



Alignment or entrenchment? Corporate governance and cash holdings in growing firms [☆]

Yenn-Ru Chen ^{*}, Wei-Ting Chuang

National Cheng Kung University, Taiwan

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ABSTRACT

This study contends that the association between corporate cash holdings and corporate governance is subject to the investment environments that firms face. For example, firms with an abundance of investment opportunities have a strong incentive to hold cash in order to maintain their competitive positions. Shareholders accept high levels of cash holdings in such growing firms if corporate governance can protect their interests. This study examines the effects of corporate governance on cash holdings for a sample of high-tech firms. The results show that CEO ownership, the directorship of venture capitalists (VCs), and independent directors play critical roles in corporate cash policy. In addition, the boards are more effective when the firms' CEOs are also their founders or when VCs hold a large stake of company shares. The effects of corporate governance are more significant in younger firms while the effects of firm-specific economic variables are more significant in older firms in the sample.

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1. Introduction

From an economic-rationale viewpoint, firms tend to hold cash to reduce transaction costs and to prevent the loss of underinvestment due to the shortage of funds (Kim et al., 1998; Mikkelsen and Partch, 2003; Opler et al., 1999; Ozkan and Ozkan, 2004). Alternatively, agency theory suggests that entrenched managers like to hold cash rather than distribute dividends to shareholders, and high cash holdings may lead to the agency problem of free cash flow (Dittmar et al., 2003; Jensen, 1986).

Holding cash assets is a matter of managerial discretion, and turning excess corporate cash into personal benefits is less costly to managers than transferring other assets to private benefits (Myers and Rajan, 1998; Papaioannou et al., 1992). Managers thus have a strong incentive to hold more cash. Weak corporate governance further encourages excess cash holdings (Dittmar et al., 2003). Moreover, the agency problem of free cash flow is more likely to arise in profitable firms with limited investment opportunities – a situation in which excess cash holdings may force managers to overinvest and subsequently harm the interests of shareholders (Dittmar et al., 2003; Easterbrook, 1984; Jensen, 1986).

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^{*} Corresponding author. National Cheng Kung University, College of Management, Department of Accountancy and Graduate Institute of Finance and Banking, 1 University Road, Tainan City, 70101, Taiwan. Tel.: +886 6 2757575x53425; fax: +886 6 2744104. E-mail address: yrchen@mail.ncku.edu.tw (Y.-R. Chen).

Whether or not such agency problems exist in firms with an abundance of investment opportunities, such as those in high-tech industries is an unanswered question in the literature. This study contends that the investment environment affects corporate cash-holding policies and that the influence of effective governance mechanisms on cash holdings also depends on the investment opportunities that firm possess.

High-tech firms are ideal for this study. They usually face very dynamic market competition, and their products have relatively short life cycles (Carpenter and Petersen, 2002). To maintain their competitive advantages, high-tech firms have to devote capital to new investment projects actively. They have a strong incentive to hold cash to mitigate the possibility of having to forego good investment opportunities due to fund shortage. Shareholders are thus in a trade-off position between facing the agency problem of excess cash and losing the opportunities of higher returns. If the corporate governance can protect the interests of shareholders, shareholders can then be free of concern about the agency problem of excess cash and thus allow firms to hold a high level of cash for high-return investment opportunities. Thus, expect high-tech firms to maintain a high level of cash holdings if effective governance mechanisms are in place.

In addition, the impact of corporate governance on cash holdings should be different in high-tech firms because the governance itself is different. For instance, venture capitalists (VCs) and founders may play critical roles in high-tech firms' governance, especially in the early years of the firms' establishment. As financiers, VCs often oversee managerial decisions (Carpenter et al., 2003; Van den Bergh and Levräu, 2002). The interest-alignment hypothesis suggests that the existence of large shareholders improves shareholder protection, leading to the positive effect of VC ownership on cash holdings. The

founders of high-tech firms often have board seats to ensure an effective decision-making process and to make good use of their highly specific knowledge of business operations. Similarly, the interest-alignment hypothesis suggests that board effectiveness affects cash holdings positively. The special characteristics of governance in high-tech firms therefore raise different concerns in capital spending decisions.

Using a sample of high-tech firms listed on the NASDAQ from 1997 to 2003, this study examines the effects of various governance mechanisms on cash holdings and investigates whether these effects are sensitive to the existence of founder CEOs and VC control, and firms' maturity. The results indicate that CEO ownership, VC directors, and independent directors show positive effects on cash holdings, consistent with the interest-alignment hypothesis. In addition, the study finds that the boards of high-tech firms are more effective when firms' CEOs are also their founders or when VCs hold a large stake of company shares. Moreover, the effects of corporate governance are more significant in younger firms, but the effects of economic variables are more significant in older firms.

2. Agency problems and cash holdings in high-tech firms

Because of a shorter product life cycle and a dynamic investment environment, high-tech firms are usually smaller, younger, and face stronger competition than traditional firms (Carpenter and Petersen, 2002). To maintain hard-earned competitive advantages, high-tech firms devote capital resources to risky investments and thus are often barely able to distribute cash to shareholders. Consequently, the agency problems relating to cash holdings in high-tech firms may not be the same as those problems in the agency literature (Dittmar et al., 2003; Easterbrook, 1984; Jensen, 1986).

The higher business complexity of high-tech firms leads to higher information asymmetry between insiders and investors and consequently higher cost of external financing than firms in traditional industries (Guiso, 1998). As a result, these firms have to generate funds from either retained earnings or negotiated financiers such as VCs. Furthermore, because the potential return on risky investments is high for high-tech firms (Wasserman, 1988), without sufficient funds for capital investments, shareholders may suffer when firms pass up value-increasing investments. Thus, whether to accept high levels of cash holdings becomes a trade-off to shareholders.

To ensure that corporate funds are spent appropriately, large shareholders such as VCs may actively involve with corporate decision making by taking board seats or creating contractual agreements (Fired et al., 1998; Van den Berghe and Levrau, 2002). For minority shareholders who are unable to influence management decisions, however, the protection from governance mechanisms is critical to accepting large cash holdings. That is, if firms possess effective governance to protect shareholder interests, or if major institutional investors such as VCs closely monitor managerial actions, shareholders will be willing to accept higher levels of cash holdings.

Therefore, the interest-alignment hypothesis suggests a positive relation between effective governance and the level of cash holdings for high-tech firms. What follows is a discussion of how governance mechanisms such as the presence of founder CEOs, the level of CEO ownership, the presence and involvement of VCs, and board effectiveness influence cash holdings in high-tech firms.

2.1. Founder CEOs

Due to their comparatively small size, high-tech firms have relatively simple governance mechanisms (Cowing, 2003). Their founders, directors, and managers possess great influence on corporate policies, including cash holdings. Furthermore, founders are often the CEOs or other executives of their firms. Bahrami and Evans (1987), Fahlenbrach (2004), and Wasserman (2003) investigate the special characteristics of firms where this is the case. They suggest that, compared with

nonfounder CEOs, founder CEOs tend to see their firms' very existence as the result of their painstaking efforts and are thus more likely to act in firms' best interests rather than for their own personal benefit. These CEOs also tend to spend less on luxurious perquisites and concentrate more on the firm's long-term performance. Therefore, shareholders whose interests align with these managers are often more willing to accept large cash holdings, suggesting a positive relation between founder CEOs and cash holdings.

2.2. CEO ownership

The interest-alignment hypothesis suggests that the conflicts of interest between shareholders and managers are less likely to occur when managers own more company shares. Because high-tech firms have a high demand for capital and they can hold more cash if the interests between shareholders and managers are aligned, the interest-alignment hypothesis suggests a positive relation between CEO ownership and the cash holdings of high-tech firms (which is not the case for traditional firms). On the other hand, the entrenchment hypothesis suggests that high managerial ownership increases the probability that managers pursue private interests at the expense of shareholders. Therefore, a high level of cash holdings may not be acceptable, leading to a negative relation between managerial ownership and cash holdings. In summary, the relation between CEO ownership and cash holdings could be positive if the interest-alignment hypothesis dominates, or negative if the entrenchment hypothesis dominates.

2.3. Venture capitalists

Prior studies indicate that VCs play different roles in high-tech firms. Directly, they are financiers, and indirectly, they monitor business operations (Phillips, 1991; Wasserman, 1988). Because high-tech firms face a riskier and more dynamic environment and are less transparent, VCs have to participate actively to reduce the information asymmetry and thus protect their long-term investments (Van den Berghe and Levrau, 2002). In addition, VCs are often considered value-added investors, and their involvement with corporate strategies is one important value-added activity (Fired et al., 1998). The interest-alignment hypothesis suggests that shareholders are more willing to accept large cash holdings to finance potential investment projects if the firms have effective monitoring mechanisms. Thus, the relation between VC ownership or VC directorship and cash holdings should be positive.

2.4. Board effectiveness

Board effectiveness also plays an important role in deciding corporate cash holdings. On one hand, an effective board can reduce information asymmetry, thus increasing a firm's capability of raising funds externally, which implies a negative relation between board effectiveness and cash holdings (Ozkan and Ozkan, 2004). On the other hand, an effective board can provide better shareholder protection. Therefore, based on the financial hierarchy model (Opler et al., 1999), shareholders should be more willing to allow managers to hold more cash.

Because high-tech firms are more complex and have more volatile cash flows than firms in traditional sectors, board effectiveness may not reduce the difficulty of obtaining external financing for high-tech firms. The high uncertainty of cash flow in these firms may still deter creditors. In addition, high-tech firms often have more investment opportunities than traditional firms, and intensive capital investment is a key factor for them to maintain their competitive advantages. Without sufficient funds, they could lose their market positions. Thus, the financial hierarchy model of Opler et al. (1999) should explain the effect of board effectiveness on cash holdings. If a board is effective, the shareholders should therefore be more willing to allow managers to hold more cash, making the relation between board effectiveness and cash holdings positive.

3. Empirical design

3.1. Research method and variable definition

This study examines the impact of corporate governance on the cash-holding policies of firms with an abundance of investment opportunities. By controlling for economic factors, this study specifically examines the effects of ownership structure and board composition on corporate cash holdings. To mitigate the possible problems of endogeneity and the adjustment delay of cash structure, this study performs the first-difference GMM estimations, following Ozkan and Ozkan (2004). The dependent variable (*CashHolding*) represents corporate cash holdings, which is the ratio of cash and cash equivalents to total assets. The followings are the definitions of independent variables.

3.1.1. Governance variables

FounderCEO is a dummy variable that equals one if a CEO is the founder and zero otherwise. Two proxies measure VC control: VC ownership (*VCOwn*) is the percentage of shares held by VCs, and VC director (*VCDir*) is the ratio of the number of seats occupied by VCs to the total number of board seats. In addition to VC ownership, the ownership variables include CEO ownership (*CEOOwn*) and non-executive-director ownership (*nonExeDirOwn*). The former is the percentage of CEO shareholdings (Dittmar et al., 2003; Papaioannou et al., 1992), and the latter is the percentage of shares in the hands of nonexecutive directors. The degree of nonexecutive-director ownership is a proxy for independency.

The board variables include board size and three types of outside directors in addition to VC directors. Firms with large boards tend to have poor corporate governance (Hellman and Puri, 2000; Wasserman, 1988; Yermack, 1996). This study defines board size (*BODSize*) as the logarithm of the total number of directors in a firm. Core et al. (1999) show that a board consisting of more outside directors is more

effective in monitoring managers and protecting shareholders. This study defines outside directors as nonexecutive directors who have no personal relation to current or former executives. Consistent with Core et al. (1999), this study classifies three types of outside directors: gray directors (*GrayDir*), interlocked directors (*InterlockedDir*), and independent directors (*IndependDir*). An outside director is a gray director if he is appointed by managers, is over 69 years old, or maintains a business relation with the company. If a corporate insider is a director of an outside director's firm, such an outside director is an interlocked director. All others are independent directors. *GrayDir*, *InterlockedDir*, and *IndependDir* represent the proportion of gray, interlocked, and independent directors on a board, respectively.

3.1.2. Firm-specific control variables

Cash flow represents the source of a firm's cash, and, consistent with Opler et al. (1999), its definition is the ratio of earnings before interests, taxes, depreciation and amortization (EBITDA) less interests, taxes, and dividends, to total assets. A company's leverage (*Leverage*) represents its financial risk, and large cash reserves can reduce the possibility of default and thus lower this financial risk. This study defines leverage as the ratio of long-term debts to total assets.

High-tech firms tend to keep a high level of cash holdings to meet this potential demand for investment capital. Consequently, this study expects a positive relation between investment expenditure and cash holdings to exist. To reflect a company's investment activities, this study considers two variables: the ratio of R&D expenditures to total assets and the ratio of capital expenditures to total assets.

The notion of a positive relation between investment opportunities and cash holdings is not new. Dittmar et al. (2003) suggest that firms facing large growth opportunities prefer to hold more cash. Similarly, Boyle and Guthrie (2003) show that holding large cash helps to keep potential investment opportunities alive. If companies lack internal funds, they may lose their growth opportunities. To represent growth

Table 1
Statistics description.

Variables (N = 2643)	Mean	Standard deviation	Maximum	75th percentile	Median	25th percentile	Minimum
<i>Dependent variable</i>							
Cash holdings (%)	34.6	24.4	99.2	53.4	33.0	13.4	0.0
<i>Governance variables</i>							
FounderCEO dummy	0.2	0.4	1.0	0.0	0.0	0.0	0.0
CEOOwn (%)	8.5	11.7	87.4	9.8	4.1	1.8	0.0
VCOwn (%)	10.8	14.2	96.9	15.9	6.5	0.0	0.0
VCControl dummy	0.2	0.4	1.0	0.0	0.0	0.0	0.0
NonExeDirOwn (%)	9.9	13.8	95.7	12.5	4.5	1.5	0.0
BODSize	6.8	2.1	20.0	8.0	6.0	5.0	2.0
Log(BODSize)	1.9	0.3	3.0	2.1	1.8	1.6	0.7
VCDir (%)	13.6	15.9	88.9	20.0	11.1	0.0	0.0
GrayDir (%)	4.6	8.5	60.0	6.0	0.0	0.0	0.0
InterlockedDir (%)	3.5	10.1	80.0	0.0	0.0	0.0	0.0
IndependDir (%)	42.6	30.3	100.0	71.4	43.8	10.6	0.0
<i>Control variables</i>							
Cash Flow (%)	-7.7	43.6	77.8	10.3	3.3	-14.1	-1534.6
Leverage (%)	10.1	19.4	241.0	12.3	0.6	0.0	0.0
R&D (%)	37.3	215.7	6729.8	24.1	12.7	3.8	0.0
CapExp (%)	5.1	5.7	54.2	6.3	3.3	1.7	-3.2
NWC (%)	4.6	26.4	85.1	17.8	3.7	-5.7	-593.0
MBA	3.3	5.5	105.1	3.4	1.9	1.2	0.2
Size	4.6	1.7	11.3	5.7	4.4	3.4	-0.5
Div dummy	0.1	0.2	1.0	0.0	0.0	0.0	0.0
Beta	1.1	0.9	4.9	1.6	1.0	0.5	-10.4

CashHolding is the ratio of cash and equivalents to total assets. *FounderCEO dummy* equals to one if a firm's CEO is also a founder of the firm. *CEOOwn*, *VCOwn*, and *nonExeDirOwn* are the percentage of shares owned by CEOs, venture capitalists, and nonexecutive directors, respectively. *BODSize* is the number of total seats on a firm's board. *VCDir*, *GrayDir*, *InterlockedDir*, and *IndependDir* are percentages of seats taken by venture capital directors, gray directors, interlocked directors, and independent directors. *Cash Flow* is defined as EBITDA less interest, taxes, and dividends, and it is scaled by total assets. *Leverage* is the ratio of long-term debt to total assets. *R&D* is the ratio of R&D expenses to total assets. *CapExp* is the ratio of capital expenditure to total assets. *NWC* is working capital net of cash, scaled by total assets. *MBA* is defined by the book value of debts plus the market value of equity divided by the book value of assets. *Size* is the logarithm of total assets. *Div dummy* is a dummy variable that equals one if a firm pays dividend in a given year. *Beta* is estimated by CAPM.

opportunities, this study uses the market-to-book ratio of assets (*MBA*), which is the ratio of the book value of debt and the market value of equity to the book value of assets.

Prior studies also show a positive relation between cash holdings and firm size (*Size*) (Kalcheva and Lins, 2004; Ozkan and Ozkan, 2004). Usually, larger versus smaller firms have a greater desire to keep large capital reserves to maintain the level and the quality of their operations and investment activities. Firm size is the logarithm of total assets. In addition, net working capital measures a firm's credit in defending its operating loss, and its measure is the ratio of working capital (net of cash) to total assets. Following Opler et al. (1999), a dividend dummy variable represents a firm's dividend policy; it equals one if a firm pays dividend in a given year. Furthermore, a firm's beta measures its risk.

3.2. Data and sample selection

Governance data are from company proxy statements, via Lexis-Nexis; financial variables are from the Compustat database. The sample contains high-tech firms listing on the NASDAQ from 1997 to 2003. This study identifies high-tech firms to be firms with the following four-digit SIC codes: 3570, 3571, 3572, 3575, 3576, 3577, 3661, 3669, 3670, 3672, 3674, 3677, 3678, 3679, 3690, 3825, 3826, 3841, 3842, 3843, 3844, 3845, 3851, 4812, 4813, 4899, 7350, 7359, 7370, 7371, 7372, 7373, 7374, 7377, 7380, 7385, 7600 and 8711. The initial collection includes firms with proxy statements for at least two years, producing 4625 firm-year observations. After eliminating missing values, the sample size decreases to 2643 firm-year observations.

3.3. Statistics description

Table 1 reports the descriptive statistics of all variables. The average corporate cash holdings in the sample account for 34.6% of total assets. Comparing this with the findings of Opler et al. (1999), which examines cash holdings for all non-financial firms, this study shows that high-tech firms keep a higher level of cash holdings.

The average VC ownership in the sample is 10.8%, which is greater than the average management ownership (8.5%) and the average ownership of non-executive directors (9.9%). Such a level of VC ownership suggests that VCs may exercise more decision-making influence than other key shareholders in high-tech firms. The average board size in the sample is 6.8 directors, which is smaller than average board size in other large and well-established firms in previous studies (e.g., Core et al. (1999) and Bushman et al. (2004) report 13 and 11.22 directors, respectively). This is probably because high-tech firm are often smaller than firms in traditional industries. In this sample, VC directors account for 13.6%, gray directors account for 4.6% and interlocked directors account for 3.5% of the board seats. The average proportion of independent outside directors on the boards is 42.6%. This higher-than-expected number reflects the fact that some VC directors are often neither gray directors nor interlocked directors and thus are independent directors.

The average annual cash flow that a firm generates is around -7.7% of total assets, which can be explained by the relatively instability of high-tech firms. In this study, more than 25% of the sample has negative cash inflows. The mean financial leverage is about 10.1% of total assets, indicating that high-tech firms use much less debt than equity due to the higher cost of debt financing in these firms. The average R&D expenditure is about 37.3% of total assets, higher than the 2.7% in Opler et al. (1999); however, the average capital expenditures (5.1%) in this study are smaller than the 9.0% in Opler et al. In addition, the average market-to-book ratio (3.30), which is also higher than number in Opler et al., verifies that the high-tech firms have more investment opportunities. The average logarithm of total assets (4.6) is similar to the number in Opler et al. The mean dividend dummy variable indicates that very few high-tech firms pay out dividends. Moreover, the average beta of 1.1 verifies that the sample firms carry a higher level of risk than the financial markets.

4. Empirical analyses

4.1. The impact of corporate governance on cash holdings

This study employs three model specifications: model (1) examines the impact of ownership structure; model (2) examines the effects of board variables; and model (3) takes into account the effects of all variables. Table 2 shows the empirical results.

The significant and positive effects of CEO ownership, VC directors, and independent directors on cash holdings are consistent with the interest-alignment hypothesis. The higher CEO ownership indicates better interest alignment, and accordingly shareholders are more likely free of concerns about managerial expropriation. By allowing firms to retain more cash for investment opportunities, shareholders can yield a higher return than asking for dividends. VC directors and independent directors represent higher board independence and governance effectiveness, which in turn encourages shareholders to let firms undertake risky investments.

On the other hand, the negative coefficient of board size seems to be inconsistent with the interest-alignment hypothesis. The literature contends that a large board indicates less effective monitoring (Core et al., 1999; Yermack 1996). Nevertheless, the average board size (6.8) in this study is much smaller than the average board size in the literature. In a board with six to seven directors, the problem of free riding and the cost of coordination would be smaller than a board with more than 10 directors. In addition, a board with six to seven directors could perform more advising and monitoring functions than a board

Table 2
Impact of corporate governance on cash holdings.

	(1)	(2)	(3)
Intercept	0.00 (−2.64)***	0.00 (−0.85)	0.00 (−0.81)
Cash($t-1$)	0.13 (1.30)	0.13 (1.31)	0.06 (0.64)
<i>Governance variables</i>			
FounderCEO dummy	−0.08 (−1.63)		−0.02 (−0.49)
CEOOwn	0.24 (2.32)**		0.19 (2.24)**
VCOwn	0.06 (0.91)		−0.01 (−0.12)
NonExeDirOwn	0.05 (0.80)		−0.06 (−0.70)
Log(BODSize)		0.10 (3.53)***	0.06 (2.31)**
VCDir		0.37 (3.25)**	0.23 (2.36)**
GrayDir		−0.08 (−0.45)	0.13 (0.71)
InterlockedDir		0.09 (0.34)	0.40 (1.62)
IndependDir		0.02 (0.23)	0.22 (2.01)**
<i>Control variable</i>			
Cash Flow	0.11 (4.73)***	0.11 (4.60)***	0.09 (4.28)***
MBA	0.00 (3.59)***	0.01 (4.16)***	0.01 (4.51)***
Size	0.07 (9.09)***	0.02 (1.05)	0.02 (1.05)
CapExp	−0.15 (−1.68)*	−0.17 (−1.89)*	−0.09 (−1.02)
R&D	0.00 (2.78)***	0.00 (2.86)***	0.00 (2.64)***
NWC	−0.21 (−4.23)***	−0.19 (−3.94)***	−0.15 (−3.33)***
Leverage	−0.03 (−0.62)	−0.05 (−1.06)	−0.06 (−1.35)
Div dummy	0.05 (1.46)	0.02 (0.63)	0.03 (0.80)
Beta	−0.01 (−1.66)*	−0.01 (−1.24)	−0.01 (−1.03)
Sargan statistics (df)	83.94 (57)	97.55 (61)	120.98 (77)

This table shows the impact of governance on cash holdings in the first-difference GMM estimations. Model (1) examines the effects of ownership structure; model (2) examines the effects of board composition; and model (3) is the full model. *CashHolding* is the ratio of cash and equivalents to total assets. *FounderCEO dummy* equals to one if a firm's CEO is also a founder of the firm. *CEOOwn*, *VCOwn*, and *nonExeDirOwn* are the percentage of shares owned by CEOs, venture capitalists, and nonexecutive directors, respectively. *BODSize* is the number of total seats on a firm's board. *VCDir*, *GrayDir*, *InterlockedDir*, and *IndependDir* are percentages of seats taken by venture capital directors, gray directors, interlocked directors, and independent directors. *Cash Flow* is defined as EBITDA less interest, taxes, and dividends, and it is scaled by total assets. *Leverage* is the ratio of long-term debt to total assets. *R&D* is the ratio of R&D expenses to total assets. *CapExp* is the ratio of capital expenditure to total assets. *NWC* is working capital net of cash, scaled by total assets. *MBA* is defined by the book value of debts plus the market value of equity divided by the book value of assets. *Size* is the logarithm of total assets. *Div dummy* is a dummy variable that equals one if a firm pays dividend in a given year. *Beta* is estimated by CAPM. The *t*-statistics of coefficients are reported in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

Table 3
Impact of founder CEOs on the relation between corporate governance and cash holdings.

	(1)	(2)	(3)
Intercept	0.00 (−2.42)**	0.00 (0.26)	0.00 (0.51)
Cash(t−1)	0.15 (1.65)*	0.01 (0.08)	−0.02 (−0.36)
<i>Governance variables</i>			
FounderCEO dummy	−0.03 (−0.56)	0.45 (2.79)***	0.33 (2.03)**
CEOOwn	0.26 (2.22)**		0.24 (2.68)***
VCOwn	0.04 (0.59)		−0.01 (−0.08)
NonExeDirOwn	0.07 (1.07)		−0.02 (−0.19)
Log(BODSize)		0.11 (3.54)***	0.07 (2.58)***
VCDir		0.25 (2.33)**	0.17 (1.81)*
GrayDir		−0.22 (−1.20)	−0.06 (−0.34)
InterlockedDir		0.46 (1.88)*	0.61 (2.70)***
IndependDir		0.16 (1.51)	0.24 (2.18)**
FC*CEOOwn	0.01 (0.07)		−0.18 (−1.01)
FC*VCOwn	0.06 (0.42)		0.02 (0.21)
FC*NonExeDirOwn	−0.23 (−1.81)*		−0.21 (−1.83)*
FC*Log(BODSize)		−0.13 (−1.83)*	−0.07 (−1.02)
FC*VCDir		−0.09 (−0.48)	0.18 (1.11)
FC*GrayDir		0.22 (0.91)	0.13 (0.60)
FC*InterlockedDir		−0.80 (−3.77)***	−0.83 (−4.18)***
FC*IndependDir		−0.29 (−2.54)**	−0.28 (−2.62)***
<i>Control variables</i>			
Cash Flow	0.11 (4.93)***	0.07 (3.71)***	0.07 (3.89)***
MBA	0.00 (4.00)***	0.01 (4.48)***	0.01 (4.65)***
Size	0.07 (9.02)***	0.01 (0.55)	0.01 (0.92)
CapExp	−0.16 (−1.86)*	−0.08 (−0.93)	−0.06 (−0.75)
R&D	0.00 (2.60)***	0.00 (2.65)***	0.00 (2.58)***
NWC	−0.21 (−4.36)***	−0.12 (−2.92)***	−0.09 (−2.57)**
Leverage	−0.03 (−0.54)	−0.06 (−1.37)	−0.05 (−1.17)
Div dummy	0.04 (1.23)	0.02 (0.49)	0.02 (0.74)
Beta	−0.01 (−1.80)*	−0.01 (−1.06)	−0.01 (−1.34)
Sargan statistics (df)	93.58 (69)	131.97 (85)	154.73 (109)

This table shows the impact of founder-CEOs on the relation between governance and cash holdings in the first-difference GMM estimations. Model (1) examines the effects of ownership structure; model (2) examines the effects of board variables; and model (3) is the full model. *CashHolding* is the ratio of cash and equivalents to total assets. *FounderCEO dummy* equals to one if a firm's CEO is also a founder of the firm. *CEOOwn*, *VCOwn*, and *nonExeDirOwn* are the percentage of shares owned by CEOs, venture capitalists, and nonexecutive directors, respectively. *BODSize* is the number of total seats on a firm's board. *VCDir*, *GrayDir*, *InterlockedDir*, and *IndependDir* are percentages of seats taken by venture capital directors, gray directors, interlocked directors, and independent directors. *Cash Flow* is defined as EBITDA less interest, taxes, and dividends, and it is scaled by total assets. *Leverage* is the ratio of long-term debt to total assets. *R&D* is the ratio of R&D expenses to total assets. *CapExp* is the ratio of capital expenditure to total assets. *NWC* is working capital net of cash, scaled by total assets. *MBA* is defined by the book value of debts plus the market value of equity divided by the book value of assets. *Size* is the logarithm of total assets. *Div dummy* is a dummy variable that equals one if a firm pays dividend in a given year. *Beta* is estimated by CAPM. The *t*-statistics of coefficients are reported in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

with fewer directors. Therefore, while it is unclear whether the positive effect of board size on cash holdings is consistent with the interest-alignment hypothesis or the entrenchment hypothesis, the average board size in high-tech firms seems to make these boards more effective than those in firms examined in prior studies.

4.2. The effect of founder CEOs

In the sample, most CEOs are also board members. In founder-CEO firms, CEOs are likely to be the chairmen or at least members of the boards. In nonfounder-CEO firms, founders also occupy other executive positions or hold board seats. In either case, founders tend to exert a great influence on decision-making and business operations. Due to their initial enthusiasm for establishing their firms, founder CEOs tend to pursue the long-term development of their firms. This study contends that the effects of corporate governance on cash holdings will be different between firms whose CEOs are or are not founders of the firms.

This study investigates the impact of founder CEOs on the relation between corporate governance and cash holdings by examining the interactions of *FounderCEO dummy* with other governance variables. As Table 2, Table 3 reports the results of the three model specifications.

Similar to the results of Table 2, the positive coefficients of *FounderCEO dummy*, *CEOOwn*, *VCDir*, and *IndependDir* are consistent with the interest-alignment hypothesis. When firms' CEOs are their founders, the CEOs' shareholdings are higher, or there are more VC directors or independent directors, shareholder interests are more likely in line with insiders. Accordingly, allowing firms to retain more cash for investment opportunities can yield higher returns to shareholders. Thus, shareholders would accept more cash holdings when corporate governance can protect their interests.

Among the ownership variables, the coefficient of *CEOOWN* is significantly positive but its interaction with *FounderCEO* is not, suggesting that their effects on cash holdings are not significantly different in firms with founder-CEOs than firms without founder-CEOs. On the other hand, although the ownership of nonexecutive directors does not show significant effect, its interaction with *FounderCEO* shows significant and

Table 4

Impact of venture capital control on the relation between corporate governance and cash holdings.

	(1)	(2)	(3)
Intercept	0.00 (−2.66)***	0.00 (−1.21)	0.00 (−0.21)
Cash(t−1)	0.16 (1.68)*	0.07 (0.92)	−0.02 (−0.23)
<i>Governance variables</i>			
VC Control dummy	0.01 (0.31)	0.19 (2.22)**	0.20 (2.50)**
FounderCEO dummy	−0.10 (−1.98)**		0.00 (0.04)
CEOOwn	0.25 (2.41)**		0.20 (2.37)**
NonExeDirOwn	0.09 (1.41)		−0.11 (−1.25)
Log(BODSize)		0.08 (2.99)***	0.06 (2.30)**
GrayDir		−0.05 (−0.33)	0.16 (0.93)
InterlockedDir		0.21 (0.86)	0.64 (2.69)***
IndependDir		0.06 (0.69)	0.30 (2.96)***
VC*FounderCEO dummy	0.04 (1.39)		0.03 (0.96)
VC*CEOOwn	−0.03 (−0.18)		−0.07 (−0.55)
VC*NonExeDirOwn	−0.07 (−0.80)		−0.03 (−0.30)
VC*Log(BODSize)		−0.10 (−2.29)**	−0.11 (−2.63)***
VC*GrayDir		−0.09 (−0.45)	−0.19 (−0.91)
VC*InterlockedDir		−0.15 (−1.71)*	−0.19 (−2.05)**
VC*IndependDir		0.02 (0.63)	0.04 (0.92)
<i>Control variables</i>			
Cash Flow	0.11 (4.92)***	0.10 (5.07)***	0.08 (4.25)***
MBA	0.01 (4.21)***	0.01 (5.62)***	0.01 (7.36)***
Size	0.07 (9.52)***	0.03 (2.59)**	0.02 (1.36)
CapExp	−0.17 (−2.11)**	−0.16 (−1.92)*	−0.10 (−1.37)
R&D	0.00 (2.60)***	0.00 (2.90)***	0.00 (2.63)***
NWC	−0.22 (−4.69)***	−0.17 (−4.01)***	−0.12 (−3.16)***
Leverage	−0.05 (−0.93)	−0.04 (−0.88)	−0.07 (−1.63)
Div dummy	0.04 (1.13)	0.03 (0.86)	0.03 (1.06)
Beta	−0.01 (−1.84)*	−0.01 (−1.06)	0.00 (−0.09)
Sargan statistics (df)	91.7 (69)	127.66 (77)	154.18 (101)

This table shows the impact of VC control on the relation between governance and cash holdings in the first-difference GMM estimations. Model (1) examines the effects of ownership structure; model (2) examines the effects of board variables; and model (3) is the full model. A firm is identified as VC controlled firm if the VCs own more than 20% of company shares. *CashHolding* is the ratio of cash and equivalents to total assets. *FounderCEO dummy* equals to one if a firm's CEO is also a founder of the firm. *CEOOwn*, *VCOwn*, and *nonExeDirOwn* are the percentage of shares owned by CEOs, venture capitalists, and nonexecutive directors, respectively. *BODSize* is the number of total seats on a firm's board. *VCDir*, *GrayDir*, *InterlockedDir*, and *IndependDir* are percentages of seats taken by venture capital directors, gray directors, interlocked directors, and independent directors. *Cash Flow* is defined as EBITDA less interest, taxes, and dividends, and it is scaled by total assets. *Leverage* is the ratio of long-term debt to total assets. *R&D* is the ratio of R&D expenses to total assets. *CapExp* is the ratio of capital expenditure to total assets. *NWC* is working capital net of cash, scaled by total assets. *MBA* is defined by the book value of debts plus the market value of equity divided by the book value of assets. *Size* is the logarithm of total assets. *Div dummy* is a dummy variable that equals one if a firm pays dividend in a given year. *Beta* is estimated by CAPM. The *t*-statistics of coefficients are reported in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

negative effect. This finding indicates that nonexecutive-director ownership is likely to discourage cash holdings in founder-CEO firms. The possible explanation is that non-executive directors often have less power over founder-CEOs in corporate decision making. When non-executive directors own more company shares, they are less likely to be in line with founder-CEOs in deciding corporate policies. This reason may also explain the positive effect of independent directors and the negative effect of its interaction with *FounderCEO*.

Among the board variables, the positive effects of VC directors and independent directors are consistent with the interest-alignment hypothesis. The effect of VC directors is not significantly different between founder-CEO and nonfounder-CEO firms. Although the effect of independent directors is positive, the effect of its interaction with *FounderCEO* is negative. This phenomenon is similar to the effect of nonexecutive-director ownership. Thus, these findings may infer that non-executive and independent directors show higher concerns in corporate decision making when the CEOs are also the founders, because founder CEOs are more likely to dominate the boards and control the agenda although they emphasize firms' long-term development. Last, the positive effect of board size and interlocked directors is not consistent with the interest-alignment hypothesis, but the negative effect of its interactions with *FounderCEO* is. This finding suggests that the boards are more effective in founder-CEO firms than in nonfounder-CEO firms.

4.3. Effect of venture capital control

VCs play an important role in capital financing and business operations in high-tech firms, especially small and young high-tech firms. In this sample, the level of VC control is high. As Table 1 shows, the average VC ownership is 10.8% and the maximum ownership reaches 96.9%. In addition, VCs hold an average of 13.6% and a max-

imum of 88.9% of board seats. Thus, further exploring the impact of VCs is important.

To investigate the effects of VC control, this study classifies the sample firms into two categories: VC-controlled firms with VC ownership higher than 20%, and nonVC-controlled firms otherwise. Table 4 shows the results. Different from the models of Table 2, the models of Table 4 replace the *VCOwn* and *VCDir* variables with the *VCControl* dummy variable. The coefficients of *VCControl* dummy are significantly positive in models (2) and (3), indicating that VC-controlled firms tend to hold more cash. This is consistent with the interest-alignment hypothesis because VCs monitor managerial decisions closely when they hold controlling stakes.

When the model includes only ownership variables (model (1)), the effect of *FounderCEO* is significantly negative. When the model includes all governance variables (model (3)), the effect of *FounderCEO* becomes insignificantly positive. The interaction of *FounderCEO* with *VCControl* is not significant in either specification. These findings suggest that founder CEOs may be relatively inactive when VCs own a large stake of their firms, and that the impact of founder CEOs does not differ significantly between firms with and without VC control. In addition, although CEO ownership shows a positive effect on cash holdings, its interaction with *VCControl* does not. That is, the effect of CEO ownership is consistently in line with the interest-alignment hypothesis.

Although the coefficients of board size and interlocked directors are significantly positive, their interactions with *VCControl* show negative impact on cash holdings that is consistent with the interest-alignment hypothesis. In addition, the coefficient of independent directors is positive and consistent with the interest-alignment hypothesis. In summary, boards are more effective when VCs hold a large stake of company shares. In turn, when governance mechanisms are effective in protecting shareholder interests, firms have more freedom to retain cash for the capital demand of investment opportunities.

Table 5
Impact of corporate governance on cash holdings: firms initially listing before and after 1996.

	Firms initially listing during or after 1996						Firms initially listing before 1996					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.00	(-4.96)***	0.00	(-4.37)***	0.00	(-3.99)***	0.00	(-1.30)	0.00	(-0.16)	0.00	(0.26)
Cash(t-1)	-0.02	(-0.25)	-0.21	(-2.99)***	-0.15	(-2.31)**	0.42	(4.57)***	0.31	(3.71)***	0.34	(4.51)***
<i>Governance variables</i>												
FounderCEO dummy	-0.05	(-0.84)			0.03	(0.61)	-0.12	(-1.40)			-0.07	(-0.89)
CEOOwn	0.23	(1.66)*			0.11	(1.06)	0.14	(0.95)			0.04	(0.29)
VCOwn	-0.06	(-0.98)			-0.10	(-1.92)*	0.15	(1.27)			0.16	(1.43)
NonExeDirOwn	0.04	(0.61)			-0.17	(-1.85)*	0.13	(0.98)			0.01	(0.11)
Log(BODSize)			0.11	(3.27)***	0.06	(1.96)**			0.05	(1.36)	0.09	(2.53)**
VCDir			0.34	(3.10)***	0.33	(3.43)***			0.37	(2.24)**	0.52	(3.02)***
GrayDir			0.00	(0.00)	0.27	(1.46)			0.08	(0.43)	0.08	(0.47)
InterlockedDir			-0.01	(-0.05)	0.29	(1.23)			0.20	(1.03)	0.23	(1.17)
IndependDir			0.19	(1.84)*	0.37	(3.05)***			0.01	(0.08)	0.01	(0.12)
<i>Control variables</i>												
Cash Flow	0.04	(1.44)	0.05	(1.95)*	0.04	(1.38)	0.13	(6.01)***	0.12	(5.70)***	0.13	(6.57)***
MBA	0.01	(5.39)***	0.01	(5.60)***	0.01	(5.71)***	0.00	(1.99)**	0.00	(2.20)**	0.01	(2.94)***
Size	0.09	(12.40)***	0.04	(2.89)***	0.03	(2.62)***	0.04	(4.45)***	0.02	(0.86)	-0.01	(-0.48)
CapExp	0.04	(0.47)	0.10	(1.01)	0.08	(0.96)	-0.49	(-3.92)***	-0.43	(-3.97)***	-0.46	(-4.10)***
R&D	0.00	(1.10)	0.00	(1.29)	0.00	(1.18)	0.00	(3.97)***	0.00	(4.31)***	0.00	(4.66)***
NWC	-0.21	(-5.04)***	-0.09	(-2.41)**	-0.07	(-2.10)**	-0.26	(-5.80)***	-0.23	(-5.40)***	-0.24	(-5.76)***
Leverage	0.11	(2.06)**	0.02	(0.40)	0.05	(1.00)	-0.09	(-1.67)*	-0.11	(-1.95)*	-0.09	(-1.84)*
Div dummy	0.06	(2.02)**	0.06	(2.26)**	0.05	(1.73)*	0.09	(2.25)**	0.04	(1.12)	0.03	(0.76)
Beta	-0.02	(-3.77)***	-0.02	(-2.73)***	-0.02	(-2.55)**	0.01	(1.36)	0.01	(0.99)	0.01	(1.84)*
Sargan statistics (df)	72.63	(57)	82.62	(61)	106.38	(77)	60.13	(57)	50.88	(61)	72	(77)

This table shows the impact of governance on cash holdings for firms initially listing before and after 1996 in the first-difference GMM estimations. Models (1) and (4) examine the effects of ownership structure; models (2) and (5) examine the effects of board variables; and models (3) and (6) are the full models. *CashHolding* is the ratio of cash and equivalents to total assets. *FounderCEO dummy* equals to one if a firm's CEO is also a founder of the firm. *CEOOwn*, *VCOwn*, and *nonExeDirOwn* are the percentage of shares owned by CEOs, venture capitalists, and nonexecutive directors, respectively. *BODSize* is the number of total seats on a firm's board. *VCDir*, *GrayDir*, *InterlockedDir*, and *IndependDir* are percentages of seats taken by venture capital directors, gray directors, interlocked directors, and independent directors. *Cash Flow* is defined as EBITDA less interest, taxes, and dividends, and it is scaled by total assets. *Leverage* is the ratio of long-term debt to total assets. *R&D* is the ratio of R&D expenses to total assets. *CapExp* is the ratio of capital expenditure to total assets. *NWC* is working capital net of cash, scaled by total assets. *MBA* is defined by the book value of debts plus the market value of equity divided by the book value of assets. *Size* is the logarithm of total assets. *Div dummy* is a dummy variable that equals one if a firm pays dividend in a given year. *Beta* is estimated by CAPM. The *t*-statistics of coefficients are reported in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

4.4. Effect of firms maturity

Because the capital demands and the financing capabilities could be different for high-tech firms in different development stages, this study further examines the effects of governance on cash holdings for firms initially listing before and firms initially listing during or after 1996. Table 5 shows the results. Comparing empirical results between two sub-samples, governance variables show higher effects in younger firms and financial variables demonstrate higher effects in older firms.

The effect of CEO ownership is consistently positive for both types of firms even though the effect is more significant in younger firms. Besides, the ownership of VCs and nonexecutive directors shows significant and negative effects on younger firms' cash holdings but insignificant and positive effects on older firms' cash holdings. These findings indicate that when they hold more company shares, VCs and nonexecutive directors have different concerns than CEOs in corporate cash holdings in younger high-tech firms. On the other hand, if VCs not only play the role of external financiers but they also participate in business operations via taking seats in the boards, the effect could be different. This may explain why the effect of VC directors is positive in both older and younger high-tech firms.

5. Conclusion

This study extends the literature of cash theory and agency theory to those firms that possess an abundance of investment opportunities (such as high-tech firms). The literature indicates that high levels of corporate cash holdings may lead to the agency problem of over-investment and thus effective corporate governance could mitigate the problems of excess cash holdings. However, the main concern for high-tech firms is that they often face financing constraints for their investment opportunities. Foregoing investment opportunities due to fund shortages would lower their firm value and shareholder wealth. Effective governance mechanisms thus protect the interests of shareholders and ensure sufficient cash holdings for their investments.

This study complements the literature of cash-governance association by focusing on firms with plentiful investment opportunities. As stated earlier, the evidence indicates that the agency costs of free cash flows are subject to the investment environment that firms face. In a dynamic and competitive environment, corporate governance in high-tech firms is relatively simple and affects the corporate decision-making process differently. In addition, this study is a timely analysis in investigating the corporate governance of high-tech firms and its impact on a major corporate policy, and the results support the argument in the

governance literature that the governance-standard compliance should be different for high-tech firms.

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