ABSTRACT

Our empirical results indicate that there is a significant positive correlation between cash holdings and firm size, this means that the corporate cash holdings without the effects of economies of scale. This result is contrary to previous studies, but it seems to be consistent with the increasing cash-to-asset ratio over the past decade. While we also find that there is a significant negative relation between short-term debt and cash holdings. This result implies that there is a substitute relationship between cash holdings and bank lines of credit.

Keywords: cash, cash holdings, line of credit, economies of scale

1. Introduction

According to the aspects of Keynes (1936), corporate cash holdings with three motivations, that is transactions motive, precautionary motive and speculative motive. Additionally, some of the different motives of holding cash have also been extensively studied ( Such as agent motive, tax motive and acquisition motive ).

Under perfect capital markets, firm is always available to fund positive NPV projects. On the contrary, in the incomplete capital markets, cash is an important tool for firms’ daily operating. Cash reserves can to cope with further favorable investment opportunities and to prevent the unexpected loss.

Why a company held cash will exceed their financing needs? According to the argument of Jensen (1986), if the information asymmetry between company managers and shareholders, the companies tend to retain larger amounts of free cash flow rather than payouts cash to shareholders. Other things being equal, cash relative to other assets is an option for the manager. Thus, we are not difficult to find managers prefer to hold relatively
higher cash balance. Opler et al. (1999) point that firms tend to hold more cash balance than estimated by the static tradeoff model. Harford (1999) also argue that firms often build up much more cash than they need to meet expected financing requirements. Harford, Mansi and Maxwell (2008) document that entrenched managers are more likely to hold higher excess cash balances. In addition, in terms of tax considerations, Foley et al. (2007) find that if multinational firms facing higher foreign earnings repatriation tax will hold higher cash position. For to encourage the multinational firms to repatriate their abroad earnings back to the U.S. and use that to increase jobs and investment, on October 22, 2004 the U.S. Congress passed the American Jobs Creation Act (AJCA) and sets up a temporary tax holiday that significantly reduces the taxation of multinational companies to repatriate earnings from foreign subsidiaries. Jennifer Blouin and Linda Krull (2009) find that firms that repatriate under the AJCA have lower investment opportunities and higher free cash flows than non-repatriating firms. This means that the earnings repatriation tax is one of the important determinants of multinational companies holding cash.

On the other hand, many articles also mentioned that why do some firms hold so little cash? When company has a substantial operating losses, firm must spend previous retained earnings to cover the losses. In the short term, this may result in the dramatic reduction of cash level. Opler et al. (1999) indicate that firms with large changes in excess cash mainly reason is as a result of operating losses. Similar to the argument of aforementioned, Denis and Sibilkov (2009) indicate that low cash constrained firm exhibit persistently low and declining free cash flows over pass period. Hence, these firms are unable to accumulate adequate cash reserves. Faulkender (2002) point that one of the main reasons for firm holds less cash is difficult to obtain funds from the capital market. In addition, on the view of the firm's organizational structure and investment strategy, Duchin (2010) indicate that multinational enterprises hold significantly less cash than stand-alone firms because they are diversified in their investment opportunities.

Previous studies indicate that large firms there are the effect of economies of scale with the transaction motive, that is larger firms hold relative lower cash balance (see, Vogel and Maddala (1967), Belts and Frank (1996) and Mulligan, (1997)). Recently, however, this effect seems to have changed. As Bate et al. (2009) point that the firms of U.S. there is an increasing cash to total assets ratios. We observe that the Taiwan listed companies have also such a phenomenon (as illustrated in Figure 1.). In our view, intuitively, it seems to be less related to transactions motive or precautionary motive of cash holdings. We infer that this may be related to the speculative motive of cash holdings. The speculative motive indicates that the manager is well aware of future market conditions, and be able to benefit from it, so the firms retain more cash to cope with future uncertainly favorable investment opportunities.
In this paper, we examine (1) whether still there are economies of scale of the cash holding and (2) whether there is a substitute relationship between cash holdings and bank lines of credit. Our results indicate that there is a significant positive relation between cash holdings and firm size, implies that the corporate cash holdings without the effect of economies of scale. This result is contrary to previous researches, but it seems to be consistent with the increasing cash-to-asset ratio over the past decade. While we also find evidence to support our argument, that there is a substitute relationship between cash holdings and bank lines of credit.

The remainder of the paper is organized as follows. Section 2 briefly describes theoretical background. Section 3 describes the data. Section 4 presents our results and Section 5 concludes.

2. Theoretical background

2.1 The theory of holding cash

The static tradeoff theory. Static tradeoff theory originally refers to the measure tax savings benefits of debt and bankruptcy costs, will determine an optimal capital structure. Kim et al. (1998) applied this theory to the firm’s cash holdings, and constructed the static tradeoff theory of cash holdings. In this model, transaction costs are the major determinant for the cash holdings, while firm has an optimal amount of cash holdings. The marginal cost of cash shortage curve is decreasing with the increasing of cash holdings and the marginal cost of cash holdings curve is a horizontal line. The optimal amount of cash

![Figure 1](attachment:figure1.png)
holdings is given point $E_0$ (as illustrated in Figure 2.) by the intersection of the marginal cost of cash holdings curve and the marginal cost of cash shortage curve.

According to the static tradeoff model, when the marginal cost of cash holdings curve or the marginal cost of cash shortage curve occur shift that will cause the shift in the optimal cash holdings. For instance, when increase of systemic risk causes the marginal cost of cash shortage curve is up to the right, then the equilibrium point will from $E_0$ shift to $E_1$, the optimal amount of cash holdings also will from $C_0$ shift to $C_1$. Alternative, when reduction of the marginal cost of cash holdings, the marginal cost of cash holdings curve will shift to down, then the equilibrium point will from $E_0$ shift to $E_2$, the optimal amount of cash holdings also will from $C_0$ shift to $C_1$.

The pecking order theory. According to the pecking order theory, firms tend to use the internal funds, and firms will prefer debt to equity when they need external funds. Myers and Majluf (1984) indicate that because of existence of information asymmetry between managers and potential investors, firms may refuse to issue stock, and therefore may pass up valuable investment opportunities, and lead the firm’s value to decline. On other side, because managers have superior firms operating information, when new shares is issued to finance investment funds, implied the company may be getting worse, so the company’s stock price will fall, too.

The free cash flow theory. Free cash flow is cash flow in excess of that required to fund all projects of the positive net present values. According to the aspects of Jensen (1986), the major conflicts between managers and shareholders are come from the dividend policies. The payment of cash dividends will reduce the resources, and weakened the
strength of the manager's control. If existence of information asymmetry between managers and shareholders, the firms tend to retain larger amounts of free cash flow rather than payouts cash to shareholders.

2-2 The motive of firms holding cash

In addition to Keynes (1936), other researchers have also suggested some different views as follow:

**The transaction motive.** The cash holdings of the transaction motive are the demand for cash to cope with the daily transaction payments. There is much evidence indicate that large firms there are existence of economies of scale with the transaction motive, that is larger firms have lower cash-to-assets ratio (see, Vogel and Maddala (1967), Beltz and Frank (1996), Mulligan (1997)).

**The precautionary motive.** Firms hold more cash to prevent the sudden shocks when access to capital markets is costly. Many previous studies support the view that financially constrained firms will hold higher precautionary cash balances. Almeida, Campello, and Weisbach (2004) model the precautionary demand for cash and find that financially constrained firms invest in cash out of cash flow, while unconstrained firms do not. Acharya, Almeida and Campello (2007) indicate that there is an important hedging motive behind cash and debt management policies. Han and Qiu (2007) show that financially constrained firms with the higher volatility of cash flow hold more cash. Bates et al. (2009) document that American firms there is an increasing cash to total assets ratios, and argue that the precautionary motive plays an important role. Duchin (2010) indicate that the precautionary motive of corporate cash holdings mainly applies to financially constrained firms.

**The speculative motive.** As the notion of Keynes (1936), argues that the manager is well aware of future market conditions, and be able to benefit from it. Hence, firms retain more cash to cope with future uncertainly favorable investment opportunities. In our knowledge, it seems that little note focus on this area. However, this concept is similar to the cash holdings of the future investment opportunities. As Opler et al. (1999) point that firms with strong growth opportunities tend to hold more cash balance. In recent years, Apple Inc., Microsoft Corp. and Google Inc. etc. are all the same as holding large cash balances in the company. The large amount of cash retained clearly less relevant to transactions motive or precautionary motive. Therefore, in addition to agent motivation, we infer that the speculative motive is a very likely explanation for holding large amounts of cash.

**The agency motive.** According to the aspects of Jensen (1986), if existence of information
asymmetry between managers and shareholders, the managers tend to retain larger amounts of free cash flow rather than payouts cash to shareholders. The major conflicts between managers and shareholders are from the dividend policies. Because of payouts cash to shareholders will reduce the controllable resources and the discretionary power of management. Another important topic of agent motivation is that excess cash will cause declined of the firm value. Faulkender and Wang (2006) find that the marginal value of cash declines with larger cash holdings. Dittmar and Mahrt-Smith (2007) and Pinkowitz, Stulz, and Williamson (2006) show that cash is worth less when agency problems between insiders and outside shareholders are greater. Drobez et al. (2010) indicate that the value of corporate cash holdings is lower when the degree of information asymmetry is higher.

The tax motive. Tax motivation occurred among multinational enterprises. When multinational enterprises face higher repatriation tax rates, then firm will retain a higher cash balance. Foley et al. (2007) indicates that firms facing higher repatriation taxes hold higher levels of cash.

3. Data and Methodology

In practice, the bank lines of credit is a short-term borrowings with cyclical, which is usually expressed in short-term debts on the balance sheet of company. In this study, we examine and expect the negative relationship between cash holdings and short-term debt, namely, there is a substitute effect between the bank lines of credit and cash holdings. In additional, we use the real bank borrowings rate as a proxy variable of corporate risk, firms with higher real bank borrowings rate, with higher individual risk, and expected to hold more cash balance.

This study use the data of Taiwan 695 listed firms over 2001-2010 period. We exclude financial firms, securities firms, insurance firms and outliers. We use a regression approach similar to Opler et al. (1999) as follows:

\[
CASH_{i,t} = \beta_0 + \beta_1 CashFlow_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 R \& D_{i,t} \\
+ \beta_5 Dividend_{i,t} + \beta_6 MBratio_{i,t} + \beta_7 NewFinance_{i,t} + \beta_8 EPS_{i,t} \\
+ \beta_9 RealbBorrowRate + \beta_{10} ShortTermDebt_{i,t} + \epsilon_{i,t}
\]  

(1)

The dependent variable in the regression is the current cash divided by book total assets on firm balance sheet. Our other variables used and definite are as follows:

Cash flow to assets. We measure cash flow as cash flow divided by book assets. Firms with higher cash flow will accumulate more cash. We expect there is a positive relation between
cash flow and corporate cash holdings.

**Firm size.** We measure firm size as the natural log of book total assets. According to the argument of Vogel and Maddala (1967), Beltz and Frank (1996) and Mulligan (1997), there is an economies of scale to cash holdings, namely, large firms held relative lower cash balance.

**Leverage.** We measure leverage as total debt divided by total debt plus the market value of equity. If firms use cash to reduce leverage, there is a negative relationship between cash holdings and leverage.

**Dividend payout ratio.** Dividend payout ratio is measured as cash dividend divided by net sales, and is set equal to zero when dividend payout is missing. Bates et al. (2009) find that firms do not pay dividends have increasing cash holdings. The intuition that firms pay dividends is likely to be less risky and have greater access to capital markets.

**R&D to sales.** R&D ratio is measured as R&D expenditures divided by net sales, and is set equal to zero when R&D is missing. This variable is viewed as a proxy for growth opportunities and financial distress, which have a positive relation between the cash ratio and R&D ratio. Firms with greater R&D ratio are assumed to have greater costs of financial distress.

**New finance (NF).** New finance is measured as net issuance of equity plus new bank loans divided by book assets.

**Market-to-book ratio.** Firms with better investment opportunities value cash more since it is costly for these firms to be financially constrained. We use the book value of assets minus the book value of equity plus the market value of equity as the numerator of the ratio and the book value of assets as the denominator.

**EPS.** Earnings per share is a firm's profitability index, is also an important source of cash flow. We measure EPS as net income divided by average outstanding number of common shares.

**Short-term debt.** Flannery and lockhart (2009) find that credit line availability is similar to and cash holdings for financially unconstrained firms. In this paper, we use short-term debt as the proxy of credit line. We expect there is a negative relation between short-term debt and corporate cash holdings, namely that credit line is a substitute for cash holdings.

**Real borrowings rate.** Real borrowings rate is the marginal cost of cash shortage curve, it is
viewed as the proxy of firm risk. We expect firms with higher real borrowings rate will hold more precautionary cash balance.

4. Empirical results

This paper examines the determinants and relationships of corporate cash holdings. We use a panel data of Taiwan 695 listed firms over the period from 2001 to 2010.

We consider the problem of the multicollinearity in a multiple regression model. When presence of multicollinearity within independent variables. It can cause a number of problems in the understanding the significance of individual independent variables in the regression model. We use variance inflation factors (VIF) helps us to identify multicollinearity issues.

Furthermore, we employ the Hausman test to test the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. As table 1 shown, we get a significant P-value, and reject the null hypothesis. Thus, in this paper, we adopt the OLS estimator of the fixed effects model.

Table 1.

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<th>Correlated Random Effects-Hausman Test</th>
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<td>Test cross-section random effects</td>
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<tr>
<td>Test Summary</td>
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Table 2 presents summary statistics of the variable used in the regressions. We find that a positive relation between cash flow, RD ratio, dividend ratio and cash holdings. We also find a negative relation between leverage, new finances, market-to-book ratio and cash holdings. Those results are consistent with previous studies. In particular, however, there is a significant positive relation between cash holdings and firm size, and means that the cash holdings without the effect of economies of scale. This result is contrary to previous researches, but it seems to be consistent with the phenomenon of increasing cash-to-asset over the past decade.
In addition, we find that there is a significant positive relation between real borrowings rate and cash holdings, means that the firm with higher risk (higher marginal cost of cash shortage), firm hold more cash. This result supports the static tradeoff theory. At the same time, we also find that there is a significant negative relation between short-term debt and cash holdings. This result is consistent with our inference, namely that there is a substitute relationship between cash holdings and bank lines of credit.

5. Conclusions

There are a lot of studies have indicated that large companies cash holding there are the effect of economies of scale, that is larger firms have lower cash-to-assets ratio. However, we believe that this phenomenon seems to be changed. In order to confirm this inference, this study examines the determinants and relationships of corporate cash holdings by a panel data of Taiwan listed firms over the period from 2001 to 2010. Through empirical, we found that a significant positive relation between cash flow, RD ratio, dividend ratio, and cash holdings, and we find a significant negative relation between leverage, new finances, market-to-book ratio and cash holdings. Those results are consistent with prior studies.

In particular, however, there is a significant positive relation between cash holdings and firm size, this imply that the cash holdings without the effects of economies of scale. This result is contrary to prior researches, but it seems to be consistent with the phenomenon of increasing cash-to-asset ratio over the past decade.
Furthermore, we find that there is a significant positive relation between real borrowings rate and cash holdings, means that the firm with higher risk (higher marginal cost of cash shortage), firm hold more cash. Our result supports the static tradeoff theory. While we also find that there is a significant negative relation between short-term debt and cash holdings. This result is consistent with our previous inference, namely, there is a substitute relationship between cash holdings and bank lines of credit.

Our study confirmed the large firms to hold the relatively higher cash balances. Previously, we mentioned that, instinctively, the large firms retain large amounts of cash is less relevant to transactions motive or precautionary motive. This is an interesting issue, and perhaps speculative motives can to explain this problem. We look forward to the subsequent studies to confirm this inference.
References


