
| Dividend dummy | 0.307 | 1     | 0      | 0.272 | 1     | 0      | 0.287  |
| Leverage | 0.205 | 1     | 0      | 0.225 | 1     | 0      | 0.216  |
Table 3. The Impact of MV Laws on Corporate Liquid Assets

This table reports the results from estimating model (1). The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. The sample period is from 2003 to 2017. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) CHE/Assets</th>
<th>(2) CH/Assets</th>
<th>(3) IVST/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV</td>
<td>-0.008*</td>
<td>0.004</td>
<td>-0.013***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>R&amp;D/Assets</td>
<td>-0.136***</td>
<td>-0.087***</td>
<td>-0.049***</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.014)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>Negative CF dummy</td>
<td>0.011**</td>
<td>0.001</td>
<td>0.010***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>CF volatility</td>
<td>0.036***</td>
<td>0.059***</td>
<td>-0.023***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Market to book</td>
<td>0.006***</td>
<td>0.006***</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>ln(Real assets)</td>
<td>-0.012***</td>
<td>-0.026***</td>
<td>0.013***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>CF/Assets*Negative CF dummy</td>
<td>-0.184***</td>
<td>-0.208***</td>
<td>0.024*</td>
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<tr>
<td></td>
<td>(0.010)</td>
<td>(0.019)</td>
<td>(0.014)</td>
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<tr>
<td>CF/Assets</td>
<td>0.203***</td>
<td>0.215***</td>
<td>-0.013**</td>
</tr>
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<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>NWC/Assets</td>
<td>-0.032***</td>
<td>-0.005</td>
<td>-0.027***</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Capex/Assets</td>
<td>-0.365***</td>
<td>-0.285***</td>
<td>-0.080***</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.015)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.164***</td>
<td>-0.126***</td>
<td>-0.038***</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.015)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Dividend dummy</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>-0.268***</td>
<td>-0.169***</td>
<td>-0.100***</td>
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<tr>
<td></td>
<td>(0.019)</td>
<td>(0.010)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Tax cost of repatriating earnings</td>
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<td>0.000*</td>
<td>-0.000***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
</tbody>
</table>

| Firm FE?                      | Yes            | Yes           | Yes             |
| Year FE?                      | Yes            | Yes           | Yes             |
| Observations                  | 44,425         | 44,425        | 44,425          |
| R-squared                     | 0.840          | 0.715         | 0.695           |
Table 4. The Impact of Antitakeover Laws on Corporate Liquid Assets

This table reports the results from estimating model (1) with five types of antitakeover laws instead of majority voting law as the key explanatory variable. The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. The sample period is from 1983 to 2015. Control variables include firm characteristics from Table 3. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) CHE/Assets</th>
<th>(2) CH/Assets</th>
<th>(3) IVST/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control share acquisition law (CS)</td>
<td>0.010**</td>
<td>0.004</td>
<td>0.006</td>
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<tr>
<td></td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Business combination law (BC)</td>
<td>0.001</td>
<td>0.006</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Fair price law (FP)</td>
<td>0.004</td>
<td>-0.004</td>
<td>0.008**</td>
</tr>
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<td></td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.004)</td>
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<tr>
<td>Directors’ duties law (DD)</td>
<td>0.001</td>
<td>0.004</td>
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<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
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<tr>
<td>Poison pill law (PP)</td>
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<td>0.002</td>
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<td>Controls?</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Observations</td>
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<td>95,748</td>
<td>95,748</td>
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<tr>
<td>R-squared</td>
<td>0.777</td>
<td>0.651</td>
<td>0.627</td>
</tr>
</tbody>
</table>
Table 5. Takeover Index and Corporate Liquid Assets

This table reports the results from estimating model (1) with takeover index (Cain et al., 2017) instead of the majority voting law as the key explanatory variable. The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. The sample period is from 1971 to 2014. Robust standard errors clustered by firm are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) CHE/Assets</th>
<th>(2) CH/Assets</th>
<th>(3) IVST/Assets</th>
</tr>
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<tbody>
<tr>
<td>Sample Period: 1971-2014</td>
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<tr>
<td>Takeover Index</td>
<td>-0.081***</td>
<td>-0.011</td>
<td>-0.070***</td>
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<td>(0.008)</td>
<td>(0.008)</td>
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<tr>
<td>R&amp;D/Assets</td>
<td>-0.133***</td>
<td>-0.055***</td>
<td>-0.078***</td>
</tr>
<tr>
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<td>(0.021)</td>
<td>(0.019)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Negative CF dummy</td>
<td>0.014***</td>
<td>0.005**</td>
<td>0.010***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
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<td>0.083***</td>
<td>0.080***</td>
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</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Market to book</td>
<td>0.009***</td>
<td>0.007***</td>
<td>0.002***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>ln(Real assets)</td>
<td>0.002</td>
<td>-0.009***</td>
<td>0.011***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>CF/Assets*Negative CF dummy</td>
<td>0.112***</td>
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<td>(0.017)</td>
<td>(0.015)</td>
<td>(0.013)</td>
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<tr>
<td>CF/Assets</td>
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<td>-0.075***</td>
</tr>
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<td></td>
<td>(0.015)</td>
<td>(0.013)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>NWC/Assets</td>
<td>-0.120***</td>
<td>-0.050***</td>
<td>-0.070***</td>
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<tr>
<td></td>
<td>(0.007)</td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Capex/Assets</td>
<td>-0.241***</td>
<td>-0.147***</td>
<td>-0.094***</td>
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<td>(0.009)</td>
<td>(0.008)</td>
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<td>-0.139***</td>
<td>-0.103***</td>
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<tr>
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<td>(0.007)</td>
<td>(0.005)</td>
<td>(0.005)</td>
</tr>
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<td>Dividend dummy</td>
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<td>0.003*</td>
<td>0.004**</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
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<td>-0.082***</td>
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<td>(0.008)</td>
<td>(0.006)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Tax cost of repatriating earnings</td>
<td>0.000</td>
<td>0.001*</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Firm FE?</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Year FE?</td>
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<td>Yes</td>
<td>Yes</td>
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<td>108,262</td>
<td>108,262</td>
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<td>R-squared</td>
<td>0.772</td>
<td>0.652</td>
<td>0.611</td>
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Table 6. MV Laws and Corporate Liquid Assets: Robustness

This table reports the results from estimating model (1). The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. The sample period is from 2003 to 2017. Control variables include firm characteristics from Table 3. In Panel A, firm fixed effects are replaced by state of incorporation fixed effects. In Panel B, year fixed effects are replaced by state of HQ by year fixed effects. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Panel A: State of Incorporation Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>MV</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Controls?</td>
</tr>
<tr>
<td>State FE?</td>
</tr>
<tr>
<td>Year FE?</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: State of HQ by Year Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>MV</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Controls?</td>
</tr>
<tr>
<td>HQ x Year FE</td>
</tr>
<tr>
<td>Firm FE?</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
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</table>
Table 7. MV Laws and Corporate Liquid Assets: Dynamics

This table reports the results from estimating a dynamic difference-in-differences model (2). The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. The sample period is from 2003 to 2017. Robust standard errors clustered by state of incorporation are in parentheses. Control variables include firm characteristics from Table 3. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) CHE/Assets</th>
<th>(2) CH/Assets</th>
<th>(3) IVST/Assets</th>
</tr>
</thead>
<tbody>
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<td>Before(^{-2})</td>
<td>0.000</td>
<td>-0.007</td>
<td>0.008**</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.005)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Before(^{-1})</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Current(^{0})</td>
<td>0.003</td>
<td>0.001</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>After(^{1})</td>
<td>-0.001</td>
<td>0.007</td>
<td>-0.009*</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>After(^{2})</td>
<td>-0.003</td>
<td>0.013**</td>
<td>-0.016***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.005)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>After(^{3+})</td>
<td>-0.014*</td>
<td>-0.000</td>
<td>-0.014***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.005)</td>
</tr>
</tbody>
</table>

Control variables? Yes Yes Yes
Firm FE? Yes Yes Yes
Year FE? Yes Yes Yes
Observations 44,425 44,425 44,425
R-squared 0.841 0.715 0.695
Table 8. Cross-Sectional Variation in the Effect of the MV Laws: Hi-tech

This table reports the results from estimating model (1) supplemented with an additional interaction term. The dependent variables are items CHE (Column 1), CH (Column 2) and IVST (Column 3) in Compustat scaled by total book assets. Hi-tech firms are defined as those that belong to an industry (using the three digit level SIC code) that has an average R&D to assets ratio of at least 2%. The sample period is from 2003 to 2017. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.1 \).

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) CHE/Assets</th>
<th>(2) CH/Assets</th>
<th>(3) IVST/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV*Hi-tech</td>
<td>-0.023***</td>
<td>0.005</td>
<td>-0.028***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>MV</td>
<td>0.005</td>
<td>0.002</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>R&amp;D/Assets</td>
<td>-0.135***</td>
<td>-0.087***</td>
<td>-0.048***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.014)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>Negative CF dummy</td>
<td>0.011**</td>
<td>0.001</td>
<td>0.010***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>CF volatility</td>
<td>0.035***</td>
<td>0.059***</td>
<td>-0.023***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Market to book</td>
<td>0.006***</td>
<td>0.006***</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>ln(Real assets)</td>
<td>-0.012***</td>
<td>-0.026***</td>
<td>0.013***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>CF/Assets*Negative CF dummy</td>
<td>-0.185***</td>
<td>-0.207***</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.019)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>CF/Assets</td>
<td>0.204***</td>
<td>0.215***</td>
<td>-0.012**</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>NWC/Assets</td>
<td>-0.032***</td>
<td>-0.005</td>
<td>-0.027***</td>
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<tr>
<td></td>
<td>(0.011)</td>
<td>(0.012)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Capex/Assets</td>
<td>-0.366***</td>
<td>-0.285***</td>
<td>-0.081***</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.015)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.164***</td>
<td>-0.126***</td>
<td>-0.038***</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.015)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Dividend dummy</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Acquisitions</td>
<td>-0.268***</td>
<td>-0.169***</td>
<td>-0.099***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.010)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Tax cost of repatriating earnings</td>
<td>0.000</td>
<td>0.000*</td>
<td>-0.000***</td>
</tr>
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<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Firm FE?</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE?</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Observations</td>
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<td>44,425</td>
<td>44,425</td>
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<tr>
<td>R-squared</td>
<td>0.841</td>
<td>0.715</td>
<td>0.696</td>
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Table 9. MV Laws and Payout Policy

This table reports the results from estimating an OLS model. The dependent variables are Dividends/Assets (columns 1-2), Repurchases/Assets (column 3-4) and Total Payout/Assets (column 5-6). Hi-tech firms are defined as those that belong to an industry (using the three digit level SIC code) that has an average R&D to assets ratio of at least 2%. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dividends/Assets</td>
<td>Repurchases/Assets</td>
<td>Total Payout/Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV*Hi-tech</td>
<td>-0.0009* (0.0005)</td>
<td>-0.0008* (0.0005)</td>
<td>0.0009 (0.0008)</td>
<td>0.0012 (0.0008)</td>
<td>0.0008 (0.0012)</td>
<td>0.0013 (0.0012)</td>
</tr>
<tr>
<td>MV</td>
<td>-0.0005 (0.0007)</td>
<td>-0.0005 (0.0006)</td>
<td>0.0010 (0.0013)</td>
<td>0.0009 (0.0013)</td>
<td>-0.0001 (0.0017)</td>
<td>-0.0002 (0.0016)</td>
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<td>Return on assets</td>
<td>0.0062*** (0.0005)</td>
<td>0.0163*** (0.0010)</td>
<td>0.0279*** (0.0017)</td>
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<td></td>
<td></td>
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<tr>
<td>ln(Real assets)</td>
<td>-0.0015*** (0.0004)</td>
<td>-0.0021*** (0.0004)</td>
<td>-0.0050*** (0.0010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market to book</td>
<td>0.0007*** (0.0001)</td>
<td>0.0012*** (0.0002)</td>
<td>0.0025*** (0.0003)</td>
<td></td>
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<td></td>
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<td>0.0118*** (0.0027)</td>
<td>0.0115*** (0.0006)</td>
<td>0.0195*** (0.0006)</td>
<td>0.0182*** (0.0007)</td>
<td>0.0391*** (0.0052)</td>
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<tr>
<td>Firm FE?</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE?</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
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<td>40,985</td>
<td>40,971</td>
<td>40,900</td>
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<td>0.6075</td>
<td>0.4337</td>
<td>0.4377</td>
<td>0.4824</td>
<td>0.4903</td>
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</table>
Table 10. MV Laws and Investment

This table reports the results from estimating an OLS model. The dependent variables are R&D/Assets (columns 1-2) and Capex/Assets (column 3-4). Hi-tech firms are defined as those that belong to an industry (using the three digit level SIC code) that has an average R&D to assets ratio of at least 2%. Robust standard errors clustered by state of incorporation are in parentheses. Variable definitions are provided in Appendix A. Note: *** p<0.01, ** p<0.05, * p<0.1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV*Hi-tech</td>
<td>0.0115***</td>
<td>0.0096***</td>
<td>-0.0026***</td>
<td>-0.0022***</td>
</tr>
<tr>
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<td>(0.0026)</td>
<td>(0.0020)</td>
<td>(0.0007)</td>
<td>(0.0007)</td>
</tr>
<tr>
<td>MV</td>
<td>-0.0013</td>
<td>-0.0003</td>
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</tr>
<tr>
<td></td>
<td>(0.0021)</td>
<td>(0.0018)</td>
<td>(0.0016)</td>
<td>(0.0015)</td>
</tr>
<tr>
<td>Return on assets</td>
<td>-0.1147***</td>
<td>-0.0079**</td>
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<td></td>
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<td></td>
<td>(0.0066)</td>
<td>(0.0039)</td>
<td></td>
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</tr>
<tr>
<td>ln(Real assets)</td>
<td>-0.0099***</td>
<td>0.0020***</td>
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</tr>
<tr>
<td></td>
<td>(0.0022)</td>
<td>(0.0005)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market to book</td>
<td>0.0032***</td>
<td>0.0017***</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0001)</td>
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</tr>
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<td>(0.0024)</td>
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</tr>
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<td>0.0308***</td>
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<td>(0.0108)</td>
<td>(0.0005)</td>
<td>(0.0031)</td>
</tr>
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<td>Firm FE?</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>44,425</td>
<td>44,410</td>
<td>44,425</td>
<td>44,410</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.7810</td>
<td>0.8501</td>
<td>0.6828</td>
<td>0.6849</td>
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</tbody>
</table>