Corporate Cash Holdings and Adjustment Behaviour in Chinese Firms: An empirical Analysis Using Generalized Method of Moments

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Abstract

This study is intended to find out the motives of cash holding in Chinese firms and theories associated with these motives. The study is unique because it not only estimates the adjustment speed of corporate cash holdings but also discuss several firm specific factors that affects cash holdings in Chinese firms with special reference to Chinese SOEs and NSOEs. An extensive set of panel data comprising 1632 A listed Chines firms, over a period from 2001 to 2013 are taken for analysis. The study reports a lower adjustment coefficient for Chinese firms compared to other developed nations. The study finds that target level of cash holdings in Chinese firms is better explained by Trade off and Pecking order theories. To cope with issues of endogeneity and serial correlation the study apply GMM and random effects model with an added AR (autoregressive) term.

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1. Introduction

Brigham and Daves (2004) argue that 1.5 % of assets are held as cash on average by industrial firms. Lee and Song empirically found that after the Asian Financial crises the firms in Asia have increased their cash holdings and showed less attraction towards leverage. However whether this level of cash holdings is optimal for the firms is an important question to be addressed. Why these firms opt for huge cash holdings when cash in itself is a non interest generating asset. Furthermore there is a lack of research on this issue in emerging markets as very few studies have been conducted to address this question of why firms hold huge amount of cash in emerging markets. As far as China is concerned its market are unique in its financing alternatives and ownership structure.

Being the world second largest economy China makes a unique setting to study the corporate cash holdings. China has less sophisticated capital markets as compared to other developed nations of the world and the major financing alternatives are bank loans. Moreover the situation becomes more complex while considering the fact of SOEs and NSOEs. Guo et al (2013) reported that by end of September 2006, largest shareholders who held 56% of shares were state shares controlled by Chinese government and other state asset management companies. Until 1998, the largest Chinese banks (most of them were state owned) were advised not to give credit to Chinese private companies. It was because of low political stature of these companies. Since 1998, these impediments in financing due to political pecking order should have been alleviated. However research evidence suggest that financing constraints for private Chinese companies are still there due to social and political factors(Huang 2003).Numerous research studies indicate that financial constraints are impediments to investment, growth and survival of the company(Stein 2003,Hubbard 1998). This implies that Chinese firms (especially private firms) have fewer alternatives of debt financing. This makes this study more important from the point of view that private firms have fewer alternatives to raise external capital, so naturally these firms will tend to hold excess cash but to which degree will imply to be the optimal cash holdings for Chinese firms. Ownership concentration is another unique feature of Chinese firms. Chinese companies are highly concentrated in term of ownership concentration. A single largest owner holds about 36% of an average company share, while 52% shares are held by five biggest owners (Guo et al 2013). This higher ownership concentration will affect the decision making process regarding Chinese firms. Thus due to investment attractiveness and possible conflicts in decision making process makes this study very important to study the behavior of Chinese firms with respect to their financial decision making.

The study uses a rich data set of 1632 firms divided into state-owned and non-state owned firms. The data covers a period from 2001 to 2013. The rest of the study is organized as follows. Section 1 provides review of published literature, followed by discussion on various determinants of corporate cash holdings and their related hypothesis. Section three provides research methodology, followed by discussion of results and conclusion.

2. Review of Prior Studies

Theoretically speaking firms hold cash due to several motives. Keynes (1936) argued that three motives drive the demand for money. These motives are transactionary, precautionary and speculative motives. Convenience and confidence is provided by first two motives while motive of speculations provide money yield. Cash is held by corporations to meet day to day demand and to manage operations. Thus demand for cash is raised due to the difference in cash inflow and cash outflow. This motive for cash is termed as transactionary motive. Money is also held as a safety margin for some unforeseen events and future uncertainties.

In speculative motive money is held by the corporations for earning profit. However holding excess cash has its costs. This cost is the opportunity cost. Holding excess cash may leads to agency conflicts between firm's management and shareholders (Jensen, 1986). Moreover Bates et al. (2009) and Foley *et al.* (2007) argue that cash is held for tax purposes.

Thus to measure the optimal cash balance, a firm must make a tradeoff between holding excess level of cash and the associated costs. Excess cash has numerous alternatives for investment. It can be invested in short term marketable securities, however they may provide liquidity to firms but they report very low after tax returns. Concentrating on the determinant factors of holding cash managers can be able to make necessary adjustments about the level of cash to attain an optimal cash level.

Different studies which analyzed cash holdings and its determinants with reference to target level of cash holdings are consistent with studies on leverage (Jani *et al.*, 2004). Frictionless capital market assumption makes holding cash by firms irrelevant. But this assumption can be relaxed owing to modern trends in cash holdings (Drobetz *et al.*, 2010). By considering transaction costs, agency problems and information asymmetry, the debate on corporate cash holdings features trade off theory and pecking order theory by Meyars(1984) and free cash flow hypothesis by Jensen (1986) very prominently.

2.1.Firm Characteristics

This study follows Opler *et al.* (1999). They reported various cash holdings' determinants in US firms. Following section provides a debate on the relationship of various determinants with cash holdings.

2.1.1. Growth Opportunities

It is very difficult to value even the projects with positive NPV since these projects are not yet realized and there is a factor of intangibility involved (Ozkan and Ozkan 2004). Thus valuing such firms is a difficult task because their value will depend upon the realization of these opportunities (D'Mello *et al.*, 2008). Pecking order theory suggests that firms with higher growth opportunities need higher cash level to cope with any shortfall in cash. Furthermore tradeoff theory predicts that a firm will need higher level of cash to avoid financial distress in time of better growth opportunities. Thus to avoid any shortfall in cash is in accordance with transasctionary motives of cash (Opler *et al.*, 1999). Second motive of avoiding financial distress is consistent with motive of precaution (Bates *et al.*, 2009). But inverse relationship of growth opportunities with corporate cash holdings is reported in numerous studies (Ferreira and Vilela, 2004; Jani *et al.*, 2004; Bates *et al.*, 2009), which corresponds to agency theory. Ferreira and Vilela (2004) reason that firms characterized by low growth opportunities may invest even in projects having negative net present value. Entrenched management and poor growth prospects compel firms to hoard more cash for use; but during funds' raising these firms will tend to conceal detailed information from investors, disclosure of which is mandatory by regulatory authorities (Jani *et al.*, 2004; Bates *et al.*, 2009).this isin line with agency theory because in such cases cash is accumulated due to agency problems (Bates *et al.* 2009).

Thus relationship of growth opportunities with corporate cash holding is unclear. This study follows Hill *et al.* (2010) in measurement of growth opportunities. Growth opportunities are measured by market to book ratio which is obtained by dividing the book value of total assets minus the book value of equity plus the market value of equity, on book value of assets.

Alternative Hypothesis (H1a): Growth Opportunities significantly affects corporate cash holdings of a firm.

2.1.2. Firm Size

According to Titman and Wessels (1988) economies of scale which can be achieved through corporate cash management makes smaller firms to be more financially distressed. Moreover, smaller firms are characterized with information asymmetry (Ozkan and Ozkan, 2004). This makes rising of external funds more costly for these firms (Ferreira and Vilela, 2004). Bigger firms have the privilege of better credit rating, thus they have bank credit line (opler et al. 1999). These two facts greatly help larger firms to obtain external financing with ease. Thus larger firms can obtain large amount of capital, and they are better positioned to reap the benefits of economies of scale (D'Mello *et al.*, 2008). Therefore tradeoff theory predicts that size has an inverse relationship with corporate cash holdings. This motive of holding cash corresponds to transaction motive (Bates *et al.*, 2009). However due to positive effects of size on profit, bigger sized firms are expected to be more successful. Hence, these firms will tend to accumulate more cash than smaller firms after controlling for their investment (Opler *et al.*, 1999, Ferreira and Vilela, 2004; Jani *et al.*, 2004). This shows that in contrast to our previous debate pecking order theory predicts a direct relationship of size with corporate cash holdings. Furthermore larger firms have high dispersion of ownership which reduces the chances of takeovers thus giving managers discretion in their financial decision making (Ferreira and Vilela, 2004). Thus a direct relationship of with corporate cash holdings is predicted by agency theory.

Based on the prediction of these three theories size can affect corporate cash holding either in positive or negative way. Natural log of firm's total assets is used to measure firm's size. Alternative Hypothesis (H2a): Size has a significant effect on corporate cash holdings.

2.1.3. Cash flow

Cash flow is a liquidity source and it reduces excess cash holdings needs (Ferreira and Vilela, 2004). Thus trade off theory predicts that cash flow negatively affects cash holdings. But Ferreira and Vilela (2004) argue higher cash flow's firms will reserve most of it as cash. Thus according to pecking order theory cash flow is expected to positively affect corporate cash holdings. Deloof (2003) argues that cash flow is a readily available source of cash and firms which utilize their liquid reserves to finance their projects will tend to accumulate more cash from their free cash flows. This is further confirmed by Garcia-Teruel and Martinez-Solano (2008) who highlight that firms with larger cash flows are expected to have higher cash levels. .This is according to the financing motive of cash holdings. However cash can also be held from cash flows as a precaution to finance operation in time of less liquidity (Deloof, 2003).

Thus these two theories give contrasting arguments about the relationship between corporate cash holdings and cash flow. This implies an ambiguous relationship of cash flow with cash holdings. This study follows Hill *et al.* (2010) in measuring the cash flow. Cash flow is EBIT plus depreciation and amortization minus, interest expense, tax charges and any common dividend paid. For purpose of scaling this value is then divided by total assets. Alternative Hypothesis (H3a): Cash flows significantly affects corporate cash holdings

2.1.4. Leverage

Financial distress and bankruptcy are two important attributes associated with leverage. Chances of bankruptcy are higher when debt level increases. Deloof (2003) argues that

firms having high leverage need to accumulate excess cash to cope with bankruptcy. This reduced possibility of bankruptcy is in accordance with precautionary motive of firm for holding more cash. Thus leverage is going to positively influence corporate cash holding, which is in accordance with trade off theory. However, Ferreira and Vilela (2004) and D'Mello et al. (2008) argue that leverage is a proxy for firm's ability to raise more debt. Thus highly levered firms are expected to hoard less cash. This accounts that corporate cash holding is negatively affected by leverage. According to pecking order theory and arguments put forward by Opler et al. (1999) and Jani et al. (2004), debt is issued in situations when a firm has used up all of the retained earnings. Thus cash level of a firm usually falls if its investment needs are higher than its retained earnings and vice versa. One important fact in this regard is that firm's high leverage can be used as a proxy for its access to the debt market (John, 1993). In the context of agency theory according to Ferreira and Vilela (2004) managers tend to hold more cash because cash is safer than debt. Furthermore Jensen (1986) argues that entrenched management is happy to hold more cash in time of poor investment opportunities rather than to distribute it to shareholders as dividends. Higher level of cash may be used by for personal benefits even they might invest in projects having negative NPV, because these projects are immune from scrutiny by financial market participants.

Thus based upon above discussion of these three theories, leverage can affect corporate cash holdings in both positive as well as negative way. This study follows Faulkender and Wang (2006) in measuring leverage. Leverage is measured by dividing firm's long term debt which also includes firm's short term borrowing on firm's long-term debt plus market capitalization.

Alternative Hypothesis (H4a): Leverage and corporate cash holdings have a significant relationship.

2.1.5. Net working capital
In the context of liquidity, networking capital acts as a substitute for firm's liquidity. Ferreira and Vilela (2004) and D'Mello et al (2008), argue that according to tradeoff theory firms having high NWC will hoard less cash because NWC in itself a source of liquidity and can be liquidated when a need arises for the firm. This corresponds to transaction motive of firm for holding higher cash level. Thus tradeoff theory predicts that networking capital is expected to negatively affect cash holdings. But there is also possibility that this relationship is positive. One important attribute in this regard is firm cash conversion cycle. Firm having shorter CCC will have higher liquidity and thus they will need to hold less cash for precautionary motives. Jani et al. (2004) are more pragmatic in arguing that shorter CCC frees up cash and thus automatically increase firm's cash holdings.

Thus how NWC affects cash holdings is ambiguous as discussed above. NWC is measured by subtracting accounts payable from the sum of accounts receivables and inventory. The value is then scaled by total assets.

Alternative Hypothesis (H5a): Firms liquidity significantly affects corporate cash holdings.

2.1.6. Capital expenditure
Firms hold more cash if they have higher need of capital expenditure (Opler et al. 1999). In the context of static trade off theory this relationship holds because a firm having higher cash level or having more liquid assets will be better positioned in fulfilling its need of capital expenditure. Bates et al. (2009) report same relationship and argue that capital

expenditure is a proxy for financial distress cost, thus suggesting that capital expenditure is going to positively affect cash holdings. Two important costs associated with raising capital are the transaction cost and opportunity cost. Jani *et al.* (2004) argue that these two costs are associated with firms having less cash or liquid assets, thus firms will hold more cash rather than raising external capital. On the other hand Opler *et al.* (1999) put forward their arguments based on pecking order theory that firms will use up cash if they have high capital expenditure need and as a result they will report low cash levels. These firms accumulate less cash with few internal resources (Jani *et al.*, 2004). Thus a negative relationship is predicted by pecking order theory. Furthermore Bates *et al.* (2009) argue that firms may use capital expenditure to create assets for collateral use for raising debt. This will give an opportunity of raising more debt to managers and firm will have increased debt capacity which will in turn decrease demand for cash. They further quote Riddick and Whited (2009) that an abrupt increase in demand may induce increase productivity which will increase capital expenditure in short run. So an increase in short term investment is expected which will in turn decrease the ability of firm to hold more cash.

From the above discussion it can be concluded that CAPEX hold either positive or negative relationship with corporate cash holdings. CAPEX is measured as change in value of tangible fixed assets from time t-1 to time t (Ross *et al.*, 2008). Depreciation is added to this value and then divided by total assets for scaling purpose.

Alternative Hypothesis (H6a): Corporate cash holdings can be affected both positively as well as negatively by capital expenditure.

2.1.7. Board Characteristics

To safeguard the interests of minority shareholders is the responsibility of board of directors through effective management and monitoring mechanism as argued by (Kusnadi, 2007). As for as board characteristics are concerned two important attributes considered by various studies in the effectiveness of board are board's size and board's independence. Studies conducted in emerging markets like Malaysia have reported the ineffectiveness of board characteristics such as board independence in overall improvement on corporate governance to ensure that minority shareholders' rights are protected. Important studies conducted in this regard include Wan-Hussin (2009).Because of the reasons discussed this study has included board size and board independence to study in what manner board is effective with regard to corporate decision making of corporate cash holdings.

2.1.8. Board Size

Managers who are effectively monitored by board have a tendency of not investing in projects having negative net present value. This reduces the accumulation of cash in these firms. However Lee and Lee (2009) argue that larger boards are prone to get involved in lengthy and inefficient decision making process. As a consequence of this beaurocratic nature of the decision making process these boards loses control on their managers who in turn give the managers an opportunity to hold more cash. This corresponds to a positive relationship between board size and corporate cash holdings. This study measures board size simply by taking the overall number of directors on the board.

Alternative Hypothesis (H7a): Board size positively affects corporate cash holdings.

2.1.9. Board Independence

Researchers agree to the fact that by increasing board independence results in an effective monitoring and oversight on managers. But the studies conducted on the role of board

independence have largely been ineffective. Weisbach (1988) argue that board independence enhance independent decision making and hence independent boards are able to replace ineffective and inefficient managers to improve firm's performance. This shows that board independence reduces managerial opportunism and consequently higher level of board independence ensures lower corporate cash holdings. However Bhagat and Black (2002) reports ineffectiveness of board independence in monitoring the management of a firm. Romano (2005) clearly highlights this discrepancy by arguing that hiring process of independent directors may be ambiguous. There is a possibility that independent directors are hired by managers just to fulfill the regulatory requirements. Moreover the theory of managerial hegemony argues that there is a shift in firm's control from shareholders to managers and directors are just a "rubber stamp" for managerial decisions making (Mace, 1971; Vance, 1983; Lorsch and MacIver, 1989; Cornforth, 2002). Thus there exists the possibility that despite of presence of an independent board managers still have the privilege of managerial opportunism resulting in higher level of cash holdings.

Based on the above discussion it can be concluded that board independence can affect firm's cash holding in either way, i.e. positive or negative. Board independence is measured simply by taking the number of independent directors on the board.

Alternative Hypothesis (H8a): There is a significant relationship between corporate cash holdings and board in dependence of a firm.

3. Research Methodology

3.1. Data and Data Source

The study uses a rich data set of 1634 A listed firms of Shanghai and Shenzhen Stock Exchange extended over a 13 years period from 2001 to 2013. Data ranges from code C00002 to C600918 mainly collected from RESET database. Firms having minimum 6 years of data are included in analysis in order to avoid survivorship biases posed due to elimination of firms with missing data.

3.2. Model Specification

We follow the static model of Opler *et al.* (1999) to analyze the relationship between identified variables and corporate cash holdings. The model in modified form is given as follows.

$$CASH_{it} = \beta_0 + + \beta_1 MTB_{it} + \beta_2 SIZE_{it} + \beta_3 OCF_{it} + \beta_4 LEV_{it} + \beta_5 NWC_{it}$$
$$\beta_6 CAPEX_{it} + \beta_7 BSIZE_{it} + \beta_8 BIND_{it} + e_{it}$$

(1)

In equation (1)

$CASH_{it}$ is the sum of cash and marketable securities of firm i at time t scaled by total assets.

MTB_{it} is the ration of market value and book value of firm i at time t.

$\beta_2 SIZE_{it}$ is the natural log of total assets of firm i at time t scaled by total assets.

OCF_{it} is cash flow from operation of firm i at time t scaled by total assets.

LEV_{it} is the market leverage of firm i at time t.

$CAPEX_{it}$ is the capital expenditure of firm i at time t scaled by total assets.

$BSIZE_{it}$ is the total number of directors of firm i at time t.

$BIND_{it}$ is the total number of independent directors of firm i at time t.

e_{it} is the error term.

However two important issue related to model (1) is the engoneity between leverage and corporate cash reserves (D'Mello *et al.*, 2008) and adjustment made by firms to achieve a target level of cash holdings (Ozkan and Ozkan, 2004). Endogeneity can be addressed by applying valid instruments for leverage prediction. But the adjustment of firms for target level cash cannot be immediately achieved due to the associated adjustment costs. This implies to following relationship between current cash holdings and cash holdings at time t-1.

$$CASH_{it} - CASH_{it-1} = \gamma(CASH_{it} - CASH_{it-1}) \tag{2}$$

In equation (2), ($CASH_{it} - CASH_{it-1}$) represents adjustment needed to achieve a target cash level γ is the adjustment speed of a firm to achieve target level of cash. Thus the term γ takes value from 0 to 1.If $\gamma=0$, it means $CASH_{it} = CASH_{t-1}$. This implies that the firm wants to remain with the same level of cash due to high cost of adjustment to achieve a target level of corporate cash holdings. However if $\gamma=1$ then $CASH_{it} = CASH_{it}^*$. This infers that in such a case a firm will opt to achieve its target level of cash immediately.

By putting equation (1), in equation (2) we get

$$CASH_{it} = \gamma\beta_0 + (1-\gamma)CASH_{it-1} + \gamma\beta_1 MTB_{it} + \gamma\beta_2 SIZE_{it} + \gamma\beta_3 OCF_{it} + \gamma\beta_4 LEV_{it}$$
$$+ \gamma\beta_5 NWC_{it} + \gamma\beta_6 CAPEX_{it} + \gamma\beta_7 BSIZE_{it} + \gamma\beta_8 BIND + \eta_i + \lambda_t + \gamma e_{it} \tag{3}$$

In the above equation η_i correspond to firm specific effects and λ_t are the time specific effects.

Equation (3) can be rewritten in simplified form as follow.

$$CASH_{it} = \alpha + \rho CASH_{it-1} + \delta_1 MTB_{it} + \delta_2 SIZE_{it} + \delta_3 OCF_{it} + \delta_4 LEV_{it} + \delta_5 NWC_{it}$$
$$+ \delta_6 CAPEX_{it} + \delta_7 BSIZE_{it} + \delta_8 BIND_{it} + \eta_i + \lambda_t + v_{it} \tag{4}$$

In equation (4) $\alpha = \gamma\beta_0$; $\rho = (1-\gamma)$; $\delta_k = \gamma\beta_k$; and $\lambda_t v_{it} = \gamma e_{it}$

Due to the problem of endgoeneity between leverage and cash holdings and firm's adjustment to achieve the target level of cash, using OLS to estimate equation (4) will be inconsistent. In order to address these issues this study applies two steps Generalized Method of Moments(GMM) estimator to estimate equation(4).Two-step GMM is selected since in term of efficiency it is better than One-step GMM.

4. Findings and Analysis

The study uses regression analysis as a statistical tool for estimating the models. Ordinary Least Square regression and random effects regression with AR (2) term is used to estimate the models. AR (2) is used to account for possible serial correlation. Finally GMM is used to

account for problem of endogeneity between leverage and cash and firm's adjustment to achieve a target level of cash.

The descriptive statistics are given in table 1 for overall firms, SOEs and NSOEs, represented with their number of observation, mean and standard deviation.

The descriptive statistics reveals that mean value of cash for overall firms at time t is 0.666692, which is equal to about 6.6 % of Chines Yuan given that one Chinese Yuan is equal to 10 units. This value is much lower as compared to studies conducted in developed nations like US by Dittmar and Mahrt-Smith (2007) and Drobetz *et al.* (2010). Furthermore mean value for cash for NSOEs is greater than SOEs. This shows that NSOEs tend to hold more cash given that prevalent loans in the market are directed towards SOEs. This corresponds to pecking order of loans towards SOEs by the creditors (Huang 2003). Descriptive statistics shows different value of mean of cash for individual sectors. To find out whether this difference in means is statistically significant the study follows Wasiuzzaman and Arumugam (2013) and conduct a Non Parametric Kruskal–Wallis Test (Kruskal and Wallis, 1952). The results are shown in Table 2.

The Kruskal–Wallis test statistic shows statistical significance of mean difference between SOEs and NSOEs. The p value for the test is 0.000 which shows statistical significance at 99% level. The highest rank is shown for State owned Enterprises. This concludes that corporate cash holdings for NSOEs are higher than SOEs.

Table 1: Descriptive Statistics

Variable	Obs	Overall Mean	Std. Dev.	Obs	NSOE Mean	Std. Dev.	Obs	SOE Mean	Std. Dev.
LEV	21944	0.224374	0.150911	9566	0.232431	0.153625	12378	0.218148	0.148486
MTB	24987	2.518086	2.490207	10350	3.092211	2.546376	14637	2.112116	2.367193
CASH	25318	0.666692	0.443969	10797	0.1934	0.383511	14926	0.192015	0.4724
CAPEX	25723	0.023783	0.047603	10797	0.023169	0.045986	14926	0.024226	0.048735
NWC	25700	0.18314	0.170456	10793	0.186752	0.164075	14907	0.180525	0.17489
BSIZE	21695	11.27615	4.550996	10226	11.44211	4.43668	11469	11.12817	4.645748
BIND	19707	3.698787	1.505934	9754	3.712528	1.513192	9953	3.685321	1.498741
SIZE	25720	20.88725	1.715709	10796	21.14644	1.300129	14924	20.69975	1.940804
OCF	25318	0.666692	0.443969	10640	0.645874	0.426481	14678	0.681782	0.455647

Table Key

LEV	Leverage
MTB	Market to book ratio
CAPEX	Capital Expenditure
NWC	Networking Capital
BSIZE	Board Size
BIND	Board Independence
OCF	Cash flow
Obs	Observations
SOE	state owned Enterprises
NSOE	Non state Owned Enterprises

Table 2: **Non parametric** Kruskal–Wallis **Test Results**

Sector	Observations	No of Firms	%of Firms	Rank Sum	Mean Cash	Kruskal-Wallis Test	
SOE	10797	702	43%	1.41E+08	0.1920	chi-squared	14.286***
NSOE	14926	932	53%	1.90E+08	0.1943		

*** shows significance at 99%

The correlation matrix corresponding to all variables with their respective VIF (Variance Inflation Factor) is given in table 3.

Table 3: Correlation Analysis

Variables	MTB	CASH	CAPEX	NWC	LEV	CF	SIZE	BIND	BSIZE	CASH(L1)	VIF*
MTB	1										1.04
CASH	0.06	1									_
CAPEX	-0.05	-0.18	1								1.07
NWC	0.03	-0.07	-0.31	1							1.21
LEV	-0.06	-0.37	0.11	-0.04	1						1.16
OCF	-0.05	0.07	0.12	-0.07	-0.15	1					1.06
SIZE	-0.16	-0.11	0.05	-0.07	0.08	0.08	1				1.11
BIND	0.01	-0.09	0.04	-0.03	0.03	0.03	0.24	1			1.56
BSIZE	0.05	-0.16	0.04	-0.05	0.12	-0.03	0.15	0.57	1		1.54
CASH(L1)	0.01	0.662	-0.18	-0.02	-0.31	0.08	-0.09	-0.07	-0.13	1	1.16

*VIF is the Variance Inflation Factor

Two important features of this table are correlation coefficients and VIF (variance inflation factor) of different variables. From the table 3 it can be concluded that there is no issue of multicolinearty. All the correlation coefficient are much lower except for lagged cash value CASH (L1)) where it is 0.662 and board size (BSIZE) which is 0.576. But the VIF values are in acceptable ranges since VIF corresponds to severity of multicolinearity.

After having no strong case for multicolinearity the study conducted pooled regression analysis to show the relationship between dependent and independent variables. Table 4 reports results for overall firms and the theories supported by these results. Table 5 and 6 report results for state-owned and non-state owned enterprises. Results for static model of equation 1 are obtained by using OLS and random effects with an added AR term to cope with the problem of serial correlation. The results for the dynamic model of equation 4 are obtained by running Generalized Method of Moments Regression (GMM). Column one of table 4, 5 and 6 represents the GLS regression with an added AR term. Column 2 represents the GMM regression while Column 3 represents the OLS regression results.

4.1.Discussion of Results

The discussion focuses on columns 1 and 2 of tables 4, 5, 6

The results indicate a positive and statistically significant lagged cash (dependent) variable. From this it can be inferred that firms pursue a target amount of cash holdings after making a tradeoff between the costs and benefits of holding more cash.

The dynamic GMM estimator in column 2 shows that adjustment coefficient γ for overall firms is 0.45. It means firms in China takes approximately 4.5 years to adjust to their target level of cash.

This adjustment speed is relatively less as compared adjustment speed found by Ozkan and Ozkan (2004) for UK's firms (0.605), Guney *et al.* (2003) for French firms and Japanese (0.561) firms. The adjustment coefficient for State owned enterprises (0.47) is higher than non-state-owned enterprises.

Apart from adjustment speed the effect of other firm specific characteristics on corporate cash holdings is also tested. The results for overall firms show that networking capital (NWC), capital Expenditure (CAPEX) and leverage (LEV) have negative and statistically significant relationship.

Adjustment coefficient for state owned enterprises is 0.42 (table 5) while for non state owned enterprises its 0.47 (Table 6) This means state-owned enterprises in China takes relatively more time to adjust to their target cash levels.

These results are consistent with pecking order theory and findings of Opler *et al.* (1999), Jani *et al.* (2004) and Bates *et al.* (2009).

Debt financing is only considered when retained earnings are exhausted and vice versa. This follows that corporate cash holdings actually fall when investment need is higher than retained earnings and cash holding level rises when investment need is less than retained earnings.

Table4: Regression Output (Overall Firms)

	Predicted Sign	GLS (AR1)	GMM	OLS	
		Coef.	Coef.	Coef.	Theory Supported
MTB	(+/-)	0.0034***	0.00291***	0.0022***	POT/TOT
		(0.0003)	(0.0004)	(0.0003)	
CAPEX	(+/-)	-0.490***	-0.6915	-0.322***	POT
		(0.0391)	(0.1216)	(0.0352)	
NWC	(+/-)	-0.211***	-0.0807***	-0.125**	TOT
		(0.0078)	(0.01453)	(0.0058)	
LEV	(+/-)	-0.243***	-0.154***	-0.146***	POT/TOT/FCF
		(0.0074)	(0.0178)	(0.0054)	
BIND	(+/-)	0.0013*	-0.00029	0.0003	FCF
		(0.0007)	(0.0011)	(0.0006)	
BSIZE	+	-0.002***	0.0013*	-0.0018**	FCF
		(0.0003)	(0.0005)	(0.0002)	
SIZE	(+/-)	-0.004***	-0.0142**	-0.003***	POT
		(0.0012)	(0.0058)	(0.0006)	
OCF	(+/-)	-0.030***	-0.056***	0.0033*	POT
		(0.0030)	(0.0104)	(0.0018)	
CASH(L1)		0.047***	0.5564**	0.589***	POT/TOT
		(0.0069)	(0.0139)	(0.0062)	
_cons		0.4201***	0.638***	0.1832***	
Wald chi2		2545***	546.89***		
Durbin-Watson		1.3747			
Baltagi-Wu LBI		1.8600			
Breusch and Pagan		190.8900			
Adj R-squared				0.4774	

standard errors are in parenthesis

***,**,* indicates statistical significance at 99%,95%, and 90% respectively

TOT	Trade off Theory
POT	Pecking Order Theory
FCF	Free Cash flow Theory

Table5: Regression Output (State Owned Enterprises)			
	GLS (AR1)	**GMM**	**OLS**
	Coef.	**Coef.**	**Coef.**
MTB	0.0042***	0.022***	0.0036***
	(0.0005)	(0.0006)	(0.0005)
CAPEX	-0.232***	-0.0353	-0.287***
	(0.0417)	(0.1422)	(0.0419)
NWC	-0.183***	-0.254***	-0.048***
	(0.0112)	(0.0216)	(0.0067)
LEV	-0.265***	-0.104***	-0.159***
	(0.0103)	(0.0184)	(0.0075)
BIND	0.002*	-0.0002	0.0015*
	(0.0010)	(0.0012)	(0.0008)
BSIZE	-0.002***	0.0001	-0.002***
	(0.0005)	(0.0006)	(0.0003)
SIZE	-0.0087***	0.015***	-0.004***
	(0.0016)	(0.0035)	(0.0009)
CF	-0.033***	-0.026**	-0.0033
	(0.0041)	(0.0077)	(0.0024)
CASH(L1)	0.061***	0.53***	0.573***
	(0.0097)	(0.0123)	(0.0089)
_cons	0.500***	-0.195***	0.2382***
Wald chi2	1367.28***	665.26**	
Durbin-Watson	1.335		
Baltagi-Wu LBI	1.83		
Breusch and Pagan	120.9***		
Adj R-squared			0.4741

standard errors are in parenthesis

***,**,* indicates statistical significance at 99%,95%, and 90% respectively

Table6: Regression Output (Non-state Owned Enterprises)			
	GLS (AR1)	GMM	OLS
	Coef.	Coef.	Coef.
MTB	0.0027***	0.0028***	0.0014**
	(0.0005)	(0.0006)	(0.0005)
CAPEX	-2.008***	-0.327**	-1.1560
	(0.1034)	(0.1517)	(0.0757)
NWC	-0.249***	-0.300***	-0.117***
	(0.0108)	(0.0253)	(0.0070)
LEV	-0.217***	-0.081**	-0.134***
	(0.0106)	(0.0203)	(0.0076)
BIND	0.0006	0.0002	0.0005
	(0.0010)	(0.0013)	(0.0009)
BSIZE	-0.0019***	0.0006	-0.002***
	(0.0005)	(0.0007)	(0.0003)
SIZE	-0.0014	0.0261***	-0.0022**
	(0.0017)	(0.0042)	(0.0009)
OCF	-0.0150***	-0.0500	0.010***
	(0.0042)	(0.0095)	(0.0026)
CASH(L1)	0.0583***	0.584***	0.574***
	(0.0100)	(0.0146)	(0.0089)
_cons	0.3735***	-0.407***	0.206***
Wald chi2	1536.8***	565.63***	
Durbin-Watson	1.4200	-	
Baltagi-Wu LBI	1.9010	-	
Breusch and Pagan	93.56***		
Adj R-squared			0.5141

standard errors are in parenthesis

***,**,* indicates statistical significance at 99%,95%, and 90% respectively

5. Concluding Remarks

This is study is unique from the point of view that it not only adjustment speed of but also investigate various determinants of cash holdings in Chinese firms with special reference to Chinese SOEs and NSOEs. An extensive set of panel data comprising 1634 A listed Chinese firms, over a period from 2001 to 2013 is taken for analysis. The adjustment coefficient for Chinese firms is relatively low compared to studies conducted in developed countries. Furthermore adjustment speed is relatively lower for NSOEs than SOEs.

The study also finds firm's characteristics that influence corporate cash holdings. Growth opportunities are found to influence cash positively because of associated information asymmetry of investment opportunities. Networking capital, leverage and capital expenditure show a negative relationship with corporate cash holdings corresponding to pecking order theory. An ambiguous relationship for board independence is found while board characteristics show a negative significant relationship which indicates the

effectiveness of board size in Chinese firms. Operating cash flow shows a negative relationship in consistency with pecking order theory because Chinese firms take the cash flow as readily available source of financing, thus avoiding costly external financing. Size negatively affects corporate cash holdings indicating that bigger sized firm have better alternative of financing due to their market reputation.

The study has its limitations. It may have added other board characteristics such as CEO duality and ownership concentration to show their effect on cash holdings. However study tries to address the issue of endogeneity by using two steps GMM.

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