

# DETERMINING THE ASSOCIATION BETWEEN MONETARY POLICY, CORPORATE INVESTMENTS AND CASH HOLDINGS

Asad Yaqub, NUML Islamabad, Pakistan

Muhammad Awais, Foundation University Islamabad, Pakistan

Saira Aslam, Riphah International University Islamabad, Pakistan

Muhammad Mohsin, Riphah International University, Pakistan

Ajij Ur Rehman, Riphah International University, Pakistan

## ABSTRACT

*This study is investigating the effect of monetary policy (growth rate), corporate cash holdings (separate and moderating effect) and financial constraint on the corporate investments decisions of listed 200 non-financial firms from Pakistan stock exchange for the sample period of 2006-18. The Altman Z-score, used to measure financial constrain which consist of tangibility, operating cash flow, leverage and size in this study. A deductive and quantitative methodology has been utilized in this study while random effect model and GMM is used to investigate panel information. Monetary policy for financially constrained firms has significant negative relation with their investment level while insignificant for unconstrained firms based on their size. Similarly monetary policy of financially constrained and unconstrained firms has significant negatively relation to their investment based on their networking capitals. MP into cash (moderating effect) has insignificant to investment levels based on all models. Tangibility has inversely significantly related to corporate investment in fixed effect and GMM model. Size has significantly related in all the models for both constrained and unconstrained firms while operating cash flow insignificant.*

**Keywords:** Monetary Policy, Financial Constraint, Cash Holdings and Corporate Investment.

## INTRODUCTION

Among few vital macroeconomic policies, monetary policy is one of most substantial macroeconomic policy which has direct association with money supply while investment is also being the crucial segment of any economy to aid the expansion of economic activities in a country. Abuka et al. (2019) highlighted the significant relation between monetary policy of a country and corporate lending while Morck et al. (2013) explained that monetary policy also directly affect the corporate investment. These policies are controlled by central bank of a country and one of key component of this policy is interest rate thus monetary policy influence the money supply consequently market interest is controlled. Subsequently, the impact of monetary policy on corporate investment has the direct association with firm reliance on internal funding and its financial dimensions of the firm (Gaurav et al., 2019). They also highlighted that corporate investments are put under a lot of stress due to tightening of monetary policy.

Furthermore, corporate investments are subject to legal and regulatory scrutiny when depending upon external borrowing even in phases of expansionary monetary policy. Song et al. (2011) explained that due to scarce possibilities of investment, the chances of bankruptcy of firms' increases consequent of interest rate expense upsurge. Though monetary policy is one of most significant tool in any economy but the association of corporate finance and monetary policy is crucial in investment bound economies Li & Liu. In this context, the

consequence of contraction of money supply policy may have adverse effects on borrowing firms' credit worth as the asset prices of firms are diminishes due to upsurge of the rate of interest. It is also the fact that in monetary contraction circumstances, which affect the economy as whole including non-financial and financial firms, financial institutions are more interested and tilted towards large organizations as compared to small ones seeking the lower possibilities of default (Guariglia & Mateut, 2006).

Thus, one way adopted by small firms, to meet the contracted money supply, is to hold cash as the fiscal crisis in last decade really shaped the management policies towards cash holdings. Jebran concluded that firms hold less cash in the times of financial crises. Ammann et al. (2010) explained that cash holding have multiple consequences for firms as holding cash has some valuable consumption while having few specific costs as well but not limited to agency cost and opportunity costs. Bond et al., (2003) explained that firms have to shrink the magnitude of investments by holding more cash by reducing returns on equity and considerable reduction in cash flow and this cycle creates financial hurdles for the firms specifically for the firms from under developing countries.

Apart from above stated dilemmas of adverse monetary policy, there are other significant external factors as well which have significant association with corporate investments. In contrast to under developing economy, such as Pakistan, assuming an impeccable capital market, firms investment decisions are not associated with financing decisions where firms are indifferent between external and internal financing due to limit less availability of finance (Rashid & Jabeen, 2018). But if the market is not impeccable such as the markets of under developing countries, including Pakistan, the investment and financial decisions are significantly associated as there are limits on availability of external finance and firms are not indifferent among external and internal financing (Fazzari et al., 1988). Subsequently firms have to be reliant on other financial factors including new sources of financing and availability of internal finance for its investment decisions consequently this constructs the phenomenon of financial constraints. In this context, studies conducted in developed economy including United Kingdom, its neighboring countries, regarding association between corporate investment and financial constraints, concluded the significant relationship among financial factors on corporate investments (Bond et al., 2003).

Previously, the focus of research for measuring these specific phenomena was industry based but contemporary paradigm of research is tilted more towards firm-level data for measuring and determining these phenomena as this specific methodology also supplements the macroeconomic investigation. The main goal, for measuring and determining these variables based on firm-level data, is that it also assist to figure out the various different financing decision behaviors among firms by determining the impact of these variables on corporate investments through numerous forms of businesses. Moreover, monetary policy is a significant for any economy in the world which is in the process of transformation from under developing to emerging or emerging to developed (Song et al., 2011).

It is noteworthy to mention here that International Monetary Fund (IMF) extended fund facility program started in July 2019 for the period of thirty nine months and before availing this program, the inflation rate was about six percent in 2017-18 while right after the extended fund facility program was arranged, the inflation rate hiked up to 11.8 percent and in last two months of 2019, the national consumer price index recorded the high rate of inflation around 12.7 percent and 12.6 percent in November and December respectively. The monetary policy is reviewed by state bank official of Pakistan in every two months consequently consistently increasing the discount rate directly has adverse effects for corporate investments. Finally the objective of this research study is to determine the impact of constriction monetary policy on the corporate investments and also to determine role of

corporate cash holding in moderating the adverse effects of tightening monetary policy if any.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are studies which show that from asymmetric prospect speed and direction of dynamically adjusted investment are influenced by transmission channels and monetary policy. In the context of monetary policy's effects, Friedman, (1978) crowd out theory is considered as landmark theory. This theory suggests that increase in interest rate and inflation is trigger by unclear and unsustainable microscopic policies. The issue with monetary policy's empirical analysis is that changing the policy instrument reflects a systematic variation in macroeconomic conditions hence the relationship of macroeconomic variables and investment behavior affected by all these shocks to economy. Money supply and inflation relationship has been tested by Qayyum, (2006) in the Pakistani context through a time-series data over the period starting from 1960 to 2005.

According to Awan, (2016), temporarily monetary policy has slight impact on macroeconomic predictors while it gets more significant in the long-term scenario. Furthermore, Awan, (2015) concluded that central banks must be given a leverage to implement monetary policy. In the period between 2005 and 2015, Fu & Liu, (2015) analyzed monetary policy impact on corporate investment change on the sample of listed Chinese A-share firms. They found that transition to corporate investment is quicker when monetary policy loosens compared with tightened monetary policy. Yang et al., (2017) also examined the impact of monetary policy on Chinese firms ' corporate investment and cash holdings during the 2003–2013 periods. They concluded that a tightening monetary policy decreases corporate investment and that the mitigating impact depends on financial constraints, ownership and also whether the company is located in a less established financial market. Chatelain et al. (2003) provided evidence of the relationship between firm expenditure and transmission of monetary policy in the euro area. They showed that investment responds differently based on liquidity and cash flow factors, and that companies with poorer balance sheets are more prone to liquidity.

The available literature related to monetary policy describes two classifications through which monetary policy affects investment of firms; the first mechanism is interest rate while the other effecting mechanism is through credit channels (Bernanke & Blinder, 1988) consequently the accessibility of external finance for firms shrinks due to variation in monetary policy as well as it also have effects on market interests rates. This association can be simply explicated as whenever central bank of a country tries to curtail its economy, due to undesirable demand which in turns contributing to abnormal inflation, central bank attempts to set the policies which will ultimately shrink the banking reserves consequently the bank nets assets are condensed. According to research study by Liu Jinquan (2002): a contractionary monetary policy have greater negative impact on firm investment as compared to lower favorable impact of expansionary monetary policy on the actual output of firms Friedman, (1978) theory work related to “*Crowd out Theory*” is referred in the studies which attempts to find out the consequence of monetary policies on firms' investments. According to this theory, the abnormal inflation and anomalous rise is interest rate may be consequence of indefensible and uncertain approach while setting macroeconomic policies such as monetary policy

Terjesen et al. (2016) further utilized and explained this effect as the consequence of increased inflation and interest rate generates financial difficulties for private firms thus these researchers reflected this phenomenon as a “*crowd out effect*” of private sector firms which would like to raise the finances through external borrowing sources. Tobias & Chiluwe, (2012) discovered the association between firm's investment decisions and monetary policy

by intensifying multiple fundamental studies related to corporate financing. Thus based on above literature review; the first hypothesis of this study is:

*H<sub>1</sub>: There is negative association between tight monetary policies and corporate investment*

In general, conflicts arise between the management and shareholders for the costs and benefits of the cash holding. Lee & Powell, (2011) have reported that companies hold persistent cash, at the detriment of shareholders. The manager's freedom of option increases with excess cash holding which decreases the company's risk (Opler et al., 1999). Bigelli & Sánchez-Vidal, (2012) found that small businesses are vulnerable to carrying excess cash compared to large businesses because of the associated risks and financial constraints. In addition, their research endorsed the Tradeoff Theory, which argues that small businesses maintain excess cash reserves due to cash flow variability and lower taxation. A strong negative relation has been reported between the cash ratio of the company and the tangibility of assets (Uyar & Kuzey, 2014). Kim et al. (2011) argued that cash holdings had a notably positive relationship with investment opportunities. Excess cash holding showed a significant correlation for those businesses that were under tremendous financial constraints due to managerial entrenchment (Sheu & Lee, 2012).

Under Jensen (1986) free cash flow principle, managers want to keep more cash so they can exert more leverage under investment decisions. Despite high cash rates by companies the need to take outsourcing declines and thus managers may invest in non-profit ventures such as acquisitions that decrease shareholder capital (Harford, 1999). Other studies found that the cash kept by established companies is due to the fact that they want to expand capital and also use the sum in ventures that are not so lucrative (Azmat, 2011). Similarly, Afza & Adnan, (2007) argued that companies are required to maintain a certain amount of cash with them for reinvestment purposes. They found that size, cash flow, cash flow uncertainty of non-financial firms in Pakistan affect cash holdings positively while investment opportunities, leverage, dividend payments and liquid assets are negatively related. Many researchers have added valuable and empirical conclusion to related literature as they found that future investment is significantly dependent on internal cash flows and liquidity of the firm (Kadapakkam et al., 1998).

Those researchers also highlighted that future investment decisions of big firms are more sensitive to liquidity and cash flow as compared to small firms. Later on researchers found the direct significant association between investments and cash flow volatility (Minton & Schrand, 1999). According to Opler et al. (1999) firms which are operating in an industry where cash flows volatility is higher, those firms have tendency to have conservative approach by having larger amount of liquid assets. As there prevails many criticism related to association between cash flows and investment decisions and questions relating to finding the relationship between financial policies and costly external finance, some researchers provided a different methodology (Almeida et al., 2004) and first time, they utilized cash flow sensitivity of cash. They explained that those firms which have cogent tendency to save cash are the firms which are facing financial constraints as compared to unconstrained firms which do not have tendency to save cash as the empirical evidence found by these researchers highlighted the significant direct relation between cash flow sensitivity of cash and financially constrained firms and vice versa for firms which are not financially constrained.

According to Pulvino & Tarhan, (2006) who extended the research of previous researchers and found contrasting results from previous researchers as their results emphasized the fact that cash to cash flow sensitivity have direct association with both type of firms thus being financially constrained or financially unconstrained is irrelevant as they utilized simultaneous equation system while taking into the consideration the variation in cash flow due to external financing's reaction. Apart from financial constraints having impact

on investment decisions, there has been a lot of study and literature available regarding monetary policy impact on corporate investment decisions.

Theoretically, firms having large cash flows are more resistant to modifications in interest rates, as for investments, these firms are more dependent on the internal financing. The firms who are more dependent on financial institutions are more affected by monetary strategies with lower debt to capital ratio. Baristha & Kurov also supported this by showing the response size in the US that the stock returns to monetary policy shocks are two times larger than the period of recession. A significant relationship can be seen in the association between monetary policy and investment activity from the whole world. Nagahata & Sekine, (2005) also examined the impact of monetary policy on firm investment (manufacturing and non-manufacturing) using micro data after the asset price bubble collapse in Japan. According to work done by Bernanke & Kuttner, (2005), it is significantly imperative to find out how the investment or asset prices are affected by the change in the monetary policy to determine role of monetary policy in setting up real economy of a country. Bernanke & Kuttner, (2005) further describe the other side of coin effects of tightening monetary policy that this type of policy implementation directly has impacts on liquidity of financial institutions which ultimately curtail the credit supply through this financial institution channel. Thus, based on above literature, the second and third hypotheses are:

*H<sub>2</sub>: Cash holding moderates between adverse effects of tightening monetary policies on corporate Investment.*

*H<sub>3</sub>: The moderating effects of cash holdings are more when firms are financially constrained.*

## RESEARCH METHODOLOGY

This research is mainly established on secondary data while results are obtained by operationalizing quantitative analysis. The sample data of Two hundred Pakistani firms, for a period of thirteen years, listed on Pakistan Stock Exchange (PSX) from non- financial sector of the Pakistan is collected for testing the hypotheses of this research. To eradicate the effect of outliers, the data is winsorized for the entire variables at 1 percent and 99 percent. There was a susceptibility of Structural multicollinearity due to the type of model used thus variance inflation factor (VIF) analysis is performed to detect multicollinearity consequently it is found that there is no multicollinearity. The regression model for this study is as follows:

$$\text{Investment}_{i,t} = \beta + \beta_1 \text{Investment}_{i,t-1} + \beta_2 \text{MPolit}_{i,t-1} + \beta_3 \sum \text{Zscore}_{i,t-1} + \lambda_i + \mu_{it} \dots (1)$$

$$\text{Investment}_{i,t} = \beta + \beta_1 \text{Investment}_{i,t-1} + \beta_2 \text{MPolit}_{i,t-1} + \beta_3 \sum \text{Zscore}_{i,t-1} + \beta_4 \text{Cash}_{i,t-1} + \beta_5 \text{Cash}_{i,t-1} \times \text{MPolit}_{i,t-1} + \lambda_i + \mu_{it} \dots (2)$$

Where; Investment<sub>i,t</sub> is the focus dependent variable which is measured using the approach adopted by (Duchin et al., 2010). It is measured as the annual variation in the total value of non-current assets including work in progress assets, intangible assets and total value of property, plant and equipment. Investment<sub>i,t-1</sub> the value of investment in lagged period and measured using approach adopted by previous mentioned researchers. MPolit-1 is indicator variable for monetary policy and its rate which is of M2 rate in context of Pakistan and this approach is in line with the studies of McCallum. Financial constraints are measured by using the  $\sum \text{Zscore}_{i,t-1}$  variable in above regression model.  $\lambda_i$  is predictor variable to control the effects of autocorrelation as dependent variable is probably correlated with firm specific individual and it is measured using GMM. Second regression equation measures and test the hypothesis related to mitigating effects of cash flow holding on tight monetary policy.

An interaction term Cashit-1 x MPolit-1 is added as moderator predictor in first regression equation along with cash holding variable.

## RESULTS AND ANALYSIS

Variable	N	Mean	SD	Min	Max
INV	2358	0.074	0.388	-0.642	2.052
OpWc	2358	0.066	0.122	-0.268	0.486
Tang	2358	0.505	0.208	0.056	0.964
Lev	2358	0.556	0.207	0.097	0.967
Size	2358	4.839	0.661	3.007	6.959
ROA	2357	0.074	0.11	-0.209	0.522
MP	2358	0	0.024	-0.039	0.051
MP*Cash	2004	0	0.003	-0.018	0.024
Cash	2004	0.063	0.1	0	0.465

Notes: INV is investment which is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent in Table 1.

Here on average the investment is about 7.5% of total assets during the sample period, having from -0.642 to 2.052 minimum and maximum values respectively. On average the operating cash flow-w, is about 6.6% of total assets, having minimum and maximum values -0.268 & 0.486 respectively. Monetary policy (growth rate) and cash (combined effect) having zero mean during the same period on average from -0.018 to 0.024 minimum and maximum values respectively. Similarly, monetary policy in Pakistan also varied, from -0.039 to 0.051 with a zero mean. Cash is about 6.3% of total assets for our samples listed firms during the sample period. Hence a tight monetary policy has an adverse effect on corporate investment level and corporate cash holdings in a non- financial sector of Pakistan in Table 2A.

Variables	N	Min.	Max.	Mean	SD
INV	609	0.051	0.36	-0.642	2.052
OpWc	609	0.049	0.11	-0.268	0.486
Tang	609	0.621	0.171	0.056	0.964
Lev	609	0.701	0.142	0.166	0.967
Size	609	4.836	0.661	3.007	6.615
ROA	609	0.018	0.105	-0.209	0.522
MP	609	0.141	0.024	0.1	0.19
MP*Cash	609	0	0.001	-0.007	0.013
Cash	609	0.021	0.042	0	0.356

Notes: N represents number of firms, SD represents standard deviation, INV is investment which is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; OpWc is operating working capital which is calculated by all company long term assets minus long term liabilities; Tang is tangibility which is determined from the ratio of fixed assets and total assets of firm; Lev is the leverage which is measured though the ratio of total liabilities to total assets, Size represents firm size measured by taking the log of total assets; ROA Is return on assets which is calculated by dividing the total net income by total assets of company; MP is monetary policy; MP\*Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

<b>Variables</b>	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>SD</b>
INV	693	0.076	0.421	-0.642	2.052
OpWc	693	0.049	0.113	-0.268	0.486
Tang	693	0.547	0.185	0.056	0.964
Lev	693	0.594	0.177	0.097	0.967
Size	693	4.842	0.666	3.128	6.959
ROA	693	0.061	0.081	-0.209	0.522
MP	693	0.143	0.022	0.1	0.19
MP*Cash	692	0	0.002	-0.015	0.02
Cash	692	0.039	0.064	0	0.465

<b>Variables</b>	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>SD</b>
INV	702	0.032	0.32	-0.642	1.929
OpWc	702	0.106	0.128	-0.268	0.486
Tang	702	0.364	0.176	0.056	0.933
Lev	702	0.408	0.176	0.097	0.967
Size	702	4.747	0.631	3.172	6.771
ROA	702	0.138	0.111	-0.209	0.522
MP	702	0.143	0.022	0.1	0.19
Mp*Cash	702	0.001	0.004	-0.018	0.024
Cash	702	0.122	0.132	0	0.465

The above Table 2B and Table 2C have indicating the descriptive statistics of constraints and unconstraint firm in Pakistan stock exchange. These firms are grouped on the basis of net working capital, like panel 1 is indicating financially constrained firms based on net working capital, panel 3 is about unconstraint firms assessed based on networking capital while panel 2 neither constraint nor unconstraint non-financial firms. Here the investment is about 5.1% of financially constrained and 3.2% of unconstraint firm of total assets, having from -0.642 to 2.052 and -.642 to 1.929 minimum and maximum values of constraints and unconstraint firms respectively. On average the financially constrained firms operating cash flow-w, is about 4.9% of total assets, having minimum and maximum values -0.268 & 0.486 respectively. While unconstraint firms operating cash flow-w, is about 10.6% of total assets, having minimum and maximum values -0.268 & 0.486 respectively. Monetary policy and cash mean of financially constrained firms having 14.1% and 2.1% respectively, while 14.1% and 12.2%, of unconstraint firms. Hence a tight monetary policy has an adverse effect on corporate cash holdings of financially constrained firms in Pakistan. The results are consistent with the result found by Duchin et al. (2010) where they found empirical evidence that has shown the hedging role played by cash holdings for corporate investment where the more cash reserved, the better protected are the firms from adverse monetary policy shocks. Further they found monetary policy tightening, increases in interest payments would reduce corporate profits, which, in turn, squeeze cash and reduce the net firm value.

<b>Variables</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
------------------	----------	-------------	-----------	------------	------------

INV	789	0.085	0.405	-0.642	2.052
OpWc	789	0.065	0.114	-0.268	0.486
Tang	789	0.521	0.187	0.056	0.937
Lev	789	0.561	0.195	0.097	0.967
Size	789	4.779	0.617	3.007	6.676
ROA	789	0.071	0.098	-0.209	0.485
MP	789	0.138	0.024	0.1	0.19
Mp*Cash	681	0	0.002	-0.012	0.02
Cash	681	0.055	0.086	0	0.465

<b>Table 3B</b>					
<b>SUMMARY STATISTICS OF CONSTRAINTS AND UNCONSTRAINT FIRM FOR ZSCORE PANEL B: NEITHER FINANCIALLY CONSTRAINED NOR UNCONSTRAINED FIRMS</b>					
<b>Variables</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
INV	785	0.062	0.375	-0.642	2.052
OpWc	785	0.061	0.126	-0.268	0.486
Tang	785	0.503	0.214	0.056	0.964
Lev	785	0.564	0.207	0.097	0.967
Size	785	4.821	0.66	3.128	6.824
ROA	785	0.068	0.106	-0.209	0.522
MP	785	0.141	0.024	0.1	0.19
Mp*cash	699	0	0.003	-0.018	0.024
Cash	699	0.065	0.104	0	0.465

<b>Table 3C</b>					
<b>SUMMARY STATISTICS OF CONSTRAINTS AND UNCONSTRAINT FIRM FOR ZSCORE PANEL C: FINANCIALLY UNCONSTRAINED FIRMS</b>					
<b>Variables</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
INV	784	0.076	0.384	-0.642	2.052
OpWc	784	0.071	0.127	-0.268	0.486
Tang	784	0.491	0.22	0.056	0.964
Lev	784	0.542	0.219	0.097	0.967
Size	784	4.916	0.698	3.378	6.959
ROA	783	0.082	0.123	-0.209	0.522
MP	784	0.138	0.023	0.1	0.19
Mp*Cash	624	0	0.003	-0.015	0.024
Cash	624	0.068	0.109	0	0.465

Notes: N represents number of firms, SD represents standard deviation, INV is investment which is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; ROA is return on assets which is calculated by dividing the total net income by total assets of company; MP is monetary policy; MP\*Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

Tables 3A to 3C has indicating the descriptive statistics of constraints and unconstraint firm grouped on the basis of Altman Z-score, like panel 1 indicating financially constrained firms panel 3 unconstraint firms of lower and higher quartiles while panel 2 neither constraint nor unconstraint firms in Pakistan stock exchange. Here the investment is about 8.5% of financially constrained and 7.6% of unconstraint firm of total assets, having from -0.642 to 2.052 minimum and maximum values of both constraints and unconstraint firms respectively. Financially constrained firm's leverage is about 5.6% of total assets, having minimum and maximum values -0.268 & 0.486 respectively. While unconstraint firms' leverage has 5.42% of total assets, minimum and maximum values 0.097 & 0.967 respectively. Monetary policy to cash having zero mean for both financially constrained and

unconstraint firms during the same period on average from -0.012 to 0.2 and -0.015 to 0.024 minimum and maximum values.

<b>Variables</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
INV	1								
OpWc	-0.01	1							
Tang	0.09*	-0.04	1						
Lev	-0.03	-0.23*	0.06*	1					
Size	0.12*	0.07*	0.03	0.01	1				
ROA	0.04	0.46*	-0.29*	-0.40*	0.06*	1			
MP	0.06*	-0.04	0.01	0.01	-0.04*	0.06*	1		
Mp*Cash	0.06*	-0.03	-0.06*	-0.04	0.04	0.07*	0.51*	1	
Cash	0	0.23*	-0.40*	-0.30*	0.15*	0.37*	0.05*	0.20*	1

Notes:\* shows significance at the .05 level INV is investment which is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; OpWc is operating working capital which is calculated by all company long term assets minus long term liabilities; Tang is tangibility ROA Is return on assets which is calculated by dividing the total net income by total assets of company; MP is monetary policy; MP\*Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

The Pearson correlation among investment and monetary policy is 0.06 about, at significance 0.05 level which shows a positive relationship between these variables. The Pearson correlation among investment and monetary policy (growth rate) to cash holdings is about 0.06, at significance 0.05 level, indicating a positive relationship between these variables in Table 4. This indicating that when a monetary policy of the state bank tight then non-financial firms also reduced their corporate level of investment as well as corporate cash holdings. But financial constraints (operating cash-flows and leverage) have inverse relationship with corporate level of investment in Pakistan. While no correlation -0.0 between investment and cash holdings has been found. Similarly, a positive correlation between cash and monetary policy in Pakistan is 0.05 at 5% significance level. But there is a negative correlation between firm size and monetary policy in Pakistan is -0.04 at 5% significance level. This indicating that when the firm size increasing then monetary policy tightness effect reduced on its cash and corporate level of investment because large firm can adjust their corporate level of investment at a long run in Pakistan.

<b>Variables</b>	<b>(1) OLS</b>	<b>(2) Fixed Effects</b>	<b>(3) Random Effects</b>	<b>(4) GMM</b>
INV	0.0158 (0.0186)	-0.117*** (0.0206)	0.0158 (0.0185)	-0.268*** (0.0253)
MP	1.205*** (0.267)	1.404*** (0.238)	1.205*** (0.243)	1.641*** (0.272)
Tang	0.144*** (0.0432)	0.895*** (0.104)	0.144*** (0.0389)	1.471*** (0.172)
Lev	-0.0518 (0.0392)	0.0384 (0.0830)	-0.0518 (0.0391)	0.117 (0.136)
Size	0.0418*** (0.0128)	0.616*** (0.0799)	0.0418*** (0.0111)	0.653*** (0.133)
OpWc	-0.166** (0.0779)	-0.108 (0.0856)	-0.166** (0.0802)	-0.138 (0.0897)
ROA	0.313***	0.471***	0.313***	0.490***

	(0.0862)	(0.132)	(0.0961)	(0.153)
Constant	-0.166***	-3.385***	-0.166***	-3.912***
	(0.0642)	(0.402)	(0.0603)	(0.636)
Observations	2,111	2,111	2,111	1,888
R-squared	0.029	0.141		
Hausman Prob-chi <sup>2</sup>			0.000	

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 INV is investment which is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

Monetary policy (growth rate) in the above Table 5 has significantly related to corporate investment level at 1% (\*\*\*p<0.01) in all the four regression models but inversely related in fixed effect model and GMM estimation. A tight monetary policy of the state bank of Pakistan has reduced the corporate investments level of non-financial firms in the economy and this finding are consistent with previous researchers (Fu & Liu, 2015; Awan, 2016; Yang et al., 2017). Hence it fulfills our first hypothesis H1 of this research study. In financial constraints operating cash flow has negative significantly related with investment at 5% in random effects model and GMM but leverage has insignificant at all the four models and these outputs correlated with the studies of (Huang et al., 2012; Morck et al., 2013). Tangibility has inversely significantly related to corporate investment in fixed effect and GMM model. Similarly another financial constraints proxy size has significant relationship with investment in all the four models at 1%. R-square values in the first two models are small so we can take the GMM models for analysis in this research study. GMM model has been used to balance the issue of endogeneity and heterogeneity.

	(1)	(2)	(3)	(4)
Variables	OLS	Fixed Effects	Random Effects	GMM
INV	-0.00688	-0.127***	-0.00688	-0.220***
	(0.0179)	(0.0219)	(0.0179)	(0.0304)
MP	1.341***	1.225***	1.341***	1.411***
	(0.346)	(0.314)	(0.317)	(0.345)
Cash	0.200**	0.321***	0.200**	0.539**
	(0.0794)	(0.115)	(0.0796)	(0.227)
MP* Cash	3.387	1.910	3.387	-0.0997
	(2.616)	(2.837)	(2.780)	(3.262)
Tang	0.225***	0.981***	0.225***	1.433***
	(0.0440)	(0.108)	(0.0466)	(0.167)
Lev	0.00959	0.0569	0.00959	0.146
	(0.0397)	(0.0889)	(0.0435)	(0.151)
Size	0.00996	0.474***	0.00996	0.508***
	(0.0117)	(0.0996)	(0.0127)	(0.172)
Operating Cash flow	-0.223***	-0.217***	-0.223***	-0.188*
	(0.0710)	(0.0748)	(0.0740)	(0.100)
ROA	0.348***	0.440***	0.348***	0.389**
	(0.0901)	(0.129)	(0.0974)	(0.175)
Constant	-0.123**	-2.774***	-0.123*	-3.248***
	(0.0604)	(0.499)	(0.0661)	(0.825)
Observations	1,783	1,783	1,783	1,570
R-squared	0.046	0.143		
Hausman Prob-chi <sup>2</sup>			0.000	

Notes: Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 INV is investment which

is measured as the total value of non-current assets including work in progress assets, intangible assets and by total value of the asset; OpWc is operating working capital which is calculated by all company long term assets minus long term liabilities; MP\*Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

Here again in the second model the monetary policy (growth rate) has significantly related to corporate investment level at 1% in all the four regression models. A tight monetary policy of has inverse or negative effect on the corporate investments level of non-financial firms in Pakistan and this consistent with the studies of (Fu & Liu, 2015; Awan, 2016; Yang et al., 2017). Similarly, corporate cash holdings have significant relationship with corporate investment level of listed sample firms in Pakistan stock exchange in Table 6. Hence both these variables have justified the hypothesis H1 & H2 of this study. The moderating effect of monetary policy and corporate cash holding has insignificant to corporate investment in all the four models of the study and these findings in a line with the studies of (Huang et al., 2012; Morck et al., 2013) and against the studies of (Kim et al., 2011). In financial constraints, the operating cash flow has negative significantly related with investment level at in the first three models and in GMM at 1%. Again, leverage has insignificant at all the four models and size have significant relationship with investment in fixed effect and GMM models at 1%. Tangibility has inversely significantly related to corporate investment in all the models. Here again R-square values in the first two models are small so we can take the GMM models for analysis to remove the issue of endogeneity and heterogeneity in this research study

**Table 7**  
**REGRESSION RESULT FOR INVESTMENT, MONETARY POLICY AND CASH HOLDINGS – A COMBINED EFFECT**

VARIABLES	Group 1			Group 2			Group 3		
	SIZ1	SIZ2	SIZ3	Z1	Z2	Z3	NWC1	NWC2	NWC3
INV	-0.0555 (0.0435)	-0.0292 (0.0332)	-0.07** (0.0307)	-0.065* (0.0376)	-0.0538 (0.0434)	-0.0349 (0.0346)	-0.0126 (0.0481)	-0.08** (0.0332)	-0.0572 (0.0392)
MP	1.308** (0.534)	0.730 (0.445)	0.180 (0.670)	1.142** (0.487)	0.770* (0.446)	1.39*** (0.436)	1.23*** (0.413)	0.743 (0.495)	1.348** (0.565)
Cash	0.526 (0.386)	-0.0175 (0.172)	0.478 (0.341)	0.464* (0.279)	0.335 (0.458)	0.128 (0.207)	0.666 (0.521)	0.175 (0.416)	0.345** (0.157)
MP*Cash	-0.185 (5.699)	-3.390 (3.084)	5.117 (3.780)	-0.272 (3.945)	1.587 (2.592)	1.857 (5.751)	-7.078 (18.62)	2.829 (8.270)	1.812 (2.883)
Tang	2.44*** (0.283)	2.03*** (0.208)	1.57*** (0.206)	2.21*** (0.336)	2.05*** (0.200)	2.21*** (0.230)	1.81*** (0.259)	1.90*** (0.226)	2.52*** (0.278)
Lev	0.397** (0.163)	-0.0291 (0.137)	0.308 (0.291)	0.268 (0.239)	0.179 (0.162)	0.0912 (0.0830)	0.536** (0.215)	0.160 (0.202)	0.185 (0.131)
Size	1.62*** (0.206)	1.64*** (0.243)	1.006** (0.410)	1.49*** (0.357)	1.55*** (0.369)	1.62*** (0.272)	1.33*** (0.384)	1.48*** (0.349)	1.57*** (0.178)
OCF	-0.129 (0.0905)	-0.25** (0.123)	-0.224 (0.158)	-0.226 (0.142)	-0.223 (0.151)	-0.0372 (0.0855)	-0.294* (0.170)	-0.200* (0.103)	-0.0057 (0.102)
ROA	0.328* (0.198)	0.59*** (0.180)	0.250 (0.247)	0.588** (0.261)	0.325 (0.252)	-0.0238 (0.198)	0.651* (0.339)	0.408* (0.229)	0.213 (0.155)
Constant	-8.2*** (0.898)	-8.8*** (1.186)	-6.5*** (2.267)	-8.4*** (1.675)	-8.6*** (1.766)	-9.0*** (1.383)	-7.933*** (1.969)	-8.2*** (1.660)	-8.5*** (0.856)
Observations	507	542	521	537	535	498	466	541	562

Notes: Standard errors in parentheses. For the significance indication \* is placed with the coefficient value which are indicated by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Group 1 is related to determination of constraint and unconstrained firms based on size where Size 1 denotes the constraint firms while Size 3 denotes unconstrained firms. Size represents firm size measured by taking the log of total assets; ROA Is return on assets which is calculated by dividing the total net income by total assets of company; MP is monetary policy; MP\*Cash is an interaction term added as moderator predictor to mitigate the effect of cash holding on tight monetary policy and Cash is cash holding which is the ratio which is obtained by dividing total cash and equivalents by total assets minus total cash and equivalent.

Table 7 is used to identify the effects of financially constrained and unconstrained firms based on their size levels (upper and lower) SIZ1, SIZ2 and SIZ3. Altman Z-score

combined variables for the measurement of financial constrain with help of proxies Z1, Z2 and Z3, while corporate cash flows with help of networking capitals nwc1, nwc2 and nwc3. Monetary policy (growth rate) for financial constrain firms has significant negatively related with their investment level while insignificant for unconstrained firms based on their size. Similarly monetary policy of financially constrained and unconstrained firms has significant negatively related to their investment based on their networking capitals in a line with the findings of (Fu & Liu, 2015; Awan, 2016; Yang et al., 2017). Corporate Cash flow of both financial constrained and unconstrained firms have insignificant to their investment levels based on size and while significant to unconstrained firm based networking capital. Monetary into cash (moderating effect) have insignificant to investment levels based on all models and these findings against the studies of (Kim et al., 2011). The financial constrained proxy of leverage has significant to investment and monetary policy of only financially constrained firms based on siz1 and nwc1, consistent with the studies of (Morck et al., 2013). Tangibility has inversely significantly related to corporate investment in fixed effect and GMM model. Size has significantly related in all the models for both constrained and unconstrained firms while operating cash flow insignificant.

## DISCUSSION

According to Awan, (2016), temporarily monetary policy has slight impact on macroeconomic predictors while it gets more significant in the long term scenario. Furthermore, he concluded that central banks must be given a leverage to implement monetary policy. Money supply, inflation and government expenditure are the major contributor in the economic development; this is also relevant for country like Pakistani for a long-term perspective. Thus the same sort of spectacle was study and highlighted as “*crowd out effect*” which is related to of private sector borrowing (Terjesen et al., 2016). So here our findings significantly related to the above studies. In our first model monetary policy (growth rate) has significantly related to corporate investment level at in all the four regression models. A tight monetary policy of the state bank of Pakistan has reduced the corporate investments level of financially constrained firms in the economy. Financial constraints proxy operating cash flow has negative significantly related with investment at in random effects model and GMM but leverage has insignificant at all the four models.

Fu & Liu, (2015) analyzed monetary policy impact on corporate investment change on the sample of listed Chinese A-share firms and find that transition to corporate investment is quicker when monetary policy loosens compared with tightened monetary policy. Yang et al., (2017) examined the impact of monetary policy on Chinese firms' corporate investment and cash holdings. They concluded that a tightening monetary policy decreases corporate investment and that the mitigating impact depends on financial constraints, ownership and also whether the company is located in a less established financial market. In our second model monetary policy has significantly related in second model to corporate investment level at in all the four regression models.

Similarly most of the literature and research studies available which highlighted the relationship of monetary policies and firm investment decision when credit supply is reduce due to tight monetary policy (Morck et al., 2013) and subsequently it generates many financial constraints ultimately it restricts the corporate investment decisions (Huang et al., 2012). Thus in this study, not only the impact of tight monetary policy on firm investment decision is investigated, this research also highlights the moderating role of cash holding in modifying the effects of the adversative monetary policy at micro level. Bigelli & Sánchez-Vidal, (2012) found that small businesses are vulnerable to carrying excess cash compared to large businesses because of the associated risks and financial constraints. A strong negative relation has been reported between the cash ratio of the

company and the tangibility of assets (Uyar & Kuzey, 2014). In addition, it has recorded a positive relationship between the cash flow and growth opportunities of companies related to cash holdings (Uyar & Kuzey, 2014). Excess cash keeping was carried out by small-scale firms with a high R&D ratio, lower networking capital ratio, and low leverage Mello. Kim et al., (2011) argued that cash holdings had a notably positive relationship with investment opportunities and showed an adverse association with liquid asset alternatives, company size, dividend payments. Excess cash holding showed a significant correlation for those businesses that were under tremendous financial constraints due to managerial entrenchment. Tobias & Chiluwe find that interest rates and a fraction of national debts of that country was adversely associated with private companies' investments while their study did not highlight any causal association between firms investments and money supply or savings. Thus, the implications of their study described the theoretical notions that micro level aspects are also substantial predictors' investment decisions of firms. Documentary evidence is provided in research work of Huang & Hui who found empirical evidence of direct relationship between increasing Chinese investment and decreasing actual interest rate or monetary policy rate. Jinqun, (2002) provided the comparison that how actual output is affected by implementing expansionary monetary policy and tightening monetary policy and he documented that tightening monetary policy has rather severe adverse impact on actual output in contrast a comparatively lower favorable impact of other type of monetary policy.

Afza & Adnan, (2007) found that size, cash flow, cash flow uncertainty of non-financial firms in Pakistan affect cash holdings positively while investment opportunities, leverage, dividend payments and liquid assets are negatively related. Shah, documented a positive relation between the cash holdings and the size of firms, leverage and cash flows. The credit rating approach is that firms are unable to raise finances from public in case these firms do not have any credit rating and consequently these types of firms have to raise finance which may set difficult and challenging for these firms (Faulkender & Petersen, 2006). Similarly, our studies indicating that strict monetary policy has adverse effect on the investment level of financially constrained firms, and it reduced corporate cash level for investment.

## CONCLUSION

This study analyzed the impact of monetary policy (growth rate), corporate cash holdings (separate and combined as a moderating effect) and financial constraint of listed 200 non-financial financially constrained and unconstrained firms on their corporate investment decision for the sample period of 2006-18. Monetary policy, corporate cash holding and financial constraints for both constrained and unconstrained firms are taken as independent variables and corporate investment dependent variable in this study. Monetary policy (growth rate) has significantly natively related to corporate investment in first two models. A tight monetary policy of has adverse effect on the corporate investments level of constrained. Monetary policy for financially constrain firms has significant negatively related with their investment level while insignificant for unconstrained firms based on their size.

## REFERENCES

- Abuka, C., Alinda, R.K., Minoiu, C., Peydró, J.L., & Presbitero, A.F. (2019). Monetary policy and bank lending in developing countries: Loan applications, rates, and real effects. *Journal of Development Economics*, 139, 185-202.
- Afza, T., & Adnan, S.M. (2007). Determinants of corporate cash holdings: A case study of Pakistan. *In Proceedings of Singapore Economic Review Conference (SERC)*. 1, 589-609.
- Almeida, H., Campello, M., & Weisbach, M.S. (2004). The cash flow sensitivity of cash. *The Journal of Finance*, 59(4), 1777-1804.
- Ammann, M., Oesch, D., & Schmid, M.M. (2010). Cash Holdings and Corporate Governance—New International Evidence.

- Awan, A.G. (2015). Shifting Global Economic Paradigm. *Asian Business Review*, 4(3), 113-118.
- Awan, A.G. (2016). Wave of Anti-Globalization and Capitalism and its impact on World Economy. *Global Journal of Management and Social Sciences*, 2(4), 1-21.
- Azmat, Q. (2011). Corporate cash holdings: A growth and mature firm perspective in Pakistani context. In 3rd International SAICON Conference.
- Bernanke, B.S., & Blinder, A.S. (1988). Is it money or credit, or both, or neither. *American Economic Review*, 78(2), 435-439.
- Bernanke, B.S., & Kuttner, K.N. (2005). What explains the stock market's reaction to Federal Reserve policy? *The Journal of Finance*, 60(3), 1221-1257.
- Bigelli, M., & Sánchez-Vidal, J. (2012). Cash holdings in private firms. *Journal of Banking & Finance*, 36(1), 26-35.
- Bond, S., Elston, J.A., Mairesse, J., & Mulkay, B. (2003). Financial factors and investment in Belgium, France, Germany, and the United Kingdom: A comparison using company panel data. *Review of economics and statistics*, 85(1), 153-165.
- Chatelain, J.B., Ehrmann, M., Generale, A., Martínez-Pagés, J., Vermeulen, P., & Worms, A. (2003). Monetary policy transmission in the euro area: new evidence from micro data on firms and banks. *Journal of the European Economic Association*, 1(2-3), 731-742.
- Duchin, R., Ozbas, O., & Sensoy, B.A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics*, 97(3), 418-435.
- Faulkender, M., & Petersen, M.A. (2006). Does the source of capital affect capital structure?. *The Review of Financial Studies*, 19(1), 45-79.
- Fazzari, S., Hubbard, R.G., & Petersen, B.C. (1988). Financing constraints and corporate investment (No. w2387). *National Bureau of Economic Research*.
- Friedman, B.M. (1978). Crowding out or crowding in? The economic consequences of financing government deficits (No. w0284). *National Bureau of Economic Research*.
- Fu, Q., & Liu, X. (2015). Monetary policy and dynamic adjustment of corporate investment: A policy transmission channel perspective. *China Journal of Accounting Research*, 8(2), 91-109.
- Gaurav, G., & Jitendra, M. (2019). Alternative measure of financial development and investment-cash flow sensitivity: evidence from an emerging economy. *Financial Innovation*, 5(1).
- Guariglia, A., & Mateut, S. (2006). Credit channel, trade credit channel, and inventory investment: Evidence from a panel of UK firms. *Journal of Banking & Finance*, 30(10), 2835-2856.
- Harford, J. (1999). Corporate cash reserves and acquisitions. *The Journal of Finance*, 54(6), 1969-1997.
- Huang, J., Yang, W., & Tu, Y. (2012). Financing mode decision in a supply chain with financial constraint. *International Journal of Production Economics*, 220, 107441.
- Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323-329.
- Jinquan, L. (2002). Studies of the Effectiveness and Asymmetry of Monetary Policy in China's Economy [J]. *Management World*, 3, 43-51.
- Kadapakkam, P.R., Kumar, P.C., & Riddick, L.A. (1998). The impact of cash flows and firm size on investment: The international evidence. *Journal of banking & Finance*, 22(3), 293-320.
- Kim, J., Kim, H., & Woods, D. (2011). Determinants of corporate cash-holding levels: An empirical examination of the restaurant industry. *International Journal of Hospitality Management*, 30(3), 568-574.
- Lee, E., & Powell, R. (2011). Excess cash holdings and shareholder value. *Accounting & Finance*, 51(2), 549-574.
- Minton, B.A., & Schrand, C. (1999). The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing. *Journal of Financial Economics*, 54(3), 423-460.
- Morck, R., Yavuz, M.D., & Yeung, B. (2013). State-controlled banks and the effectiveness of monetary policy. *National Bureau of Economic Research*.
- Nagahata, T., & Sekine, T. (2005). Firm investment, monetary transmission and balance-sheet problems in Japan: an investigation using micro data. *Japan and the World Economy*, 17(3), 345-369.
- Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3-46.
- Pulvino, T., & Tarhan, V. (2006). Cash flow sensitivities with constraints. In Northwestern University Working Paper.
- Qayyum, A. (2006). Money, inflation, and growth in Pakistan. *The Pakistan Development Review*, 203-212.
- Rashid, A., & Jabeen, N. (2018). Financial frictions and the cash flow external financing sensitivity: evidence from a panel of Pakistani firms. *Financial Innovation*, 15(4).
- Uyar, A., & Kuzey, C. (2014). Determinants of corporate cash holdings: evidence from the emerging market of Turkey. *Applied Economics*, 46(9), 1035-1048.

Yang, X., Han, L., Li, W., Yin, X., & Tian, L. (2017). Monetary policy, cash holding and corporate investment: Evidence from China. *China Economic Review*, 46, 110-122.

**Received:** 04-Oct-2021, Manuscript No. AAFSJ-21-8640; **Editor assigned:** 07-Oct-2021, PreQC No. AAFSJ-21-8640(PQ); **Reviewed:** 21-Oct-2021, QC No. AAFSJ-21-8640; **Revised:** 21-Mar-2022, Manuscript No. AAFSJ-21-8640(R); **Published:** 28-Mar-2022