

# Manufacturing Firms' Cash Holding Determinants: Evidence from Bangladesh

Sohani Islam (Assistant Professor)

Department of Business Administration (Finance)

Stamford University Bangladesh, Bangladesh

E-mail: sohaniislam@yahoo.com

Received: December 3, 2011

Accepted: February 13, 2012

Published: March 16, 2012

doi:10.5539/ijbm.v7n6p172

URL: <http://dx.doi.org/10.5539/ijbm.v7n6p172>

## Abstract

Cash holding decision is one of the most significant decisions taken by the financial managers of any manufacturing firms. The decision not only depends upon the theoretical view but also the firm-specific variables of the economy along with the macro economic variables. This paper aims to determine what variables play major role in taking cash holding decision by firm. For case purpose we have considered manufacturing firms of Bangladesh. The data set contains five years' (2006-2010) data of firm specific variables. Regression analysis considered sufficient for hypothetically assumed least squared model. The analysis showed all considered variables other than net working capital, Tobin's Q and Volatility of Cash flow hold significant relationship with Cash hold by the firms, which contain cash and cash equivalent. Macroeconomic variables have not discussed here. The authors considered industry specific analysis may have scope produce more concentrated and detailed view about firms cash holding determinants of a developing country like Bangladesh.

**Keywords:** Cash Holdings, Liquidity, Capital structure theories, Firm-specific variables

## 1. Introduction

The most liquid asset Cash is hold by corporation for several reasons, but mainly to meet up immediate payment. Brigham (Essentials of Managerial Finance, 14<sup>th</sup> Ed) emphasized upon following four reason to hold liquid asset at hand: 1) Transactions balance—the balance associated with routine payments and collections, 2) Compensating balance – A minimum checking account balance that a firm must maintain with a bank to help offset the costs of services such as check clearing and cash management advice, 3) Precautionary Balances – A cash balance held in reserve for unforeseen fluctuations in cash flows, 4) Speculative balance – A cash balance held to enable the firm to take advantage of any bargain purchases that might arise.

Several theories have been developed, criticized and discussed on the issue of what determines target or holding level of Cash by Corporate. Several studies were conducted on the U.S., Euro, Asian and other international samples and researchers tried to find out the determinants using two theoretical models: the trade-off model with tax of Miller-Modigliani (1958) and the pecking order model (Myers and Majluf, 1984). A Very popular trade – off theory identified that, firm will consider tax-shield and bankruptcy cost for an optimal capital structure. When the benefit is Tax- shield, the cost included financial distress, cost of refinancing etc. In a perfect Miller-Modigliani market holding larger cash is not very important as they have easy access to the capital market. Cash holding may be actively managed by managing firms cost and benefit. Pecking order theory, on the other hand leads the manager to choose the least expensive source of financing. This theory also talks about dividend payment, nonpayment, interest payment and mostly deficit of financing. Agency theory and Signaling hypothesis both emphasis upon agency cost due to managers reckless decision and agency conflict, dividend payout decision and the ultimate debt/asset ratio of the firm. Among all the theories, Trade off and Pecking order are recognized as most relevant theories with corporate cash holding determinants.

### 1.1 Objectives

Major objective of this paper is to identify the variables having influence upon cash holding amount of manufacturing firms in Bangladesh. For this purpose capital structure theories have been discussed correlation among target variables and tier relationship with dependent variables are prior part of this study. So the objectives are twofold:

- 1) Consulting different capital structure theories relevant with cash holding decision
- 2) Identifying significant variables influencing firm's cash holding decision.

## 2. Literature Review

The Optimal levels of cash holding by firms, based on monetary theory, has been studied by several researchers, for example, by Baumol (1952), Miller and Orr (1966) and Melzer (1963). The theoretical approach is interested in determinants of firms cash holdings and firms performance and capital structure (Jensen, 1986; Opler et al., 1999; Dittmar et al., 2003). This paper follows to some extent, the theoretical framework developed by Opler et al. (1999), which states that, transaction cost, asymmetric information and agency cost for holding debt and liquid asset are major determinants of firm cash holding. Firms hold cash by substituting the cost with benefit of holding cash. Manager holds excess cash if it is possible for him after meeting up the regular interest and debt payment. Keynesian portfolio theory used in many theories afterwards to support managers this precautionary motive. A predetermined interest rate will be taken as bench mark to take decision whether it will be good to hold liquid asset or better to invest (Harford, 1998; Bruinshoofd & Kool, 2002; Waltheri Waljus 2010 and so on).

When firm does not generate sufficient cash flow to support further business, it may be difficult for small or growth firm to raise fund easily. Common choice for them is to issue even riskier debt. The limitation on debt issuance (Jensen and Meckling, 1976) is more important for such firms. Developing firms may not have sufficient fund to reinvest, as a result cost of capital may be higher than the required rate of return. Most of the studies discussed and evidenced implication of two major theories on optimal capital structure of firms, though most of them did not focus on—cash holding which is another face of optimal capital structure as mentioned by Opler et al (1997).

As Capital structure of any firm is major indicator of holding cash, theories in this paper magnifying the objective of this paper. Explanatory variables have been selected in the light of this discussion.

### 2.1 Trade off theory

The trade-off theory suggests that firms target an optimal level of leverage to balance the benefit of tax shield and costs of debt financing which they have to pay to creditor as long as a firm has taxable profits. According to trade-off theory, like debt cash holding also generates cost and benefit. Under static trade off theory a firm's target leverage is driven by three competing forces and cash is required for those forces: taxes, agency costs and bankruptcy costs. Both tax-based and agency-cost-based models belong to the static tradeoff models as supported by Kraus and Litzenger (1973), Jensen and Meckling (1976), Miller (1977), Kim (1978), Jensen (1986) and Harris and Raviv (1990). So agency problem and financial distress are two major cost associated with this model.

Jensen (1986) presents agency problem associated with free-cash flow. He suggests that—free cash flow problem can be somehow controlled by increasing the stake of managers in the business or by increasing debt in the capital structure, thereby reducing the amount of “free” cash available to managers.

The costs of financial distress (Myers 2001) impose limits on the optimal level of debt targeted by a firm The theory also supported by Lahcen Achy (2009) for non listed firms of MENA region. The costs can be direct out-of-pocket cost or indirect such as the reluctance of suppliers to deal with firms in financial distress.

Opler et al (1997) run regression analysis of firm specific independent variable as determinants of cash holding among listed firms of USA (1971-1994) and they found that, firms having larger access to capital market tend to hold more cash. The analysis also relevant with trade off theory (Precautionary motive) - Interest and Dividend also has to be paid on time.

As theory, the use of trade off model cannot be ignored, as it explains that, the company with high debt actually losing its profitability to meet the cost of debt and it becomes difficult for them to search and switch into new source of financing. Holding cash on that point is not only maintained by the smaller firm but also larger firms. So firm size does not matter when the question of bankruptcy interrupt the capital structure decision. Statistically and practically tested work of Shyam-Sunder, Meyers (1999) showed that trade—off theory is not ignorable, but Pecking order theory is much convenient to explain background of firms holding decision of mature corporation.

### 2.2 Pecking order theory

Myers and Majluf (1984) introduced very influential pecking order theory saying; manager prefers to finance deficit of capital by issuing SAFE security. The theory also stressed that, when the retained earnings and internal source of fund will be in short to invest then manager will issue debt, not new equity and issue new equity with only possibility of issuing junk debt (Financial distress possibility). An important survey of Myers (2003, pp.235)

documented the following findings on the pecking order theory of corporate financing, supported by Chikashi Tsuji (2011), Yusuf Demir, Seref Kalayci and Ismail Çelik (2007) etc: (1) Firms prefer to use internal source of fund as their first choice, (2) Dividend payout ratio has separate determinants. A change in dividend payout ratio does not facilitate capital expenditure, (3) In the question of external financing debt issuance is more preferable by the firm than issuance of equity, and (4) The firm's debt ratio shows their requirement of external financing.

A determinant of cash holding from the perspective of pecking order theory has been supported by many researchers more dominating than trade off theory. Sebastian Gryglewicz (2010) Studied Dutch firms corporate liquidity and solvency and their impact in financial decision. He found that, corporate liquidity and solvency interact through information, hedging, and leverage channels. The information and hedging channels increase equity-value of firms which helps to pay regular dividend and most importantly reduce volatility in cash flow.

Gao et al (2010) survey on cash policies in public and private US firms with a sample of 7,092 private firm-year observations and 35,213 public firm-year observations from 2000-2010. They found that public firms add more to their cash reserves than private firms. Private firms face more cash volatility than the public ones.

Frank and Goyel (2002) tested US based firms (1971-1998) and end up with evidence that larger firms are more organized to take decision followed by this theory. Smaller firms were not following this theory and being traded publicly during that time which also supports Trade-Off theory. As the smaller firms moved away from pecking order theory so, overall average moves further from the pecking order.

Soku Byoun (2008) tested US firms (1971-2006) and found different security issues pattern by small, medium and large industry. While testing financial flexibility and capital structure of the firms the author observed that, large mature firms prefer using internal funds and safe debt in order to recharge financial flexibility rather than issuing equity. In case of small firms though they have low leverage, in order to cope with lack of cash at hand, they prefer to issue equity and increase cash holdings. However he end up with Financial flexibility hypothesis which refers firms hold cash and expect future cash flow, and that characterize their future investment plan and current ability to sort out financial constraints. Such idea also supported by Ahmed and Hisham (2009, Malaysian firms), Koshio and Cia (2002-03 for Brazilian and US firms), Afza and Adnan (2006, Pakistani firms) and so on.

Lee Pinkowitz and Rohan Williamson (1999) made a study on firms of Japan and USA. In Japan they have a traditional relationship with bank, so the firms cannot repay back the debt even if they hold cash. As a result, Japanese firms hold more cash than US firms. Banks encourage firms to hold more cash, collect fees from them regularly and reduce their cost of monitoring the firms. With a cross country time series analysis they found that, bank ownership can lead to lower volatilities of cash flow as well as decreasing agency costs. This improvement encourage investment motive of firms.

Kyojik Roy Song and Youngjoo Lee (2010) worked on East Asian financial crisis at the period of 1997-1998 considering the influential event of the Continent to effect on corporate cash holdings- according to them, long-term impact of macroeconomic shocks on the change in the firms' cash holding policies. They found that, firms' investment policy has significant negative relation with holding cash. Because of conservative investment policies firms were holding comparatively higher cash at post crisis period. Financial constrained among firms did not matter at cash holding policies significantly.

Salehi and Bigler (2009) studied performance of Firms at Iran and find it relationship with capital structure. They found that, book value and market value of equity both are measure are often used to determining expected cash flow. For Iranian firms, market value of equity was given more emphasis while considering responsible variable to hold cash. Firms with high profitability and good performance hold less debt. Two important decision has been taken here-MV of equity is an important measurement to see how much cash is at firms hand and good firm may have less debt, though they may have high profitability. So these firms also carry high possible cost of financial distress. All three major variables also play an important role behind firms; cash holding decision which is another face of capitals structure.

Organizational structure got emphasis on many of the researchers' study and both the govt. and non govt. factors discussed to identify determinants of cash holding by those corporations. Venkat Subramaniam et al (2010) argued on firms' concentration mode and cash holding pattern. They studied US based firms on industry wise from the period of 1988 to 2006 and concluded that, it is not always possible to apply same relevant variable to identify cash holding determinants. They found that, diversified firms hold significantly less cash than their counterparts. A very common source of internal fund, sale of asset to generate cash in order to cover agency cost also found no to be statistically significant among diversified firms.

Wolfgang Drobetz and Matthias Ch. Grüniger studied cash holding pattern of Swiss firm for the period of 1995-2004. Swiss firms' cash holding pattern was analyzed comparing with the firms of UK and USA. The study not only considering cash related variables but also corporate governance. Dividend payment and cash holding were registered as positively correlated variables for Swiss firm. However the study end up with an interesting findings about managerial function, which is, higher percentage of managerial ownership reduce cash ratio. On the other hand were the CEO played the role of COB at the same time, hold substantially more cash. This situation matched with Jensen's prediction about agency cost. Jensen (1986) argues that in the presence of managerial discretion, managers have incentives to hold large amounts of cash to have more flexibility to pursue their own objectives. Cash allows management to make investments that the capital market would not be willing to finance.

Manuel Amman et al (2010) studied international evidence to document the relationship between cash holding and corporate governance. From a cross sectional analysis among 1875 firms of 46 countries they have discovered new findings as determinants of firms cash holdings. Firms with poor level corporate governance hold more cash than firm with better corporate governance. This line of findings also matched with some prior findings (Jensen, 1986; Islam and Hasan, 2010; Soku, 2011) that smaller firms hold more cash than bigger firms.

Agency conflict and its impact on cash holding were discussed by Mai Daher (2010). 60,000 firms (1994-2005) of UK has taken into consideration and among other findings it was found that, agency the higher the ownership concentration in a firm, creates lesser agency problems, which reduce the levels of cash held by that firm.

Corporate tax has been found as another reason to hold more cash by corporate. C. Fritz Foley et al (2007) discussed on US based multinational firms and concluded that, larger tax payee firms hold more cash than the non multinational firms. Analysis of detailed data on the domestic and foreign operations of these firms shows that tax burden on other countries increase cash held abroad. These higher foreign cash holdings are not directly offset by lower domestic cash holdings.

Legal protection and minority investor also has been discussed on the issue of international firms' cash holding decision. Yuanto Kusnadi and K. C. John Wei researched on firms of 43 countries (1985-2004). From the panel data study they concluded that, firms in countries with strong legal protection for the minority investors hold lesser cash than the firms with weak level of legal protection. A strong law and order situation not only good for the international firms working at off shore but also it is good to have better corporate management by the local firms.

Information asymmetries registered to be one of the most important problems in issuing new securities. Saddour (2006) tested cash holding determinants of French firms of the year 1998- 2002. His study was upon mature and growth firms and whether the variables differentiate among firms or not. The variables were developed on the basis of both trade off and pecking order theory. Among the case firms he found that, firms increase their cash level when their activities are risky and the levels of their cash flow are high and reduce. It when they are highly leveraged. So firm's age and conditions are important variables to hold cash.

For Bangladesh, Mohammad Abu Sayeed (1999-2005) studied capital structure test, on based on both trade off and pecking order theories and showed that Tax rate is having positive impact on capital structure of the firm whereas Bankruptcy costs and profitability are irrelevant in determining leverage ratios. Mahbuba Lima (2004-2008) tested capital structure of pharmaceuticals firms and conclude that agency cost of equity, operating leverage, tangibility and debt service capacity play a major role in the determination of the capital structure. Not very much effective and relevant study has been made on manufacturing firm's cash holding determinants and it can be said that, the scope and area is still not properly explored.

There are only a few researches on how a crisis affects determinants of cash holdings. Elkinawy and Stater (2007) studied non –financial firms of Argentina, Brazil, and Mexico to study Brazilian crisis effect on cash holding of these firms after 1999, the study represents different cash holding pattern by Mexican post-crisis period and Brazilian post-crisis period. Tobin Q used as cash determinants. They found from industry analysis is that the effects of a crisis differ from country to country and industry to industry. The same idea was supported by Lee and Song (2007) for Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand.

Alvarez et al. (2010) studied large panel data of firms at Chili. Their focus was on liquidity crisis in side of the country and its impact on cash holding by corporations. Their findings evidenced that leverage; bank debt, liquid assets, and size reduce cash holdings of Chilean firms. precautionary motives was still the reason behind holding cash at hand like any other firms however additionally it was found that, time-varying industry sales volatility increases amount of cash holdings.

### 3. Research Methodology

#### 3.1 Background of Variables Selection

There are few attributes of firms which are according to the capital structure theories responsible for firm's cash holding decision.

##### 1) Growth Opportunities

Firms which have growth opportunities may want to raise capital. If it's being levered than cost of bond may rise. As a result they may hold more cash. If the firm does not avail debt then according to the, they will have to issue more expensive equity. As cash holding is less expensive so, according to pecking order theory, a positive relationship is expected between cash holding and growth opportunities. Trade off theory also suggests a positive relationship as, firm either used debt or equity to accumulate capital and that will lead to rise of cash balance.

##### 2) Cash flow

Cash mainly comes from operational income. So it is expected that a positive relationship will sustain between Operating Income and cash at hand. According to pecking order theory, firms prefer internal finance to external finance. A positive relation between cash holdings and cash flows is expected. Thus, one could expect cash holdings to increase with cash flow level (Byoun, 2011; Couderc 2005, Salehi et al 2009, Martínez-Carrascal, 2010). Trade off theory Flow of cash can be considered as substitute of cash, so expected to have negative relationship (Saddour, 2006).

##### 3) Volatility of Cash Flow

When operational cash flows are high, firms use them to investing in positive NPV projects or reinvest in any exiting project, to repay debts, to pay dividends and finally to accumulate cash. If payments are not regular according to the Trade off theory, financial distress cost is expected to be higher enough. So a positive relationship is expected between cash holding and volatility of cash flow.

##### 4) Leverage

Leverage ratio present firm's debt structure. Firms which have ability to enter in to the capital market at larger scale are expected to hold less cash at hand for investment purpose, than the organizations which have lesser excess. These firms also sometimes find it impossible to renegotiate existing debt agreements to prevent default and bankruptcy. Such firms have high incentives to hold larger cash. LI Wenyao (2005) indicated that, firms with high leverage about to hold more cash to avoid financial distress. Same argument followed by Sola, Teruel Solano (2010), Martínez-Carrascal (2010) and so on. According to trade off theory a positive relationship is expected between cash holding and leverage ratio On the other hand, pecking order theory prefers to use internal fund first. They only use external fund when it will be require making any payment. So a negative relationship is expected with extended leverage, as debt will be used for payment purpose (Afza and Adnan 2006). However, because of the existence of agency costs of debt, highly leveraged firms find it difficult and expensive to raise additional funds.

##### 5) Investment Set

Good investment scope will reduce firm's cash holding as firm use available cash for investment purpose. Pecking order theory expects a negative relationship according to its line of assumption. On the other hand good investment scope may encourage taking high leverage if it increases the level of profitability and ROE. So trade off theory expects a positive relationship among variables.

##### 6) Size of firms

The firm size is expected to be positively significant with cash holding by corporations according to pecking order theory. Relatively large firms tend to be more diversified and less likely to bankrupt as observed by previous studies (Titman and Welles, 1988). It also suggested that large firms have a relatively small proportion of bankruptcy costs to total firm values and low financial distress costs. And large firms also have large collateral values. Ranjan and Zingles alternative view, according to trade off theory indicated that larger firms may have less incentive to raise debt resulting less cash holding. So both the theory suggests positive relationship between firms' size and amount of cash holding.

#### 3.2 Variable Identified

Having consistency with the literature review, supported by most of the studies, the following variables have been selected for this study:

- Cash:  $CASH_{it}$  is Cash holdings of firm  $i$  in year  $t$ . this is the dependent variable of the study. We have taken

each year's amount of cash available to the firm from 2006 to 2010. (Wenyao, LI, 2005 for China).

- Current asset: Current asset of any firm if is higher that also means that, the firms hold more cash than firm with lower current asset. It is evidenced that, current asset can be considered as substitute of holding cash. We are expected a positive relationship between cash and current asset.
- Cash Flow: In order to catch the level of cash flow captured by the firms Operating Income from operation of the firm has been considered, calculated as:  $\text{Cash Flow} = \text{Operating income} / (\text{Total Asset} - \text{Cash and Equivalent})$ .
- Volatility of cash flow: Cash flow volatility is been calculated as a firm's cash flow standard deviation over the period of the study (VOLAT) (Saddour, 2006). A negative relationship is expected with firm's cash hold and volatility of cash flow from earning.
- Short term Debt and Total debt: In order to capture firm liability structure Short term debt and total debt has been considered. Allard Bruinshoofd (2002) used Short debt for estimating determinants of Dutch firm's cash holding where Short debt expresses as short term debt as fraction of short and long term debt. In our study we used short term debt as for short term purpose and Summation of Long term and short term debt for showing total debt.
- Leverage: Firms can use borrowing as a substitute for holding cash because leverage can act as a proxy for the ability of firms to issue debt. Moreover, the cost of funds used to invest in liquidity increases as the ratio of debt financing increases, which would imply a reduction in cash holdings with increased leverage. Sometimes the firm may take less amount of short term loan, but if the ratio is high then, they may have to hold more cash to repay early debt. However firms with long term debt tend to hold less cash. Leverage ratio firm calculated as:  $\text{Leverage ratio} = (\text{Long term debt} - \text{short term debt}) / (\text{Total Asset} - \text{cash and equivalent})$
- Intangible asset: Other than fixed and current asset, the firm may has intangible asset like good will, patent, branding etc. If the firm spends for those purposes and calculate as part of total asset, then tangibility of total asset ultimately would be reduced.
- Market to book value ratio: Though this variable does not have any direct influence upon holding cash, it can be used as proxy of accessing to the capital market. Koshio and Cia (2002-03) argued that, firm with high market to book value may attract larger number of investors, and so the larger firm may tend to have lower cash. Opler, et. al. (1998) suggested model used for this ratio calculated as (Afza and Adnan, 1998).  $\text{MTB} = (\text{Book Value of Asset} - \text{Book value of equity} + \text{Market value of equity}) / \text{Book value of Asset}$
- Tobin's Q: To highlight the importance of the growth opportunities in explaining the firms' cash level, initially estimate the regressions of Cash for our whole sample using Tobin's Q as one of the explanatory variables (Saddour, 2006; Couderc, 2005). Here the ratio is calculated as:  $\text{Total market value of the firm} / (\text{Book value of fixed assets})$ . Market value of the firm calculated as the market value of equity plus the book value of debt. Both the capital structure theories are expected that firms increase their cash holdings when they have important growth opportunities.
- Size of firms: Kim 2006 (South Korea) used log total asset as size of firm , however Log on sale is used to show size of firms in previous studies which is suitable for this paper as well as (Islam and Hasan, 2010; Soku, 2011)
- Tangibility of total asset: Theoretically tangible assets offer more security than intangible assets like Band name, Goodwill, Patent etc. If firms face financial distress, then it can sell out its fixed asset like Land, Building and Equipment etc and can meet up the dues. Financial distress costs vary from firm to firm (Shleiferand Vishny 1992). However it is expected that firms with high tangible asset may not hold more cash in hand. Calculated as:  $\text{Tangibility of total asset} = (\text{Total asset} - \text{Intangible asset}) / \text{Total asset}$ .
- Net working capital: Martínez-Carrascal (2010) used Net working capital as to show how much cash has been utilized by the Spanish firms for short term investment and daily operational purpose. Afza and Adnan (1998) used the same method for Pakistani firms. Opler et al (1998) model is followed here,  $\text{Net Working Capital} = (\text{Short-term assets} - \text{Cash and its equivalents}) / (\text{Total assets} - \text{Cash and its equivalents})$
- Dividend payout ratio: Dividend payout ratio can be used as a proxy for Firm's financial flexibility demand. DeAngelo, DeAngelo, and Stulz (2007) considered firms with large dividend payouts serve as mature firm. Soku (2011) supported this idea arguing large dividend payouts are generally not feasible for developing firms which have not attained high profitability. For this paper, we included this variable at initial stage. 40 % of our selected firms did not provide any information regarding this on their annual report or web- page. Ultimately in order to maintain consistency among the firms we have deducted this variable in our final regression.

### 3.3 Data Set and model construction

The study selected 66 manufacturing firms Among the 500 listed companies of DSE (Dhaka Stock Exchange). The exchange is dominated by the financial institutions. So deduction of those firms changed study pattern. The sample was collected from 134 manufacturing and service firms. A panel data of year 2006-2010 was expected to use for empirical analysis purpose. In order to test the target objective 66 Manufacturing firms has been taken under consideration, which are all listed under Dhaka Stock Exchange. On the basis of data availability the final data reduced into 54 manufacturing companies. For data collection we have used annual report and available data on the respective firm's web page.

Insert Table 1-here

After start collecting the data, we have faced difficulties because of non availability of annual report. Engineering, Pharmaceuticals and Textile industry has given maximum focus. Our target year was 2006-2010 and the above sample can cover all the variables selection criteria. We have worked on published information only and because of that the sample covered 42% of total population. Jute (3), Service (4) and Telecommunication (1) industry had been deducted because annual report was available only from 2007-2010. Ordinary least square (OLS) for panel data is considered as a sufficient method for estimation procedures.

### 3.4 Methodology

The explanatory variables used to evaluate the cash holdings of the firms in this research include growth, investment opportunities, real size of the firm, cash flow, liquidity requirements, leverage, cash flow uncertainty, and tangibility of asset. While hypothesizing the relationship between cash levels and these variables, the expected behavior of each of them would be examined under the two theoretical models as discussed at the literature review part.

## 4. Analysis and Findings

Simple least Square model used to test which of the variables is significant enough to influence the cash holding decision taken by manufacturing firms. So our general hypothesis can be written as:

$$CASH_{i,t} = \alpha + \beta_1 CA_{i,t} + \beta_2 OI_{i,t} + \beta_3 CF_{i,t} + \beta_4 VCF_{i,t} + \beta_5 Size_{i,t} + \beta_6 STD_{i,t} + \beta_7 TD_{i,t} + \beta_8 Lev_{i,t} + \beta_9 MTB_{i,t} + \beta_{10} IntA_{i,t} + \beta_{11} Tobin's Q_{i,t} + \beta_{12} Tangibility_{i,t} + \beta_{13} Net Cash_{i,t} + \beta_{14} NWC_{i,t} + \lambda_{i,t} + \epsilon_{i,t}$$

Where CASH is Cash holdings of firm  $i$  in year  $t$ ,  $\beta$  represents firm-specific effects,  $\lambda_{i,t}$  represents time-series effect and  $\epsilon$  is the disturbance term. It is assumed that the variables are independently distributed across firms with possibility of heteroskedasticity across firms and time. It is assumed that firm-specific effects have a significant impact on cash holdings; however it is difficult to observe individual firms as they belong to different industry. In contrast, time-effects vary through time but are the same for all firms in a given year, representing mainly economy-wide factors that are beyond the firms' control.

Insert Table 2-here

Descriptive statistics show the mean, percentiles and standard deviation of the variables and provide a general overview of the characteristics of the data. From the table it can be found that, mean of cash to asset ratio is 11% which is quite higher for manufacturing firms. This also matched with Opler (1998) 17% of USA firms, Abel (2008) for Swedish small manufacturing firms (15%), Lee (2010) for South Korean firms 14%, Afza for Pakistani firm 13.5% at 2006 and so on. The Leverage ratio mean is 2.26 which is quite higher and also showed tendency to be highly levered by the manufacturing firms. Mean value of Size 8.56 shows most of the listed manufacturing firms are larger.

From the correlation matrix it is clear that only Short term debt has correlation more than 0.8 with total debt and Operating income has auto correlation with current asset.

Insert Table 3-here

From the Regression analysis it is clear that most of the variables have significant influence upon cash holding decisions of firms. Only the MTB ratio is significant at 10% significance level, the other variables are significant at 5% level of significance. Operating income and net cash has the maximum influence upon cash holding decision. According to the theory we have expected some relationship which always does not materialized.

Insert Table 4-here

Current asset and Operating income both have variables matched with trade off theory assumption with their positive coefficient. Cash flow, operating income and leverage ratio are significant. Firm size, cash flow and industry sigma are significant at 1% significant level in the cross sectional regression analysis. Cash Flow was

reported negative in earlier studies like. Opler et al. (1999), Ozkan and Ozkan (2002), Martínez-Carrascal (2010) and so on which supports Trade off model. This result is, however in contradiction to pecking order theory which suggests that firms finance investments first with the retained earnings and then go for debt.

Manufacturing firms of Bangladesh have tendency to be levered up, may be because of lesser amount of internal source of fund. The result of Short term debt supports the notion of Pecking order theory being negative. However total debt supports trade off theory. Notion of Net cash was positive which is consistent with both the trade off and pecking order theory. This represents if firms hold more cash and equivalent asset in their total asset, then of course it is expected to have higher level of cash. The negative sign on net working capital is consistent with the notion that firms with higher liquid assets hold less cash which is consistent with the expected relationship between the two variables. Table 5 shows the expected and actual relationship among dependent and independent variables.

Insert Table 5-here

In the light of above analysis the hypothetically assumed least square model can be rewritten as following:

$$\text{CASH}_{i,t} = \alpha + \beta_1 \text{CA}_{i,t} + \beta_2 \text{OI}_{i,t} + \beta_3 \text{CF}_{i,t} + \beta_4 \text{Size}_{i,t} + \beta_5 \text{STD}_{i,t} + \beta_6 \text{TD}_{i,t} + \beta_7 \text{Levr}_{i,t} + \beta_8 \text{MTB}_{i,t} + \beta_9 \text{IntA}_{i,t} + \beta_{10} \text{Tangibility}_{i,t} + \beta_{11} \text{Net Cash}_{i,t} + \lambda_{i,t} + \varepsilon_{i,t}$$

The ultimate decision asserts as, Bangladeshi Manufacturing firm's cash holding decision depends upon the above firm-specific variables which can be identified as, Current asset, Operating income, Cash flow, Firm's size, Total debt, Leverage ratio, Market to book value ration, Intangible asset, and Net cash. As it was not possible to assess the influence of macro variable on firm-specific factors and the effect of time series pattern, those were hold as constant over all the case firms.

## 5. Conclusion

In this paper, I empirically investigate the determinants of corporate liquidity holdings in Bangladesh. I have approached through the past literature in two ways. First, I discussed about the literature regarding capital structure theories. Then I have considered panel data to identify the responsible variables which have been selected discussing capital structure theory. With a panel data of 54 manufacturing companies (2006-2010) listed at Dhaka stock Exchange I have calculated regression analysis. The objective was to find out among the selected variables, which variables have significant influence upon cash holding decision of manufacturing firms.

Descriptive statistics showed a high ratio 11% of cash holding by the manufacturing firm. The reason can be identified as the pattern of business demand immediate cash for operational purpose. This is generally a high level of cash holdings which may suggest the existence of managers' wish to keep the liquid assets under their control. Such phenomenon also indicates that the firms may face agency problems. However pecking order theories suggest that holding cash is better for future investment purpose than issuing new securities.

The least square model of the study considers the *Cash* hold by the manufacturing firm as a function of firm specific factors including Current asset, Operating income, Cash flow, Size, Short term Debt, Total Debt, Intangible asset, Leverage ratio, Net cash, Volatility of cash flow, Net working capital and Tangibility ratio. Influential variables discussed on the basis two models: Trade off model and Pecking order model.

From The regression results it is found that most of the variables in the model are significant in defining the cash levels of Bangladeshi firms. Our study showed that, Net working capital; Tobin's Q and Volatility of cash flow do not have significant relationship with Cash hold by the firms. Current asset, Operating income, cash flow, Size, Short term Debt, Total Debt, Intangible asset, Leverage ratio, net cash and tangibility ratio have significant relationship with cash hold by the manufacturing firms.

Most of the variables that are relevant for explaining cash holdings in the United States and European countries are also relevant in Bangladesh. For Asia we have studied about firms of China, South Korea, Malaysia, Iran and Pakistan. Most of the variables matched with the prior studies on Asian firms as well as. Our study also comes with a conclusion that, Bangladeshi firms capital structure and cash holding pattern mostly dominated by the assumption of trade - off theory.

Having the in depth idea of current paper, there are many scopes to study the liquid cash holding pattern by the manufacturing firms of Bangladesh. The size of firms can be analyzed to check cash holding criteria of small size and bigger sized firm as done by some of the European and American researchers. Leverage ratio also can be considered as another standard to compare cash holding determinants of manufacturing firms. I have intention to study impact of cash holding upon firm's value, EPS and mostly capitals structure as suggested by Opler et al –cash holding is another face of capital structure.

## References

- Abel, Maxime. (2008). The Impact of Working Capital Management on Cash Holdings Quantitative Study of Swedish Manufacturing SMEs. [Online] Available: <http://www.uppsats.se/uppsats/a7a81cb44a/>
- Achy, Lahcen. (2009). Corporate Capital Structure Choices in Mena: Empirical Evidence from Non-Listed Firms in Morocco. *Middle East Development Journal*, 1(2), 255-273. <http://dx.doi.org/10.1142%2FS1793812009000127>
- Afza, Talat., & Adnan, Sh. Muhammad. (1998). Determinants of Corporate Cash Holdings: A Case Study of Pakistan. [Online] Available: <https://editorialexpress.com/cgi-bin/conference>
- Allard, Bruinshoofd. (2002). The Determinants of Corporate Liquidity in the Netherlands. [Online] Available: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=300698](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=300698)
- Álvarez, Roberto., Sagner, Andrés., & Valdivia, Carla. (2010). Liquidity Crises and Corporate Cash Holdings in Chile. *Central Bank of Chile Working Papers*, 564. [Online] Available: <http://www.bcentral.cl/eng/stdpub/studies/workingpaper>
- Annual report of the case companies.
- Besley & Brigham. (2010). *Essentials of Managerial Finance*. (14th ed.). South-Western College Pub.
- Buoyin, Soku. (2011). Financial Flexibility and Capital Structure Decision. [Online] Available: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1108850](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1108850)
- Byungmo Kim., & Hwa-Sung Kim. (2003). Do cash holdings give the signal for a change in a firm's capital structure?: Evidence from Korea. [Online] Available: [www.iksa.or.kr/search/down.php?r\\_code=1100002&num=485](http://www.iksa.or.kr/search/down.php?r_code=1100002&num=485)
- Chikashi Tsuji. (2011). An International Survey Of The Evidence On The Pecking Order Theory Of Corporate Financing. *Business and Economics Research*, 1(1), E1. [Online] Available: <http://www.macrothink.org/journal/index.php/ber/article/view/952/729>
- Couderc, Nicolas. (2005). Corporate cash holdings: financial determinants and consequences. [Online] Available: [http://www.univ-orleans.fr/deg/GDRecomofi/Activ/couderc\\_strasbg05.pdf](http://www.univ-orleans.fr/deg/GDRecomofi/Activ/couderc_strasbg05.pdf)
- Daher, Mai. (2010). The determinants of cash holding in UK public and private firms. [Online] Available: [http://www.professionsfinancieres.com/docs/2011104904\\_25--the-determinants-of-cash-holdings.pdf](http://www.professionsfinancieres.com/docs/2011104904_25--the-determinants-of-cash-holdings.pdf)
- DeAngelo, Harry., Linda De Angelo., & Rene M. Stulz. (2007). Fundamentals, market timing, and seasoned equity offering. *National Bureau of Economics Research working paper 13285*. [Online] Available: <http://www.nber.org/papers/w13285.pdf>
- Drobetz, Wolfgang., & Grüninger, Matthias Ch. (2006). Corporate Cash Holdings: Evidence from a Different Institutional Setting. [Online] Available: <http://econpapers.repec.org/paper/bslwpaper/default1.htm>
- Elkinawy, Susan., & Stater, Mark. (2007). *Cash Holdings and Firm Value during Latin American Financial Crises*. Paper presented at 2007 FMA Annual Meeting Program. [Online] Available: [http://myweb.lmu.edu/ccfc/index\\_files/Fall07/Susan\\_Cash\\_Holdings\\_and\\_Firm\\_Value\\_in\\_Latin\\_America.pdf](http://myweb.lmu.edu/ccfc/index_files/Fall07/Susan_Cash_Holdings_and_Firm_Value_in_Latin_America.pdf)
- Frank, Murray Z., & Goyal, Vidhan K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, 67(2003), 217-248. [Online] Available: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=243138](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=243138)
- Gao, Huasheng., Jarrad, Harford., & Kai Li. (2011). Determinants of Corporate Cash Policy: Insights from Private Firms. [Online] Available: <http://finance.sauder.ubc.ca/~kaili/ghl2.pdf>
- Harford, Jadd. (2008). Corporate Cash Reserve and Acquisition. [Online] Available: <http://faculty.bs.school.washington.edu/jarrad/corpcash.pdf>
- Harris, Milton., & Raviv, Artur. (1990). Capital Structure and the Informational Role of Debt. *The Journal of Finance*, 45(2), 321-349. <http://dx.doi.org/10.2307%2F2328660>
- Imam, Mahmood Osman., & Malik, Mahfuja. (2007). Firm Performance and Corporate Governance Through Ownership Structure: Evidence from Bangladesh Stock Market. *International Review of Business Research Papers* 3(4), 88-110.
- Jensen, Michael C. (1986). Agency Cost of Free cash flow, Corporate Finance and Takeovers. *The American Economic review*, 76(2), 323-329.

- Kayhan, Ayla., & Titman, Sheridan. (2004). Firms' Histories and Their Capital Structures. [Online] Available: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=552144](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=552144)
- Khaoula Saddour. (2006). The Determinants and The Value of Cash Holdings: Evidence from French Firms. *Cahier De Recherche*. [Online] Available: [http://www.cereg.dauphine.fr/cahiers\\_rech/cereg200606.pdf](http://www.cereg.dauphine.fr/cahiers_rech/cereg200606.pdf)
- Kim, Hyesung., Heshmati, Almas., & Aoun, Dany. (2006). Dynamics of Capital Structure: The Case of Korean Listed Manufacturing Companies. *Asian Economic Journal*, 20(3), 275-302. <http://dx.doi.org/10.1111/j.1467-8381.2006.00236.x>
- Koshio, Senichiro. (2003). The Determinants of Corporate Cash Holdings in Brazil. [Online] available: <http://cladea.revistaleadership.com/doctoral/senichiro-koshio.pdf>
- Kytönen, Erkki. (2004). Cash Management Behavior of Firms and Its Structural Change in an Emerging Money Market. [Online] Available: <http://herkules oulu.fi/isbn9514274148/>
- Lee, Youngjoo., & Song, Kyojik "Roy". (2010). Financial crisis and corporate cash holdings: Evidence from East Asian firms. [Online] Available: [http://efmaefm.org/0EFMSYMPOSIUM/China2010/papers/Financial%20crisis\\_complete.pdf](http://efmaefm.org/0EFMSYMPOSIUM/China2010/papers/Financial%20crisis_complete.pdf)
- Lima, Mahabuba. (2010). An Insight into the Capital Structure Determinants of the Pharmaceutical Companies in Bangladesh. [Online] Available: [http://www.gbmf.info/2009/An\\_insight\\_into\\_the\\_Capital\\_Structure\\_Determinants\\_Lima.pdf](http://www.gbmf.info/2009/An_insight_into_the_Capital_Structure_Determinants_Lima.pdf)
- Martínez-Carrascal, Carmen. (2010). Cash Holdings, Firm Size and Access to External Finance: Evidence for the Euro Area. *Documentos de Trabajo*, No. 1034, 2010. Banco de España, Madrid: Unidad de Publicaciones.
- Martínez-Sola., Cristina, García-Teruel., & Pedro J. (2010). Corporate cash holding and firm value. [Online] Available: [https://editorialexpress.com/cgi-bin/conference/download.cgi?db\\_name=finanzas2009&paper\\_id=101](https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=finanzas2009&paper_id=101)
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13, 187-221. [http://dx.doi.org/10.1016/0304-405X\(84\)90023-0](http://dx.doi.org/10.1016/0304-405X(84)90023-0)
- Nosipho Mgudlwa. (2009). Size and Other Determinants of Capital Structure in South African Manufacturing Listed Companies. [Online] Available: [http://www.nmmu.ac.za/documents/theses/Nosipho\\_Mgudlwa\\_final\\_research\\_doc\\_%20%283%29.pdf](http://www.nmmu.ac.za/documents/theses/Nosipho_Mgudlwa_final_research_doc_%20%283%29.pdf)
- Opler, T., Pinkowitz, L., Stulz, R., & R. Williamson. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3-46. [http://dx.doi.org/10.1016/S0304-405X\(99\)00003-3](http://dx.doi.org/10.1016/S0304-405X(99)00003-3)
- Pinkowitz, Lee., & Williamson, Rohan. (1998). Bank Power and Cash Holdings: Evidence from Japan. [Online] Available: <http://www.cob.ohio-state.edu/fin/pinkowitz/ic071498.pdf>
- Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50(5), 1421-60. <http://dx.doi.org/10.2307/2329322>
- Sayeed, Mohammad Abu. (2011). The Determinants Of Capital Structure For Selected Bangladeshi Listed Companies. *International Review of Business Research Papers*, 7(2), 21-36.
- Sebastian Gryglewicz. (2010). A Theory of Corporate Financial Decisions with Liquidity and Solvency Concerns. *Journal of Financial Economics*, 99(2011), 365-384.
- Shyam-Sunder., Lakshmi, Myers., & Stewart C. (1999). Testing static trade off against pecking order models of capital structure. *Journal of Financial Economics*, 51(1999), 219-244.
- Soku Byoun. (2011). Financial Flexibility and Capital Structure Decision. [Online] Available: <http://ssrn.com/abstract=1108850>
- Stulz, R. (2002). Managerial discretion and optimal financing policies. *Journal of Financial Economics*, 26, (1990), 3-27. [http://dx.doi.org/10.1016/0304-405X\(90\)90011-N](http://dx.doi.org/10.1016/0304-405X(90)90011-N)
- Subramaniam, Venkat., Tang T Tony., Yue, Heng., & Zhou Xin. (2011). Firm structure and corporate cash holdings. *Journal of Corporate Finance*, 17, 759-773. <http://dx.doi.org/10.1016%2Fj.jcorpfin.2010.06.002>
- Waljus, Walteri. (2010). Determinants of Cash Holdings in Finnish Industrial Sector: Measuring The Impact of Financial Crisis 2007-2010. [Online] Available: <http://www.doria.fi/bitstream/handle/10024/66689/nbnfife201101071015.pdf?sequence=3>
- Wenyao Li. (2005). The Determinants of Cash Holdings: Evidence from Chinese Listed Companies. [Online]

Available: [www.sciofbluemountain.com/search/detail.php?id=3461](http://www.sciofbluemountain.com/search/detail.php?id=3461)

Table 1. Data Coverage (Collected form DSE at November 2011)

Name of Industry	Number of Companies	Sample Number	Sample covers the Market
Cement	6	1	0.794%
Ceramics	5	3	2.381%
Engineering	23	9	7.143%
Food and Allied	15	4	3.175%
Fuel n Power	13	5	3.968%
IT	5	2	1.587%
Miscellaneous	9	5	3.968%
Paper n Printing	1	1	0.794%
Pharmaceuticals	20	10	7.937%
Tannery	5	3	2.381%
Textile	24	11	8.730%
	126	54	42.857%

Table 2. Descriptive Statistics

	N	Mean	Std. Deviation
Cash to total asset	331	0.119621045	1.366650887
NWC	331	0.30244365	15.15870126
Tangibility Ratio	331	0.968514539	0.227154056
Volatility of Cash Flow	331	1.589108307	4.47950859
CF	331	1.921760441	6.128199282
LEVR	331	2.26621501	5.132662944
Tobin Q	331	7.862577518	3.459872821
Size	331	8.568484575	1.116146829
MTB	331	12.48055953	1.410504078
Intangible Asset	331	1.294852715	7.944382803
OI	331	3.258787266	1.224160821

Table 3. Correlation matrix

	Cash	CA	OI	CF	Vol Of cF	Size	STD	TD	LEVR	MTB	Dummy of Intangible asset	Tobin's Q	Asset tangibility	Net cash	NWC
Cash	1.00	0.90	0.97	-0.03	-0.06	0.23	0.15	0.41	0.09	-0.03	-0.04	-0.08	0.04	0.31	-0.01
CA		1.00	0.87	-0.01	-0.09	0.35	0.17	0.41	0.20	-0.05	0.07	-0.05	0.05	0.17	0.02
OI			1.00	0.05	-0.03	0.27	0.15	0.41	-0.06	-0.03	-0.03	-0.09	0.07	0.25	0.05
CF				1.00	0.38	0.20	0.02	0.01	-0.12	0.01	-0.12	-0.10	0.10	0.18	0.46
Volatility					1.00	-0.22	-0.04	-0.06	-0.10	0.89	-0.07	-0.09	0.04	0.19	0.16
Size						1.00	0.19	0.25	-0.04	-0.30	0.07	0.05	0.02	0.21	0.12
STD							1.00	0.96	-0.08	-0.03	0.01	0.80	0.04	0.09	-0.05
TD								1.00	-0.08	-0.05	-0.01	0.73	0.05	0.15	-0.06
LEVR									1.00	-0.04	0.03	-0.08	-0.04	0.05	-0.05
MTB										1.00	-0.04	-0.04	0.02	0.19	0.02
Intangible asset											1.00	-0.07	-0.78	-0.09	-0.03
Tobin's Q												1.00	0.03	-0.02	-0.08
Tanta													1.00	0.06	0.01
Net cash														1.00	0.26
NWC															1.00

Table 4. Regression Analysis

Coefficients	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	2673667153.9764		2.5919	0.0143
Current Asset	0.0364	0.1854	2.6398	0.0127
Operating Income	0.0775	0.5856	6.6670	0.0000
Cash Flow	16139907.4149	-0.0973	-2.4945	0.0180
Volatility of Cash Flow	25165935.0975	0.1094	1.3999	0.1712
Size	34510006.4811	-0.0660	-2.4818	0.0185
Short term debt	0.1295	-0.5868	-2.1148	0.0423
Total debt	0.1343	0.6955	2.2333	0.0326
Leverage ratio	6427141.1735	0.0797	2.8464	0.0077
MTB	4569183.9905	-0.1251	-1.7051	0.0979**
Intangible Asset	4.6285	-0.0964	-2.3802	0.0234
Tobin's Q	6703923.4443	-0.0462	-1.0755	0.2902
Tangibility Ratio	2657675541.1440	-0.0921	-2.3868	0.0231
Net cash	175210602.1993	0.1154	4.6229	0.0001
NWC	12538201.3281	-0.0258	-1.0046	0.3226

Variables are significant at 5% significant level, \*\* at 10% significant level

Table 5. Relationship

Variables	Trade Off	Pecking order	Actual Relationship
Current Asset	Positive	Positive	Positive
Operating Income	Negative	Positive	Positive
Cash Flow	Negative	Positive	Negative
Volatility of cash flow	Positive	Positive	Positive
Size Of Firm	Positive	Positive	Negative
Short term Debt	Positive	Negative	Negative
Total Debt.	Positive	Negative	Positive
LEVR	Positive	Negative	Negative
MTB	Positive	Positive	Negative
Intangible Asset	Positive	Positive	Negative
Tobin's Q	Positive	Positive	Negative
Tangibility	Positive	Positive	Negative
Net cash	Positive	Positive	Positive
NWC	Negative	Negative	Negative