Explaining the Simultaneity between Monetary Policy and Excess Stock Returns in Pakistan Stock Exchange

Abida Hafeez*

Abstract

This paper investigates the role of monetary policy in predicting excess stock returns in Pakistan. The methodology used in this study is structural VAR in order to consider simultaneity problems through long-run restrictions. The results of IRF (impulse response function) confirm that monetary policy is a phenomenon of short-term to predict returns in the Pakistan Stock Exchange (PSX). The results of VD (variance decomposition) suggest that the most dominant factor to predict FEV (forecast error variance) of stock return(s) is policy rate. The implication of these findings is that various policies of the central bank while using different monetary-based variables can influence the investment-related decisions, as well as the state of the economy on the whole. This study substantially makes a contribution to the monetary literature of the central bank of Pakistan.

Keywords**:** stock return predictability, monetary policy, simultaneous equations, structural VAR

Introduction

It is an interesting topic to explore the role played by monetary policy in the predictability of excess stock return(s) for policymakers as well as market participants. Stock/equity holders are conscious of their portfolios' value and how the value is being influenced by the central bank's actions. From another perspective, an important component of the evaluation of monetary transmission mechanism (MTM) is contingent upon the estimation of return predictability and the role of monetary policy in it. MTM explicates how monetary policy is important while playing its role in an economy (Can et al., 2020). Financial propagation mechanism, as well as credit channel of MTM (monetary transmission mechanism), provides the basis in this study to examine the relation of stock (return) predictability to the monetary policy as highlighted by Bernanke & Gertler (1989); and Fazzari et al., (1988).

A nonlinear domain is depicted by both mechanisms in which macroeconomic shocks are disseminated depending upon the firm's financial health in an economy. First of all, shocks are hyperbolized and propagated by financial propagation mechanism through movements in agency cost(s) of lending endogenously in

*Assistant Professor, Department of Economics and Business Administration, Division of Management and Administrative Science, University of Education, Lahore, Pakistan, Email: abida.hafeez@ue.edu.pk

balance sheets of the firm along with external and internal finance spread. Secondly, two mechanisms including the bank lending channel and balance sheet channel can explain the credit channel in which monetary-based shocks result in reduced as well as a costlier loan supply.

Theoretically, the financial position of the borrower which is very important can be explained through the balance sheet channel. The problems of moral hazard and adverse selection will be maximized the borrower's weak (financial) position. Two things are highlighted by the borrower's weak (financial) position, one is that borrower is unable to offer more to collateralize his loan and the second is that the investor faces difficulty while self-financing the project by a larger share. Under the balance sheet channel, a decrease in stock prices is the result of contractionary monetary policy consequently firm's net worth declines, which contributes toward lowering investment as well as output. Moreover, a rise in moral hazard problems and adverse selection leads/contribute toward the deterioration of a firm's cash flow due to a high nominal rate of interest. Secondly, a decline in the bank reserves is also a result of contractionary monetary policy under the bank lending channel that leads to decrease lending power of banks as well as a reduction in the supply of loans of banks because of a decrease in reserves.

The primary motive behind this study is the estimation of various monetary indicators' predictive power under both mechanisms such as credit channel and financial propagation. The main aim/objective of the research study is to examine the role of both types of variables' predictive power (including financial and monetary) in stock (returns) predictability under the null hypothesis of "No Predictability". This study is significant for policymakers, investors and portfolio managers to weigh the contribution of monetary and financial variables in predicting excess stock returns in the PSX. The methodology of structural VAR is employed to identify various monetary-based shocks while assessing their predictive power of returns in the Pakistan stock exchange (PSX). The results of VD (variance decomposition) suggest that the most dominant factor to predict FEV (forecast error variance) of stock return(s) is policy rate. A study by Bernanke & Kuttner (2005) supports this finding. Secondly, the results of IRF (impulse response function) confirm that monetary policy is a phenomenon of short-term to predict returns in the Pakistan Stock Exchange (PSX) and all the long-term effects die out. The remainder of the paper is organized as follows: Section 2 contains the presentation of the literature review. Description of data as well as a methodology (SVAR) can be found in section 3. The results discussion and conclusion are in sections 4 and 5 respectively.

Research Questions

These research questions will be addressed in this study:

i. How does monetary policy play its role in predicting stock returns in the Pakistan stock exchange?

ii. Does simultaneity exist between excess stock returns and various financial & monetary indicators?

Literature Review

Predictors of Stock Returns

Literature sheds light on most of the predictors that are found good indicators of stock return predictability by different researchers can be explained theoretically as variables of macroeconomics. Patelis (1997) finds that monetary indicators are important and powerful predictors of stock returns. Patelis (1993) indicates stock returns and macroeconomic indicators are positively correlated.

Bissoon et al. (2016) explain that monetary variables are predictors of stock returns in both the short-run and long run. Chebbi & Derbali (2019) also highlight an association between US monetary policy shocks/surprises and the volatile behaviour of returns of European markets.

The interest rates, dividend yield, term premium, spread, default premium, inflation rate, money supply, monetary indicators and different financial factors are substantial predictors of stock/asset returns and other macroeconomic variables (Bernanke, 1990; Cooley & Quadrini, 1999a; Fama & French, 1989; Estrella & Hardouvelis, 1991; Jensen et al., 1996; Metin & Muradoglu, 2000; Özlen & Ergun, 2012; Ali et al., 2014; Rabia & Khakan, 2015; Messai & Gallali, 2019; Kartal et al., 2020; Olasunkanmi & Oladipo, 2020; Černohorský, 2021; Nocoń, 2021; Černohorská, 2021).

The policy rate is a measure of changes in the central bank's policy. The shocks of contractionary monetary policy led to give a rise in the policy rate however, the expansionary monetary policy leads to a decline in stock prices and real stock returns (Bernanke & Blinder, 1992; Christiano et al., 1994a; Chami et al., 1999). Habib & Gul (2017) highlight the significant financial predictors of stock return including trading volume, size, earnings growth rate, momentum, and institutional ownership.

Impact of Monetary Policy and Macroeconomic Shocks on Stock Returns

Different researchers conduct various empirical studies regarding the impact of monetary policy shocks on asset prices. As far as the empirical analysis is concerned, the following studies use the structural VAR methodology.

Thorbecke (1997) analyzes the contagion effect of monetary policy shocks on returns in the United States. The study finds that monetary policy increases expected asset returns and also finds that an expansionary (monetary) policy increases contemporaneous stock return. Lastraps (1998) examines the contagion effect(s) of money supply shocks on output and asset/stock prices using the structural VAR technique. It is found that a real liquidity effect exists in the asset market. This study is important to understand the monetary transmission mechanism (MTM) role in asset markets.

Rapach (2001) analyses the effects of different macroeconomic shocks including money supply shock on stock prices using a structural VAR technique. The long-run restrictions have been used to identify these macroeconomic shocks. The major finding indicates that these shocks affect stock returns.

Neri (2004) investigates the dynamic response(s) of the stock market to monetary shocks employing the methodology of structural VAR. The contagion effects of various monetary shocks have been measured by impulse response function (IRF), indicating a transitory and negative effect on the stock/asset market.

Bjørnland & Leitemo (2009) analyze the contagion effect of monetary shocks on equity returns using the structural VAR technique in the case of the United State of America. A sharp decline in stock returns is found because of a monetary shock.

Bhatti et al. (2015) examine the shocks of macroeconomic activities (monetary policy as well as fiscal policy shocks) using a structural VAR model from 1991 to 2012 in Malaysia. The study finds that these macroeconomic activities are closely associated with stock returns.

Siranova & Kotlebova (2018) explore interest-rate policy as an exogenous variable using SVAR, which affects Govt. bonds' rate of interest in long-term as well as other interest-rates. Maio (2014) also highlights the impact of monetary policy (MP) on returns employing the VAR methodology. The study exhibits the negative impact of shocks of (Fed) funds rate on stock returns.

Hypothesis Testing

The associate null hypotheses are as follows:

H_0: There is "No Predictability" of stock returns in the Pakistan Stock Exchange.

H_{01}: The role of monetary policy is not significant in predicting stock returns.

H_{01}: There is no simultaneity between excess stock returns and various indicators (financial & monetary)

Research Methodology

Excess Return

This study focuses on excess (asset) returns (ER). Data on the weekly KSE 100 index is retrieved from July 2011 through June 2020 from the Data Portal of Pakistan Stock Exchange.

Monetary Indicators

Indicators of the monetary policy (MP) contain policy rate (PR) and non-borrowed reserves (NBR) are explained below:

Policy Rate (PR): Weekly data on the TB6 rate has been accumulated from the central bank of Pakistan i.e. SBP. The six-month Treasury bill rate is proxied for the policy rate. Bernanke & Blinder (1992) argue that policy rate is responsive to the supply of bank reserves shocks which reflect monetary policy actions.

Non-borrowed Reserves (NBR): Data on non-borrowed reserves have been retrieved from *www.sbp.org.pk/ecodata & OMO Injections*. The central bank can control liquidity through non-borrowed reserves.

Financial Indicators

Financial variables are those indicators that are traditionally used in stock returns predictability. Among the different variables, a few of them have been selected are as follows:

Dividend Yield (DY): The Dividend Yield data file is retrieved from Thomson Reuters DataStream. Low (future) stock returns can be predicted through a low dividend yield, which can be explained in two possible ways.

First, it can be explained through the acceptance of the possibility of irrational bubbles and then irrationally high stock prices are signalled by a low dividend yield, at last, a price bubble bursts which produces low asset returns. Price bubbles can be measured through the dividend yield (DY) is one explanation of DY.

The second explanation is given by Campbell & Shiller (1988a & 1988b) through a log-linearized accounting identity with the assumption of no bubbles. The dividend yield ($d_i - p_t$) *is* taken in log form which is further explained as a weighted average of the expected growth of future dividend Δd_{t+1+j} along with return r_{t+1+j} (known as the Dynamic Gordon Dividend Model). This approach is equivalent to that followed in the literature where dividends are summed up over a year to avert seasonality. In this study, the dividend yield is obtained by summing up dividends across different firms.

TERM: The difference between the yields of the three (3) months treasury bill rate and 10-year Govt bonds is known as the term. Returns are predicted through the term using interest rates of various maturities, which is also known as another indicator of MP (monetary policy). Data on 10-year Govt bonds is collected from the Financial Markets Association of Pakistan (FMAP).

Real Interest Rate (RR): This is also an indicator of stock return predictability. Data on CPI rate is obtained from the PBS (Pakistan Bureau of Statistics). CPI rate is used as an indicator of inflation in Pakistan. RR (Real interest rate) is measured through the subtraction of the CPI rate from 3-month T-Bills. Data for three (3) months T-bill is collected from the Financial Markets Association of Pakistan (FMAP).

Econometric Methodology

The methodology of SVAR is adopted in this paper being an appropriate econometric technique to determine the dynamic responses of different (estimated) variables to both financial and monetary shocks as it links both economic theory and the analysis of multiple time series. The structural VAR method is regarded as the most appropriate technique while measuring monetary transmission mechanisms (Gottschalk, 2001). A mathematical expression of the system of simultaneous equations takes the following form:

$$By_t = \gamma_0 + A(L)\, y_{t-1} + M\varepsilon_t \tag{1}$$

Where y_t is a vector containing endogenous variables undertaken, y_{t-1} indicates lagged values vector, a constant is represented by γ_0. The vector for disturbance terms is presented by ε_t which is a reflection for external shocks. 'B' represents different structural parameters in square matrix form. A matrix for lagged polynomials is indicated by A(L). A matrix 'M' highlights how different endogenous variables respond to various structural shocks. The reduced form for SVAR in a two-variable model is expressed in a matrix as:

$$\begin{bmatrix} 1 & \beta_{12} \\ \beta_{21} & 1 \end{bmatrix} \begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix} \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{2}$$

Or in vector form it can be written as $BYt = \Gamma_0 + \Gamma_1 Y_{t-1} + e_t$ Where $\Gamma_0 = B^{-1}\gamma_0$, $\Gamma_1 = B^{-1}A(L)$ and $e_t = B^{-1}M\,\varepsilon_t$. As the matrix A(L) is multiplied by B^{-1}, it is known as a standard (VAR) model. Zivot

(2000) states that the disturbance/error terms belonging to the SVAR model are assumed uncorrelated to determine unexpected/unanticipated shocks. Amisano & Giannini (1997) argue that random disturbance terms (e_t) in reduced form model cause variation in y_t are the origin of variation in endogenous variables (y_t), in short, these random disturbances are known as (a vector) of innovations.

The results of SVAR can be summed up as VD (variance decomposition) and IRF (impulse response function). The SVAR technique is applied by using long-run restrictions to generate VD which relatively specifies the importance of various shocks while explicating the contribution in an overall variation in (endogenous) variables made by each shock. IRF delineates the time path for endogenous variables while responding to various shocks (Khan, 2008).

The derivation of the SVAR method depends upon specific theoretical restrictions for the identification of external shocks. The long-run restrictions were used in the SVAR model for the identification of external/exogenous shocks to find out their role while varying endogenous variables (Blanchard & Quah, 1989).

Model Specification and Identification of Restrictions

The composition of a system of simultaneous equations provides the basis for the SVAR model, which exhibits a relationship between both types of indicators such as financial and monetary through standard Cholesky decomposition of VAR-residuals. Initial ordering for both types of indicators (financial and monetary) is PR, NBR, RR, TERM, DY, and ER. The mathematical form for the structural model used in this paper is expressed in the following way:

$$PR = \beta_{10} + \beta_{12}NBR + \beta_{13}RR + \beta_{14}TERM + \beta_{15}DY + \beta_{16}ER + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{PR}$$

$$NBR = \beta_{20} + \beta_{11}PR + \beta_{13}RR + \beta_{14}TERM + \beta_{15}DY + \beta_{16}ER + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{NBR}$$

$$RR = \beta_{30} + + \beta_{11}PR + \beta_{12}NBR + \beta_{14}TERM + \beta_{15}DY + \beta_{16}ER + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{RR}$$

$$TERM = \beta_{40} + \beta_{11}PR + \beta_{12}NBR + \beta_{13}RR + \beta_{15}DY + \beta_{16}ER + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{TERM}$$

$$DY = \beta_{50} + \beta_{11}PR + \beta_{12}NBR + \beta_{13}RR + \beta_{14}TERM + \beta_{16}ER + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{DY}$$

$$ER = \beta_{60} + \beta_{11}PR + \beta_{12}NBR + \beta_{13}RR + \beta_{14}TERM + \beta_{15}DY + \alpha_{11}PR_{t-1} + \alpha_{12}NBR_{t-1} + \alpha_{13}RR_{t-1} + \alpha_{14}TERM_{t-1} + \alpha_{15}DY_{t-1} + \alpha_{16}ER_{t-1} + \mu_t^{ER}$$

(3)

The model for SVAR is presented in 6X6 matrices under the identification restriction(s) is as follows:

$$\begin{bmatrix} \mu_t^{PR} \\ \mu_t^{NBR} \\ \mu_t^{RR} \\ \mu_t^{TERM} \\ \mu_t^{DY} \\ \mu_t^{ER} \end{bmatrix} \sim \text{i.i.d.} \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ \beta_{21} & 1 & 0 & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & 0 & 0 & 0 \\ \beta_{41} & \beta_{42} & \beta_{43} & 1 & 0 & 0 \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & 1 & 0 \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & 1 \end{bmatrix} \quad (4)$$

Generally, the lower triangular matrix is taken into consideration while applying long-run restrictions. PR, NBR, RR, TERM, DY, and ER are endogenous variables in a system of equations. μ_t^{PR}, μ_t^{NBR} μ_t^{RR} μ_t^{TERM} μ_t^{DY} μ_t^{ER} are interpreted as (structural) innovations and not correlated. These (system of) equations can be written in the following matrix form:

$$\begin{bmatrix} 1 & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} \\ \beta_{21} & 1 & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} \\ \beta_{41} & \beta_{42} & \beta_{43} & 1 & \beta_{45} & \beta_{46} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & 1 & \beta_{56} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & 1 \end{bmatrix} \begin{bmatrix} PR \\ NBR \\ RR \\ TERM \\ DY \\ ER \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \end{bmatrix} \begin{bmatrix} PR_{t-i} \\ NBR_{t-i} \\ RR_{t-i} \\ TERM_{t-i} \\ DY_{t-i} \\ ER_{t-i} \end{bmatrix} + \begin{bmatrix} \mu_t^{PR} \\ \mu_t^{NBR} \\ \mu_t^{RR} \\ \mu_t^{TERM} \\ \mu_t^{DY} \\ \mu_t^{ER} \end{bmatrix} \quad (5)$$

Where, *i = 1, 2, 3, 4, n.* The first step involves SVAR estimation for the calculation of reduced form for the VAR model. In which disturbance terms are linear combinations of both covariance and structural disturbances given in matrix form.

Results and Discussion

To proceed towards SVAR, it is necessary to examine the stationary of both financial and monetary indicators. ADF test will be employed to test the hypothesis of a unit root. The results have been presented in the tabulated form of unit root analysis.

Table-1

Results for Unit Root Analysis (ADF Test)

Variables	ADF				Remarks
	Level	Prob.	I[st] Diff.	Prob.	
PR	-1.586	0.283	-19.08***	0.000	I (1)
NBR	-5.050***	0.001	-	-	I (0)
RR	-1.4024	0.202	-18.10***	0.000	I (1)
TERM	-1.3550	0.120	-20.06***	0.000	I (1)
DY	-3.1903	0.080	-17.03***	0.000	I (1)
ER	-6.102***	0.000	-	-	I (0)

Notes: * indicates the presence of unit root in the variables or to reject the null hypothesis at 1% level is indicated by three asterisks (***), or 5% level by two asterisks (**) or, 10 % level by one asterisk (*)**

The results in table 1 are exhibited that all indicators have been integrated in a different order. The findings of unit root analysis (ADF test) demonstrate that indicators like non-borrowed reserves (NBR) and excess asset return (ER) are stationary at a level while variables such as dividend yield (DY), term, real interest rate (RR), and policy rate (PR) are stationary at first difference.

Table-2

Descriptive statistics

STATISTIS	ER	PR	NBR	RR	TERM	DY
Mean	-12.021	12.140	641.00	8.0340	2.0110	452.10
Median	-12.610	12.001	620.50	8.060	2.4300	433.00
Maximum	-5.022	14.100	1120.6	11.310	6.0200	650.30
Minimum	-24.378	7.7000	390.00	2.050	-1.2500	313.060
Std. Dev.	2.6021	1.9075	159.01	2.0170	1.2232	74.042
Skewness	-0.6090	-0.5030	0.5020	-0.5170	0.3408	0.7410
Kurtosis	5.0030	2.3003	2.2503	2.0670	2.7400	2.7570
Jarque-Bera	62.106	22.079	21.2003	30.150	8.1050	35.010
Probability	0.0000	0.0000	0.0002	0.0000	0.0174	0.0000
Observations	470	470	470	470	470	470

Table 2 presents descriptive statistics of weekly data of different variables used in this study. Kurtosis with a positive value is indicating a flatter tail of the return series as compared to the stationary distribution. The skewness of ER with a negative value is suggesting the asymmetric distribution of the time series which is skewed toward the left. A significant change in return volatility indicating an association between the stock price behaviour and socio-economic conditions of an economy is shown by the coefficients of standard deviation. Moreover, the high value of average distribution with longer and thicker tails and a sharper peak instead of a normal distribution indicate a situation that is conducive to risk-loving investors. Figure 1 presents that IRF (impulse response function) describes short-term phenomenon/mechanism after imposing long-run restrictions. The findings indicate the response function of excess return to monetary and financial indicators by one-unit shock to demand as well as policy innovations.

Shock in policy interest rate (TB6) predicts returns in the short run till the 15 weeks after that it reverts to the baseline. The impact of policy rate dies out in the long run. Initially, excess return decreases for the first week due to shock in policy interest rate, followed by an increase in excess return by one percentage point in the second and third week. A sharp fall in excess returns i.e. approximately five (5) percent representing the next two weeks then followed by an increase again.

Theoretically, this variation in excess return confirms a negative relation of interest rate to stock prices. A noteworthy fact is that the contagion effects of policy rate on the excess return are usually transitory becoming statistically insignificant after 10 to 12 weeks.

In theory, non-borrowed reserves are positively related to excess returns. Upwardly growth of non-borrowed reserves entails an increase in liquidity. Consequently, excess liquidity means more funds are available to investors for investment opportunities. In the beginning, a shock to non-borrowed reserves from the demand-side shows a decrease in excess returns during the first five weeks followed by an increase in the excess return during the next five weeks. Over again, short-term variation in excess returns is explicated through non-borrowed reserves. Eventually, it reverts to the baseline after ten (10) weeks indicating excess returns are unpredictable by the non-borrowed reserves in the long run. Both monetary variables indicate that monetary policy is a short-term phenomenon and unable to predict returns in the long run.

Any shock to the real interest rate causes an increase in excess return from the third to the seventh week, followed by a decline till the tenth week. The real interest rate also predicts excess return in the short run. Initially, the Term indicates a constant trend till the first week but an increase in excess return is shown in the third and fifth weeks. Overall term causes a decrease in excess return indicating a negative relation of bond and stock investment. However, the term is unable to predict return in the long term.

In principle/theory, the dividend yield is positively related to the excess return. It responds to excess return positively. This positive relationship is also confirmed by Naranjo et al. (1998). On the other hand, Campbell (1990) finds that the expected dividends are negatively correlated to expected returns, which implies that an increase in the stock market reaction concerning dividend news. Initially, dividend yield shows a rise in excess return in the first week followed by a dramatic decline till the eighth week. It predicts excess return till the fifteenth week then reverting to the baseline indicating no long-run predictability of returns. On the whole, both monetary and financial variables predict excess returns in the short term. They are unable to predict long-term returns.

Table 3 shows variance decomposition for the series of asset returns. FEV (forecast error variance) of policy rate (PR) has been explained at the time horizon of 1 to 52 weeks. Policy rate shock has contributed 25.34 percent at horizon 52 weeks in predicting stock returns. Policy rate remained a dominant variable in predicting asset return, followed by a term that predicts asset return 19.61 percent. This finding is similar to that reported by Bernanke & Kuttner (2005). They documented the strong response/reaction of stock returns to the Fed fund rate.

However, liquidity (NBR) shock does not show any strong contribution while predicting asset return. The least predictive power has been shown by NBR amongst all the indicators i.e. 4.12 %. The predictive power of the real interest rate is 10.70 percent which lies in the middle of all the indicators, then followed by dividend yield predicting asset return by 6.48 percent. While the largest contribution made by its shock in innovations i.e. 34.02 percent over the period of 52 weeks. On the whole, 66 % asset return is predicted by both financial and monetary variables and 34% by itself.

Under the 1-year time horizon, the predictive power of both types of shocks such as financial and monetary has appeared significant and their contribution is 36.80 percent and 29.46 percent respectively. Therefore, the acceptance of the alternative hypothesis of return predictability is supported by this finding. The following conclusion, which is based on the SVAR method, has been made that VD (variance decomposition) reflects that the most dominant indicator amongst all the factors is policy rate in making a prediction regarding excess asset return’s forecast error variance.

Figure-1
Impulse Response Function (IRF)

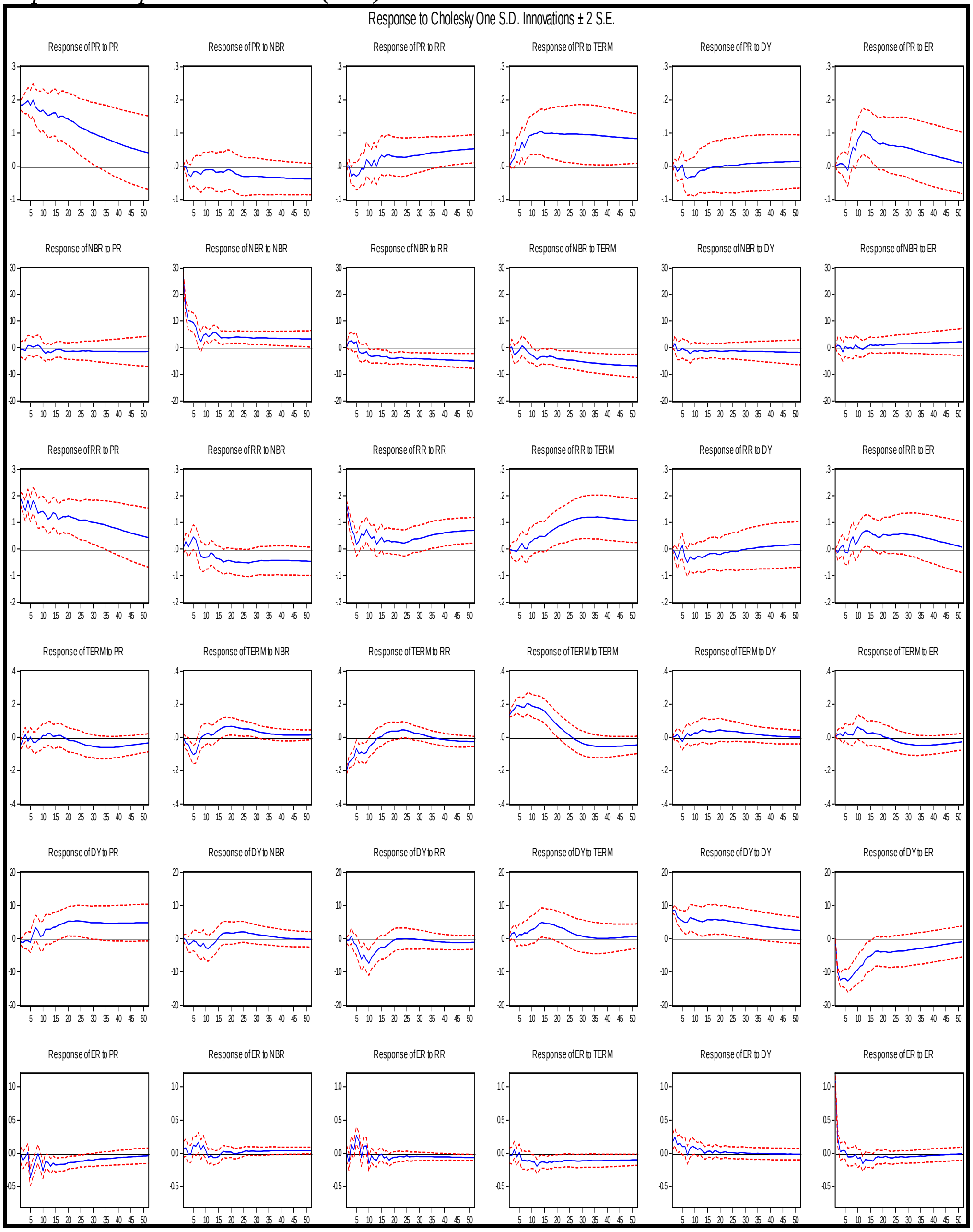

Table-3

Results of Variance Decomposition (VD)

Period	*S.E.*	*PR*	*NBR*	*RR*	*TERM*	*DY*	*ER*
Variance Decomposition of PR							
1	0.1879	100.00	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.5936	44.254	4.7742	3.3902	39.747	1.4046	6.4292
26	0.9839	18.523	4.3392	7.9608	51.985	1.3855	15.805
39	1.2622	11.320	5.2643	11.868	49.953	1.4941	20.098
52	1.4648	8.7185	7.3667	13.386	46.336	1.8764	22.314
Variance Decomposition of NBR							
1	26.613	0.4632	99.536	0.0000	0.0000	0.0000	0.0000
13	47.896	2.2844	71.876	2.4834	4.1485	9.9645	9.2427
26	63.186	2.8993	55.840	6.3573	10.838	10.087	13.976
39	79.458	3.1492	44.579	10.013	15.637	9.0346	17.586
52	95.471	3.4355	38.491	11.884	18.141	8.3144	19.732
Variance Decomposition of RR							
1	0.2533	0.0593	0.0382	99.902	0.0000	0.0000	0.0000
13	0.6332	14.098	2.3176	63.034	12.826	0.9635	6.7594
26	0.8947	10.387	6.4395	38.468	27.311	1.5274	15.865
39	1.1903	5.9820	9.0734	26.705	35.020	1.9262	21.292
52	1.4518	4.4348	10.685	23.285	35.398	2.2049	23.990
Variance Decomposition of TERM							
1	0.2460	0.0038	3.3800	47.395	52.601	0.0000	0.0000
13	0.7952	7.3453	5.9709	13.128	68.024	0.5197	5.0112
26	0.9259	12.464	6.2874	16.478	59.308	0.4618	4.9983
39	0.9832	12.553	6.7011	15.518	58.032	0.4279	6.7667
52	1.0569	10.966	6.2171	15.212	56.809	0.3708	10.423
Variance Decomposition of DY							
1	8.0918	0.1489	0.0193	0.1861	0.0288	99.616	0.0000
13	48.003	0.5818	0.5391	1.9806	9.0521	25.867	61.978
26	60.086	0.5600	2.3120	4.5870	11.922	27.328	53.290
39	66.620	1.6570	3.6527	6.3551	10.085	25.958	52.292
52	70.309	3.2513	3.8482	6.0606	9.2837	25.390	52.165
Variance Decomposition of ER							
1	1.1150	2.0080	0.3131	0.0331	1.0825	1.2765	95.354
13	1.5181	17.648	3.9810	8.4009	7.5018	10.014	52.405
26	1.7108	24.206	3.5130	9.9120	11.830	8.5315	42.030
39	1.8104	24.980	3.6108	9.9910	14.682	7.8478	38.909
52	1.8740	25.340	4.1203	10.704	19.610	6.4840	34.020

Conclusion

This research paper explores a link between the (excess) asset return predictability and macroeconomic variables under the contagion effects of the monetary policy. The results of VD (variance decomposition) suggest that the most dominant factor to predict FEV (forecast error variance) of stock return(s) is policy rate. A study by Bernanke & Kuttner (2005) supports this finding. The simultaneity has been found between both policy rate and the predictability of stock returns entailing that this piece of information is significant from the perspective of monetary policy conduct. Such findings imply that various policies of the central bank regarding the usage of various monetary indicators can regulate and shape investment and investor's decisions, thereby, influencing the entire state of the economy. In this regard, it is also essential (particularly for central banks' perspective) to perceive the MTM (mechanism of monetary policy transmission) for the regulation of the stock market. Moreover, the results of IRF (impulse response function) confirm that monetary policy is a phenomenon of short-term to predict returns in the Pakistan Stock Exchange (PSX) and all the long-term contagion effects die out. The findings render useful information which paves the way to constitute legitimate asset pricing models, predicting stock return volatility and developing insights into the characteristics of the PSX.

Limitations and Future Directions

This study attempts to explore the simultaneity of excess stock returns with various indicators while limiting the analysis to only monetary and financial variables. However, analysis can be extended to examine other macroeconomic and political factors to make sure the Pakistan stock market efficiency and stability for future research.

References

Ali, F., Adeeb, B. & Saeed, S. (2014). Impact of monetary policy on stock returns: Evidence from manufacturing sectors of Pakistan. *Basic Research Journal of Business Management and Accounts*, *3*(2), 28-38.

Amisano. G. & Giannini. C. (1997). Topics in Structural VAR Econometrics, Revised and Enlarged Edition (2nd), Heidelberg, Springer, Berlin.

Bernanke, B. S. & Blinder, A. (1992). The federal funds rate and the channels of monetary transmission. *American Economic Review, 82*(4), 901-21.

Bernanke, B. S. & Gertler, M. (1989). Agency costs, net worth, and business fluctuation. *American Economic Review, 79* (1), 14–31.

Bernanke, B. S. (1990). On the predictive power of interest rates and interest rate spreads. *New England Economic Review,* 51-68.

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.

Bhatti, G. A., Ziaei, S. M. & Rehman, A. (2015). Monetary and fiscal policies variables interaction with stock returns in Malaysia. *Science International (Lahore)*, *27*(1), 449-465.

Bissoon, R., Seetanah, B., Bhattu-Babajee, R., Gopy-Ramdhany, N. & Seetah, K. (2016). Monetary policy impact on stock return: evidence from growing stock markets. *Theoretical Economics Letters,* *6*(5), 1186-1195. http://dx.doi.org/10.4236/tel.2016.65112

Bjørnland, H.C. & Leitemo, K. (2009). Identifying the interdependence between US monetary policy and the stock market. *Journal of Monetary Economics*, *56*(2), 275–282.

Campbell, J. Y. & Shiller, R. J. (1988a). Stock prices, earnings, and expected dividends. *The Journal of Finance, 43*(3), 661-676.

Campbell, J. Y. & Shiller, R. J. (1988b). The dividend price ratio and expectations of future dividends and discount factors. *Review of Financial Studies, 1*(3), 195-228.

Can, U., Bocuoglu, M. E. & Can, Z. G. (2020). How does the monetary transmission mechanism work? Evidence from Turkey. *Borsa Istanbul Review, 20*(4), 375-382.

Černohorská, L. (2021). The impacts of monetary policy of the Czech National Bank on selected economic indicators. *International Journal of Monetary Economics and Finance, 14*(1), 35 – 53.

Černohorský, J. (2021). The relationship of liquid money and selected price indices in the USA**.** *International Journal of Monetary Economics and Finance, 14*(1), 69–90.

Chami, R. & Cosimano, T. F. & Fullenkamp, C. (1999). The Stock market channel of monetary policy. IMF Working Paper No. 99/22, Available at SSRN: http://ssrn.com/abstract=880549

Chebbi, T. & Derbali, A. (2019). US monetary policy surprises transmission to European stock markets. *International Journal of Monetary Economics and Finance, 12*(1), 3 – 14.

Christiano, L. J., Martin E., & Charles L. E. (1994a). The effects of monetary policy shocks: evidence from the flow of funds. Working paper 94/2, Federal Reserve Bank of Chicago.

Cochrane, J. H. (2007). The Dog That Did Not Bark: A Defense of Return Predictability. University of Chicago GSB and NBER Published by Oxford University Press.

Cooley T. F. & Quadrini, V. (1999a). Monetary policy and financial decisions of firms. Mimeo.

Estrella, A. & Gikas A. H. (1991). The term structure as a predictor of real economic activity. *The Journal of Finance, 46*(2), 555-576.

Fama, E. F. & French, K. R. (1989). Business conditions and expected returns on stocks and bonds. *Journal of Financial Economics, 25*(1), 23-49.

Fazzari, S. M., Hubbard, G. R. & Bruce C. P. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity, 19*(1), 141-206.

Gottschalk, J. (2001). An introduction into the SVAR methodology: identification, interpretation and limitations of SVAR models. Kiel Working Paper No.1072.

Jensen, G. R., Jeffrey M. M. & Johnson, R. R. (1996). Business conditions, monetary policy, and expected security returns. *Journal of Financial Economics, 40*(2), 213-237.

Kartal, M. T., Depren, Ö., and Depren, S. K. (2020). Determination of influential financial factors on non-performing loans: evidence from Turkey**.** *International Journal of Monetary Economics and Finance, 13*(6), 569 – 584.

Khan M.H. (2008). Short run effect of an unanticipated change in monetary policy: interpreting macroeconomic dynamics journal of financial economics in Pakistan. *SBP Research Bulletin, 4*(1), 1-30.

Lastrapes, W. D. (1998). International evidence on equity prices, interest rate and money. *Journal of International Money Finance, 17(3)*, 377-406.

Maio, P. (2014). Another look at the stock return response to monetary policy actions. *Review of Finance*, *18*(1), 321–371.

Messai, Ahlem-Selma & Gallali, M. I. (2019). Macroeconomic determinants of credit risk: a P-VAR approach evidence from

Europe. *International Journal of Monetary Economics and Finance, 12*(1)15 – 24.

Metin, K. & Muradoglu, G. (2000). Forecasting stock prices by using alternative time series models. *ISE Review, 4(13)*, 17-24.

Naranjo, A., Nimalendran, M. and Ryngaert, M. (1998). Stock returns, dividend yields, and taxes. *The Journal of Finance*, *53*(6), 2029-2057.

Neri, S. (2004). Monetary policy and stock prices. Bank of Italy Working paper No. 513.

Nocoń, A. (2021). BVAR models in short-term prediction of modern central banks: empirical evidence of the Euro area. *International Journal of Monetary Economics and Finance, 14*(1).54 – 68.

Olasunkanmi, R. O. & Oladipo, O. S. (2020). Factors affecting inflation in Nigeria. *International Journal of Monetary Economics and Finance, 13*(6), 545 – 568.

Olivei & Tenreyro. (2007). The timing of monetary policy shocks. *The American Economic Review, 97*(3), 636-663.

Özlen, Ş. & Ergun, U. (2012). Macroeconomic factors and stock returns. *International Journal of Academic Research in Business and Social Sciences, 2*(9), 315-343.

Patelis, A D. (1997). Stock return predictability and the role of monetary policy. *The Journal of Finance, 52*(5), 1951–1972.

Patelis, A. D. (1993). Predictability in Stock Returns and the Macroeconomy. Unpublished manuscript, Princeton University, Princeton, NJ.

Rabia N, & Khakan N. (2015). Impact of macro variables on Karachi stock exchange. *Journal Business & Financial Affairs,4*(3), 1-6.

Rapach, D.E. (2001). Macro shocks and real stock prices. *Journal of Economics and Business, 53(1)*, 5–26.

Rehman, H.U. & Gul, F. (2017). Stock Return predictability using panel regression: Empirical evidence from Pakistani equity market. *Journal of Managerial Sciences, 11*(2), 267-284.

Shapiro, M. & Watson, M. (1998). Sources of business cycles fluctuations. In NBER Macroeconomics Annual. MIT Press, 3, 111-156.

Siranova, M. & Kotlebova, J. (2018). SVAR description of ECB monetary policy effects via banking sector in individual EA countries: case of Slovenia. *International Journal of Monetary Economics and Finance*, *11*(1). 56 – 75.

Strongin, S. (1995). The Identification of monetary policy disturbances: Explaining the liquidity puzzle. *Journal of Monetary Economics, 35(3)*, 463-497.

Zivot, E. (2000). Notes on structural VAR modelling. Notas de clase disponibles en, http://faculty. Washington. edu/ezivot/econ584/584notes. Htm.