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Impact of Uncertainty on Cash Holding: Evidence from Manufacturing Firms of Pakistan

ABSTRACT

This study investigates the impact of uncertainty on the cash holdings of manufacturing firms of Pakistan. It also explores the impact of uncertainty on cash holdings for financially constrained firms. We employ dividend payout ratio as a proxy for classification of financially constrained firms. In order to mitigate the problem of endogeneity and to take into account the dynamic nature of the panel dataset, we employ the two-step system-GMM using unbalanced panel dataset of 301 firms covering the period of 2001-2015. The results reveal that cash holdings of firms increase with both macroeconomic and firm-specific uncertainty. However, the increase in cash holding during higher macroeconomic uncertainty is more than that of firm specific uncertainty. The reason behind is that firm specific uncertainty can be hedged while macroeconomic uncertainty cannot be evaded. The results also suggest that financially constrained firms further increase their cash holding while facing both sorts of uncertainty.

Keywords

Cash holding; macroeconomic uncertainty; firm-specific uncertainty; financial constraint

JEL Classification

D81, G30, G32, G34, G35

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1. INTRODUCTION

In a world of perfect capital market, maintaining internal funds is meaningless. It is due to the fact that firms can easily raise funds from external capital market with a least cost. Through logical perspective, maintaining internal funds like cash reserves have both costs and benefits. For example, Keynes (1936) explained three main advantages of holding cash to face any unforeseen uncertain situation, by giving his famous motives of cash holding. In contrast, Jenson (1986), Kim et al. (1998) opposed the high level of cash holding by explaining the concept of agency costs which arises due to high level of cash holding. Earlier studies mainly focuses on cash holding and uncertainty separately. For example, Opler et al. (1999), Pinkowitz and Williamson (2004), Foley et al. (2007), Ozkan and Ozkan (2004), Dittmar and Mahrt-Smith (2007), Bates et al. (2009), Uyar and Kuzey (2014), Rashid and Ashfaq (2017) and Bhuiyan and Hooks (2019) explored the determinants of cash holding and suggested that cash holding is more valuable for those firms which are small in size, have good growth opportunities and involve in riskier activities. However, Chen et al. (2019) declared that cash holding level of firm is decided on the basis of rival firms' cash reserves.

Furthermore, evaluating cash holding under uncertainty most of the researchers consider uncertainty at macro-level. For example, Baum et al. (2006) reported that volatile macroeconomic condition affects the cash holding policy of firms. They report the positive connection of macroeconomic volatility with cash holding. Yet, Xu et al. (2016) explored the negative relation of political uncertainty with cash holding for Chinese firms. Moreover, Anand et al. (2018) empirically supported the effect of macroeconomic variable on cash holding of firms. In addition to, Demir and Ersan (2017) found that with the rise in economic policy uncertainty cash holding level of firms also increases. Similarly, uncertainty in cash flow of firms is investigated and positive relation with cash holding of firms is determined for Pakistan non-financial firms (Rashid & Ashfaq, 2017). Also, Smietanka et al. (2018) examined the impact of economic uncertainty on cash holding and investment for UK firms.

There are few studies which emphasizes in examining the cash holding under the source of uncertainty; macroeconomic and firm-specific or idiosyncratic uncertainty. This issue has captured attention of researchers in recent times. For example, Hyun et al. (2016) considered three component of cash holding, firm specific, idiosyncratic and macro-level uncertainty. They found that as the uncertainty increases cash holding is more valuable to that one. Similarly, Baum et al. (2016) found that the source of uncertainty: firm-specific and macroeconomic level uncertainty play a key role while determining the value of cash.

However, these researchers mainly focused on the developed countries for investigating the connection of cash holding and uncertainty. The firms of developed economies, where financial markets are well-established and well-functioning both theorists and empirics give little consideration to firms operating in developing economies. Firms in developing countries are different in many ways. For example in developing economies the firms confronts more uncertain environment – both macroeconomic and firm specific uncertainty – as compare to developed nations. Further, firms in developing nations face poor connection with capital market, more problems of asymmetric information and also high cost of external funds. Hence, we can say firms in developing economies evaluate cash holding differently and pay more attention to uncertainty as compare to developed countries. In this perspective, it would be advantageous and informative to examine how firms of developing countries evaluate cash holding while considering uncertainty. Therefore, the objectives of our study is to examine the impact of uncertainty and its sources; firms specific and macroeconomic on cash holding and also extend it to examine the influence of financial constraint while investigating the impact of uncertainty on cash holding of non-financial firms of Pakistan.

Consistent with finding of Baum et al. (2009), Hyun et al. (2016) and Demir and Ersan (2017), our findings show that both macroeconomic and firm-specific uncertainty are positively linked to cash holdings of firms. Though, the magnitude of coefficient of firm-specific uncertainty is less than that of

macroeconomic uncertainty, which shows that firm-specific uncertainty can be hedged by firm management. On the other hand, macroeconomic uncertainty is similar to all firms and cannot be hedged by firms.

After the first section of introduction, the second section presents the relevant theoretical and empirical literature of cash holding and uncertainty. Section 3 reports the methodology and data sources of our study. The estimation results are presented in Section 4 and Section 5 consists of concluding remarks.

2. REVIEW OF LITERATURE

Financial literature developed various theories and empirical studies to find out the reason behind firm's holding cash and also to compare marginal costs and benefits of cash holding. For example, Keynes (1936) explores the benefits of cash by giving motives of cash holding. In the same way, Bates et al. (2009), and Kim et al. (1998) stated that transaction motive, precautionary motive, tax motive and agency motive are the key sources to increase the cash level of US firms. Conversely, various studies focused on cost of cash holding like Jensen (1986) opposed the high level of cash holding by explaining the concept of agency costs arises due to high level of cash holding.

To decide an optimal level of cash holding earlier studies explore the question of what determines the cash level. They found that there are several determinants like leverage, firm's size, dividend payments, market to book ratio and return on assets are those factors which determines optimal level of cash. Opler et al. (1999), Pinkowitz and Williamson (2001), Ozkan and Ozkan (2004), Harford (1999), Ferreira & Vilela (2004), Guney et al. (2007), Afza and Adnan (2007), Bates et al. (2009), Boubakri et al. (2013) Rashid and Ashfaq (2017), Bhuiyan and Hooks (2019). In addition, cash holding also depends upon the financial status of the firms. For example, Almeida et al. (2004) found that no influence of cash inflow is seen for unconstrained firms though financially constrained firms are positively connected to cash inflow. Similarly, Faulkender & Waang (2006) and Pinkowitz and Williamson (2006), Denis and Sibilkov (2009) indicated that cash holding is more valuable to those firms which are facing financial constraint.

While considering uncertainty as determinant of cash holding, prior researchers solely focused on macroeconomic or industry level uncertainty which is similar to every firm. For example, Graham and Harvey (2001) highlight the key role of financial flexibility (having internal fund for financing) and credit rating to face any macroeconomic shocks. Likewise, Baum et al. (2004) also described macroeconomic influence on uncertainty. They found that firms behave identically in deciding liquidity ratio once facing macroeconomic uncertainty. In addition to, Baum et al. (2008) indicated during uncertain circumstances firms increase demand of cash for precautionary motive. Similarly, Smietanka et al. (2018) also explained the impact macroeconomic uncertainty after great financial crises of 2008 and find that firms prefer to hold more cash reserves in order to face macroeconomic uncertainty.

To evaluate the influence of uncertainty on cash, it is essential to consider the source of uncertainty. As Baum et al. (2016) found that firms' cash holding is positively connected firm-specific uncertainty whereas macroeconomic uncertainty decreases level of cash holding. Moreover, Im et al. (2017) claimed that firms' cash level rises more than double in uncertain environment than level of cash in low uncertainty. Regarding cash holding under uncertainty, earlier studies focused on developed countries while few studies available for developing countries like Pakistan but they did not consider uncertainty. For instance, Afza and Adnan (2007), Rashid and Ashfaq (2017) examined factors that determine cash holding level of non-financial listed firm of Pakistan.

The literature determines the connection of uncertainty and cash holding and also highlights the determinants that affect cash holding. However, to the best of our knowledge, no study is available to evaluate cash holding under uncertainty for developing country like Pakistan. Developing countries face more uncertain situation (both macroeconomic as well as firm-specific) as compare to developed countries. Hence, our study contributes to the literature regarding two aspects. First, impact of uncertainty

and its source on cash holding is determined. Second, we also extend the literature by examining the impact of financial constraint on cash holdings.

3. EMPIRICAL MODEL

3.1. Background of Model

Following Dittmar et al. (2003), Ozkan and Ozkan (2004), Faulkender and Wang (2006), Han and Qiu (2007), Demir and Ersan (2017) and add the sources of uncertainty, macroeconomic and firm-specific uncertainty as in Baum et al. (2016).

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_1 MU_t + \beta_2 FU_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 DIV_{i,t} \\ + \beta_6 RoA_{i,t} + \beta_7 TOBINQ_{i,t} + \varepsilon_{i,t}$$

where, β_0 is constant and $\beta_1 - \beta_7$ are the coefficients of independent variables. Similarly, i indicates firm while t represents year and $\varepsilon_{i,t}$ is the disturbance term. Dependent variable $CASH_{i,t}$ represents cash holding of firm with independent variable and $CASH_{i,t-1}$ is the lagged value of cash. The independent variable MU_t is the macroeconomic uncertainty and $FU_{i,t}$ represents firm-specific uncertainty. Furthermore, the control variables are $TOBINQ_{i,t}$ denotes TOBINQ ratio, $LEV_{i,t}$ represents leverage, $RoA_{i,t}$ is return on Asset, $DIV_{i,t}$ represents dividend payout ratio of firm, and $SIZE_{i,t}$ represents size of firm

3.2. Measurement of Macroeconomic and Firm-specific Uncertainty

In order to capture macroeconomic uncertainty researchers used different proxies, like Ghosal and Loungani (2000) obtained proxy for macroeconomic uncertainty from moving standard deviation of macroeconomic series. Similarly, Schmukler et al. (1999) and Graham and Harvey (2001) employed survey based method (from firm's banks managers) based on forecasting used as a measure of macroeconomic uncertainty. In our analysis, we use Generalized Auto Regressive Conditional Heteroskedastic (GARCH) model as a proxy for macroeconomic uncertainty, as in Byrne and Davis (2002), Driver et al. (2005), Baum et al. (2008) and Baum et al. (2016). We consider the volatile nature of CPI (Consumer price index) as a proxy for Macroeconomic uncertainty which the firm consider in decision making process. We construct GARCH (1, 1) model for consumer price index for the period of 2001m1-2015m12. The derived conditional variance from this generalized autoregressive conditional heteroskedastic model, we put it in our regression equation as a proxy for macroeconomic uncertainty.

Similarly, we can use various proxies to capture firm-specific uncertainty as Ghosal and Loungani (2000), Baum et al. (2016) uses standard deviation of firms profit as proxy of uncertainty. Bo and Lensink (2005) use stock price volatility, sales volatility and number of employees to measure the firm uncertainty. Following Bo (2002), Rashid (2011), Caglayan and Rashid (2014), we use sales to total assets ratio as a proxy for firm-specific uncertainty. We use autoregressive model AR (1) by calculating standard deviation of the residuals obtained from model for every year of the firm represent firm-specific uncertainty to that firm.

3.3. Financial constraints

Different proxies are used to evaluate the financial constraint. For example, Fazzari et al. (1988) claims that firms with a higher payout ratio are unconstrained while lower payout ratio shows financially constrained firms. In addition, Almeida et al. (2004) used different approaches to categorize firms into financial constrained and unconstrained firms. They classified firms on the basis of dividend payout ratio, firm's assets size, bond rating and commercial paper rating. Following Fazzari et al. (1988), Opler et al. (1999), Almeida et al. (2004), Han and Qiu (2007), Denis and Sibilkove (2009), Baum et al. (2016) and Rashid and Ashfaq (2017) we categorize firms into financially constrained based on the dividend payout

ratio. Specifically, financially constrained firms are those that cannot easily access external capital markets and they prefer to hold more cash and do not pay dividend (Fazzari et al. (1988), Chan et al. (2013)). We generate a dummy variable that categorize firms into financially constrained firms and also interact it with the baseline regression equation model. For example, we create dummies $D_{i,t}^{cons}$ for financially constrained firms during accounting year, it is equal to one if firms regularly pay dividend if not then zero.

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 MU_t + \beta_3 FU_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 ROA_{i,t} + \beta_6 DIV_{i,t} \\ + \beta_7 TOBIN Q_{i,t} + \beta_8 MU_t \times D_{i,t}^{cons} + \beta_9 FU_{i,t} \times D_{i,t}^{cons} + \varepsilon_{i,t}$$

All variables of above equation is of our base line regression model for full sample. In this equation we add dummies for sorting constrained firms and to check impact of uncertainty on cash holding under the link variable of financing constraint.

3.4. Estimation Technique

We employed the two-step system GMM in order to estimate the impact of uncertainty on cash holdings of firms by following Uyar and Kuzey (2014) and Rashid and Ashfaq (2017). The two-step system GMM suggested by Arellano and Bover (1995) which is fully developed by Blundell and Bond (1998). In our study, we use AR (2) test proposed by Arellano and Bond (1991) to examine second order serial correlation in residuals. The null hypothesis for AR (2) shows that the model is free from second order serial correlation. For validity of instruments, Hansen (1982) provides J-statistic to test the orthogonality of instruments to residuals. Besides, the null hypothesis is that instruments are orthogonal to residuals.

3.5. Data

To investigate the impact of uncertainty on cash holdings of firms, we build an unbalanced panel dataset of Pakistan stock exchange listed manufacturing (non-financial) firms. Financial firms are not included in the sample because of the fact that their valuation of cash holding is totally different from that of non-financial firms. Our sample covers period from 2001 to 2015. Data of firm-specific variables are deducted from balance sheet analysis published by state bank of Pakistan. The data on macroeconomic variables are taken from the International Financial Statistics (IFS).

4. EMPIRICAL RESULTS

The results of our estimation are given below in Table 1. The diagnostic tests show the reliability of estimation. For example, in our model the estimates of Hansen test provide evidence of not rejecting null hypothesis. This indicates that instruments are orthogonal to residuals. Likewise, we do not find any evidence of autocorrelation existence in the model. These two tests provide the evidence for validity of instruments used in our baseline regression model.

The coefficient of our main independent variable, macroeconomic uncertainty shows positive connection with cash holding. The positive result supports the precautionary and speculative motive of cash holding. Firms increase their level of cash to face macroeconomic uncertainty (Baum et al. (2009), Demir and Ersan (2017)). On the other hand, the study of Baum et al. (2016) reported negative impact of macroeconomic uncertainty on marginal value of cash for US firms. They are with opinion that cost of cash holding increases with the increase in cash holding due to which firm's prefers to hold less cash in uncertain situation. Furthermore, firm uncertainty (FU) indicates the positive and significant impact on cash holding (Baum et al. (2016)). The magnitude of coefficient of firm uncertainty is less than that of macroeconomic uncertainty which can be interpreted as the increase in firm specific uncertainty causes to increase cash holding level of firm but small increase as compare to the macroeconomic uncertainty. It is due to the reason that uncertainty which is specific to firm decisions can be hedged by firm while macroeconomic uncertainty cannot be hedged.

We find that our base line regression estimates are in line and consistent to prior studies. The independent variable L.CASH has the positive coefficient and statistically significant. This indicates that firms with more cash holding in previous period also continue to hold more cash in current period. These results are supported by the studies of Ozkan and Ozkan (2004), Han and Qiu (2007), Uyar and Kuzey (2014) and Rashid and Ashfaq (2017). The firm size coefficient is negative, which is significant and consistent with the prior studies.

Table 1: Estimation Results of Baseline Regression Model

Cash holding of firms is dependent in estimation				
Variables	Coefficient	Std. Error	Coefficient	Std. Error
Constant	0.511***	0.001	0.483***	0.002
L.CASH	0.554***	0.000	0.486***	0.000
MU	0.132***	0.001	0.085***	0.001
FU	0.005***	0.000	0.005***	0.000
SIZE	-0.073***	0.000	-0.069***	0.001
LEV	-0.004***	0.000	-0.051***	0.000
DIV	-0.305***	0.000	-0.040***	0.000
ROA	0.0390***	0.000	0.045***	0.000
TOBINQ	0.006***	0.000	0.010***	0.000
$MU_t \times D_{i,t}^{cons}$	0.026***	0.001		
$FU_{i,t} \times D_{i,t}^{cons}$	0.087***	0.000		
Diagnostic Tests				
Number of observations		3875		3875
AR (2)		1.36		1.26
P-value		0.175		0.209
Hansen-Statistics		290.33		285.12
P-value		0.385		0.454

***, **, * is significant level at 1%, 5% and 10% respectively

This negative sign of coefficient shows that larger firms prefer less cash holding. It supports earlier literature cash level increases with the rise in firm size (Trade-off Theory). As return on assets increases, more flow of cash to firm occur which causes to increase the cash holding level. Leverage shows a positive and significant relation with cash holding. Consistent with earlier studies leverage is negatively connected to cash holding of firms. As Opler et al. (1999), Ozkan and Ozkan (2004), Dittmar and Mahrt-Smith (2007), and Guney et al. (2007) Uyar and Kuzey (2014) and Baum et al. (2016) indicated the negative impact of leverage on cash level. They stated that leverage is considered as an ease of acquiring debt, so firms with greater ratio of leverage can shift their financing from cash holding to borrowing.

Consistent with Opler et al. (1999), Boubakri et al. (2013), Baum et al. (2016) and Demir and Ersan (2017), we find that the dividend payout ratio displays the negative relation with cash holding. The negative association of dividend can be interpreted as a firm pay high dividend causes outflow of cash due to which cash holding of firm decreases. The growth opportunities represented by TOBIN Q show the positive and significant impact on cash holding. This suggest that as the growth opportunities increases, firm's prefer to hold more cash in order to avail these opportunities. This relationship is in line with earlier studies, such as Opler et al. (1999), Ferreira and Vilela (2004), Duchin (2010) and Rashid and Ashfaq (2017) also reported a positive sign of TOBIN Q.

To investigate the effect of financial constraint on cash holding we generate dummy based on dividend payout ratio. The third and fourth column of Table 1 presents the estimation results of effect of financial constraint. In diagnostic tests, the Hansen statistics give evidence that instruments are not correlated to residuals. Similarly, the AR (2) estimates provides evidence that model is free from second order serial correlation for both measures. This proves the validity of our instrument and these diagnostic tests proves soundness of our estimation results.

Through dividend payout based classification, financially constrained firms shows positive connection to cash holding while facing both types of uncertainty. For example, Consistent with the studies of Baum et al. (2008) and Demir and Ersan (2017) the coefficient of macroeconomic uncertainty for financially constrained firms is positive which shows that with the increase in macroeconomic uncertainty, financially constrained firms also increase their cash holding. Besides, firm's specific uncertainty also indicates positive connection with cash holding for firms who faces constraint in raising funds. This indicates that with the increase in firm's specific uncertainty, financially constrained firms also raise their level of cash holding to counter this uncertainty. This connection is significant and in line with earlier literature like Baum et al. (2016).

The coefficient of firm-specific uncertainty for financially constrained firms is more than that of macroeconomic uncertainty. It means that those firms which faces constraints values more firms specific uncertainty because it is limited to its decisions (i.e. sales, profit, etc.) while macroeconomic uncertainty is same for all its competitor also and cannot be hedged with the increase in cash holding. Therefore, financially constrained firms increase their cash holding level more to face firm's specific uncertainty than macroeconomic uncertainty.

5. CONCLUSION

In this paper, we explore the uncertainty connection with cash holding for manufacturing firms. The source of uncertainty i.e. macroeconomic and firm-specific uncertainty is considered and its isolated impact is investigated. The study is further extended to examine the effect of financial constraints on cash holding.

Full sample results indicate a positive relation between to the source of uncertainty; macroeconomic and firm-specific uncertainty and the firm cash holdings. It implies that with the increase in both types of uncertainties the firms increase their cash holding to face that uncertainty. However, the cash holding increases more for macroeconomic uncertainty than firm-specific uncertainty. The firms prefer more cash holding to face macroeconomic uncertainty because it is beyond the control of firms to control the macroeconomic situations of a country. On the other hand, firm's rises their cash reserves to face firm's specific uncertainty but less in magnitude than macroeconomic uncertainty because firm's specific uncertainty is evadable through portfolio. The control variables such as size of firm, leverage and dividend show negative connection while previous year cash holdings, return on assets and growth opportunities indicate positively linked with cash holding for full sample. Furthermore, we employ dividend payments of firms as a measure of financial constraint. Under both sorts of uncertainty the constrained firms prefer to hold more cash holdings. Finally, the study provide evidence that as macroeconomic uncertainty rises firm's managers are required to increase their cash holding level to face that uncertainty. Similarly, with the increase in firm specific uncertainty mangers correspondingly rise their cash holding but less as compare to macroeconomic uncertainty.

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