The impact of monetary strategies on economic growth: an empirical analysis for Pakistan

Hamid Mahmood[a*], Abdul Waheed[a], Samia Khalid[b]

[a*], [a] Foundation University Islamabad, Pakistan
hamidawan@fui.edu.pk (Corresponding author's email address)
[b] Fatima Jinnah Women University, Rawalpindi, Pakistan

Corresponding author

ABSTRACT

The present study aims to check the long run relationship between monetary variables and gross domestic product. The study has used the yearly data for the periods of 30 years from 1983 to 2013. It is concluded that GDP is positively associated with M2, government expenditures, and inflation. While it is negatively related with interest rate, growth becomes possible with low interest rate. Investment opportunities are increased in economy. With currency appreciation, it has positive impact on growth. Domestic products are cheaper that compete in international markets and BOP becomes favorable. Due to increase in government borrowing from SBP for development purposes money supply increases. Money supply firstly effects the growth, and then it shows the impact on inflation. Due to the increase in the demand of goods output increases and it generates more employment opportunities. Lower interest rate encourages the investor to invest with the result employment increases. These monetary policies increase output growth through money supply which has short run effect. Most of the developing countries lag behind in attaining the objectives and goals of monetary policy. The main hurdles are to increase internal government borrowing and inflation pressure which destabilize the entire economy.

Contribution/ Originality

The present study aims to check the long run relationship between monetary variables and gross domestic product. The study has used the yearly data for the periods of 30 years from 1983 to 2013.

Citation: Hamid Mahmood, Abdul Waheed and Saima Khalid (2017). The impact of monetary strategies on economic growth: an empirical analysis for Pakistan. Asian Journal of Empirical Research, 7(10), 260-268.

1. INTRODUCTION

Monetary policy is a process through which SBP controls the supply of money. The important variable of monetary policy is money supply. For maintain the demand of M2 the SBP makes the polices. Monetary policy is helpful for both controlling money supply and stable economic growth. These goals are attained through targeting monetary aggregates related to real GDP and inflation targeting. Broad money supply is consistent with real GDP and inflation rate.

The high rate of inflation causes the problem for individual and also for economic performance. The Long run inflation as well as moderate inflation both are harmful for economic growth. The monetary policy changes the large reduction in output volatility (Roberts, 2004).SBP the one percent point increase in inflation reduced the 0.0233% annual growth in USA (Smyth, 1992).Inflation causes uncertainty and reduce the economic growth. Price stability is target of SPB policy rule and SBP is responsible for attaining it. The money supply affected the real GDP and then increases the inflation. This is reason for loose monetary policy structure maintained by SBP.

The monetary policy is factor that influenced the all macroeconomic variables. Contractionary monetary policy increased the interest rate. The high interest rate increased the inflation in economy. The change in money supply has effected the liquidity position of financial institutions, private and public spending. The SBP makes the monetary policy by considering both demand and supply management. The government expenditure causes the expansionary monetary policy and makes the inflationary pressure in economy.

Through monetary policy, monetary authority control the money supply .Maintained the interest rate for the purpose of maintaining the economic growth and stability. Change in money supply affected the economic variable (Cambazoglu and Karaalp, 2012). Through the effective monetary policy the low unemployment and stable prices are attained .Stable prices and exchange rate helped to face external shocks and gain the stable economic growth. The average growth of country since last 40 years is not more than 4 percent (Khalid, 2005). The short run supple shocks causes the inflation but it improves early. Short run supply doesn't affect the long run inflation (Kemal, 2006). Inflation is caused due to long run supply of money in economy. The inflation forecasting gave good results. Monetary policy closely related to inflation gap (Wimanda *et al.,* 2012).

The monetary policy is related to management of expectation. Interest rate is important factor for borrowing money and supply of money in economy. Variety of tools are used to control both factors. Through contractionary and expansionary monetary policy, supply of money controlled in economy. The different monetary tools like increased the fait interest rate, monetary based and increased reserved requirements are used. The short goals of monetary policy is attained through the open market operations. The quantity of money is control through buying and selling of securities. All these buying and selling cause increase and decrease of currency in circulation.

Economic stability and persistent economic growth are the ultimate goals of the present government which rest entirely on the type of monetary policies initiated by the government. In Pakistan State Bank of Pakistan plays this pivotal role of policy making. To attain the goals of economic growth and stability the State Bank of Pakistan not only ensures the supply money but also availability of money and interest rate. Monetary policy is usually taken as a yard stick to gauge the efficiency of government in certain domains such as economic growth, unemployment, inflation and exchange rates. For this purpose, monetary policies themselves depend on the relationship that exists between the total supplies of money and interest rates in the economy.

The plethora of problems faced by Pakistani economy such as high foreign debts, low reserves, sky scraping inflation and budget deficits lie on the choice of appropriate monetary policy. Right after the emergence of Pakistan the successive government's endeavored to frame the monetary policy. A minute analysis of different monetary policies adopted by successive governments after the emergence

of Pakistan revealed a lack of consistency and certain loop holes which hindered the attainment of stable economic growth in Pakistan. But, in later stages the governments took huge loans to complete the task of national reconstruction which resulted in monetary expansion. The essential features of monetary policy from 1960 to 1972 were liberalization, deregulation, and increase in interest rate and reserve requirement system.

1.1. Objectives of the study

Present study will attempt to investigate how the changes in the monetary policy effect the economic growth of Pakistan. Inflation is the most researched topic in the modern era because it has very serious implications for growth and income distribution. In case of Pakistan the excess money supply is the main factor responsible for inflation. The topic here clearly emphasizes the monetary policy have a direct link with inflation whether this policy is tight or lose because it had to effect in one way or another. Other monetary phenomenon also impact the overall growth therefore this paper will also determine whether, and how, GDP in Pakistan would respond to a change in money supply (M2), the inflation rate, exchange rate, unemployment, government expenditure and interest rate in economy.

2. LITRATURE REVIEW

The exploration of the importance to determine the impact of monetary policy on growth has engaged the scholars in economic arena for decades. In spite of plethora of work in the field there is still a need to identify the relationship explicitly.

From past several years Economic scholars have engaged themselves to explore the importance in determining the impact of monetary policy on growth. Many researchers have given different opinions regarding this relationship. In spite of a lot of studies, there is still a gap to identify this relationship. The present study identifies some areas of the study which are discussed one by one.

Hussain (2009) studied that inflation is not only influenced by monetary shocks but also by exchange rate and government spending. Moreover monetary policy affects the output through four main ways i.e. interest rate, exchange rate, price asset and credit. The exchange rate is considered as an important tool of monetary policy and has a significant effect for controlling inflation and output instability. Hameed and Ume (2011) examined how change in monetary policy affects growth rate. They found that Tight or loose monetary policy had direct effect on inflation which causes changes in GDP. Monetary policy had been supportive for both economic growth and price stability. Monetary aggregates were operated in economy on the basis of real GDP growth and targeted inflation rate. Altavilla and Ciccarelli (2007) forecast inflation with the help of monetary policy and related price effects. Inflation forecasting influenced the impact of monetary policy. Inflation forecasting helped the monetary authorities to maintain the interest rate and employment. Inflation forecasting from various models gave accurate results. Therefore they concluded that uncertainty decreases through the effective decision making of polices. Previously Martin and Milas (2004) also studied different inflation related problems related to monetary changes. Fatas et al. (2007), analyzed the de jure monetary regime and de facto targets that showed positive effects. Khalid (2005) tested the relationship between inflation determinants and its forecasting mechanism. This study investigated the inflation indicators and determinants. These indicators helped in effective policy making to control inflation. Inflation targeting was phenomenon of emerging economies. The short run and long run fluctuation in inflation was studied by Kemal (2006) and he also concluded that in short run unpredicted increase in money supply was beneficial for growth and long run money supply caused high rate of inflation. Wimanda et al. (2012) investigated the policies rules in Indonesia, based on the relationship between inflation, exchange rate and monetary policy. They found that the monetary policy is closely related to inflation while exchange rate depends upon economic condition. Vasicek (2009) applied Taylor rule to study the impact of monetary policy in new EU member's states. He studied short term nominal interest rate effect in domestic inflation and domestic price stability in small economies. He found that monetary policy was important indicator of price stability. Roberts (2004) investigated that monetary policy fluctuation effect on inflation-unemployment relationship.

Change in monetary policy caused instability in output gap. Bjornland (2008) found exchange rate was closely related with monetary policy. For inflation targeting many countries used fixed exchange rate. The relationship between exchange rate and monetary policy caused by short term and long term restrictions. Chaudhary *et al.* (2012) Investigates the short run and long run relationship monetary policy and its impact on inflation and economic growth in Pakistan. They concluded that there is valid relationship between GDP and other macroeconomic variables. Inflationary effects caused by money expansion. Real GDP and real exchange rate were related to each other bidirectional and real GDP was related with financial depth, budget deficit and domestic credit unidirectional. Acknowledge Goldfajn and Gupta (2003) analyzed the relationship between monetary policy and exchange rate after currency crisis. In this situation policy makers used different polices. Tight policies to stabilize exchange rates .Higher interest rates for effective response. The 80 countries of data set 1980 to 1998 had used for estimation. The results showed that tight monetary policy had reduced the undervaluation other than high inflation. And he output had also positively affected. The inflation decreased through the tight monetary policy. The improvement in output became steeper with tight monetary policy. Monetary policy affected the price and growth through different ways. Muco *et al.* (2004) studied the impact of monetary policy on macroeconomic variables during the transition period. The mechanism between real variable to nominal variable was determined. For estimation monthly data had been used from 1994 to 2004. Vector Auto regression technique was used for data estimation. It was found out that exchange rate was important determinant for maintaining low inflation during the transition period. Monetary policy instruments were important indicators of stable money supply and prices. Indirect monetary instruments were effective for transition mechanism. Georgantopoulos and Tsamis (2010) explored the short and long run relationship between money supply, inflation, government expenditure and economic growth. The study considered the global financial impact on economy of Cyprus. The economic stability depends upon the government expenditure for development and contractionary monetary policy. The data had been taken from 1980 to 2009. Error Correction Mechanism (ECM) and Johansen co-integration test were used to obtain the relationship between the variables. The results showed that economy got benefits from both the public and private sector cooperation. The inflation had negative relationship between economic growths due to adverse supply shocks. The excess money supply caused inflation pressure in economy. Ahsan and Anjum (2013) examined that inflation was caused by increase in money supply. The excess supply of money by State Bank caused increased in commodity prices. The tight money supply decreased the inflation and which was beneficial for output. Annually data set was used from 2000 to 2011. OLS regression technique was used for data analysis. It was concluded that controlled money supply had positive impact on growth. Interest rate and CPI were significantly related with GDP and inflation was insignificantly related with GDP. Atesoglu (2008) introduced the new monetary policy rule in 2007. The comparison between Atesoglu policy and FED policy rule was determined. This rule told the relationship between inflationary and disinflationary fluctuations with aggregate demand. The data used from 1994 to 2006. The results showed that the FED policy was less stable than Atesoglu policy. This rule estimated the Keynesian neutral rate of interest and maintaining the full employment in economy.

3. DATA AND METHODOLOGY

3.1. Data sample
Yearly data has been taken from 1983 to 2013. Data has been collected from different sources. Data is collected from World Bank, IMF, Economic survey of Pakistan and State Bank of Pakistan.

3.2. Model specification
To determine the long run affiliation between the monetary policy and growth Co-integration, VECM methodology is used for short run relationship between monetary policy and growth. For co-integration Johansen-Juselius (1990) approach has been used. The JJ (1990) methodology is based on maximum likelihood estimates and gives maximum Eigen Value and Trace statistics to detect number of co-integrating vectors.

3.3. Model explanation

This study explores the long term relationship between the understudied variables. Using co integration approach the model can be written in the following way:

$$gdp = \beta_1 + \beta_2 erate_{t-1} + \beta_3\ irate_{t-1} + \beta_4 unemp_{t-1} + \beta_5 gexp_{t-1} + \beta_6 inf_{t-1} + \beta_7 m2_{t-1} + \varepsilon \qquad \text{---------------- (1)}$$

The natural log is taken to make the variables continuous and linear. T-1 shows the lag and β1, β2, β3, β4and β5are the parameters. *Erate* is exchange rate, irate is interest rate, *unemp* means unemployment, *gexp* is government expenditure, *inf* refer inflation and M2 refer money supply. Where €is the error term in the model.

The co-integration test estimates the number of co-integrating equations or vectors present in the model. It has two likelihood ratios, one is Max -Eigen statistics and second in Trace statistics. The Max-Eigen statistics can be calculated in a following way:

$$\lambda max = -T\ ln\ (1 - \lambda r + 1) \qquad \text{---------------- (2)}$$

The second method is Trace statistics test. The Trace statistics can be calculated by using the following formula:

$$\lambda trace = -T\ \Sigma ln\ (1 - \lambda I\ ) \qquad \text{------------------ (3)}$$

Trace statistics and Max-Eigen statistics will help us to find the number of co-integrating equations or vectors present in the model.

4. RESULTS AND INTERPERTATION

The descriptive analysis, unit root test (Augmented Dicky-Fuller test), Johansen-Julius co-integration and Vector Error Correction Model (VECM) technique are used for data analysis.

4.1. Descriptive analysis

The table1 given below includes the values of mean, median, minimum, maximum, standard deviation and skewness etc. The mean value shows that GDP has increased 4.7965 percent annually. Standard deviation shows the deviation from its mean as 2.4345. Skewness statistics shows that government expenditures, inflation and M2 are positively skewed. GDP, interest rate and unemployment are negatively skewed. Similarly govt. expenditure, inflation rate, interest rate, money supply, exchange rate and unemployment increased annually.

Table 1: Descriptive statistics

	GDP	GEXP	INF	IRATE	M2	ERATE	UNEMP
Mean	4.7965	11.0086	8.6248	0.1030	42.9224	37.5132	5.4855
Median	4.75	11.0385	8.5524	0.8467	43.1825	31.105	5.8305
Maximum	9	16.7849	20.2861	5.3417	49.1865	86.34	8.267
Minimum	0.0000	7.78080	2.91413	-7.9561	37.4758	0.0000	3.071
Std. Dev.	2.4345	2.4394	3.82328	3.2169	3.2609	24.9373	1.5863
Skewness	-0.3914	0.42907	0.64551	-0.3186	0.2062	0.3754	-0.0136

4.2. Unit-root test

Before applying co-integration we have to fulfill the condition of stationarity of the series. To check the order of stationarity Augmented Dicky-Fuller (ADF) test has been applied. The results of Unit root test are shown below in the table 2. Results clearly indicate that all the variables are stationary at 1st difference. It means that the variables are integrated of order one I (1). This shows that co-integration test can be applied on this time series data.

Table 2: Unit Root

Variable	ADF Test t-test value		Stationarity
	Level	**Ist difference**	
M2	-2.5786	-5.1801*	1(1)
Inf	-2.7056	-7.0581*	1(1)
Irate	-3.4703	-7.1261*	1(1)
Gexp	-1.6317	-7.0808*	1(1)
Unemp	-1.5854	-7.6357*	1(1)
Erate	-1.7180	-3.9304*	1(1)
Gdp	-2.8816	-8.9016*	1(1)
Critical value			
1percent level	-3.64634	-3.67932	
5percent level	-2.95402	-2.96777	
10percent level	-2.61582	-2.62299	

*significant at 5percent level

4.3. Johansen co-integration test results

After getting the confirmation that data is stationary at first difference, co-integration test has been applied. In co-integration, maximum likelihood ratio test has been used in which trace statistics and max Eigen value statistics are included. The results of co-integration are shown in the above table.3. The null hypothesis indicates that at none there is no co-integration between the variables. At null hypothesis trace statistics values are greater than the critical values. The null hypothesis is rejected and there is co integration among variables. So the trace statistics had shown that there are at 6 co-integrated equations or two co-integrating vectors among the variables at 5percent level. At Ho trace statistics 176.6035 is greater than critical value 128.1277 so reject the Ho. At 'at most 1trace statistics' 126.8662 is greater than critical value 97.6687 so reject the H_0. So there exists a long run relationship among the variables.

For the purpose of confirmation we have also checked the Max-Eigen value in the Table 3. The Max-Eigen statistic has also showed the same results and had also confirmed the existence of two co-integrating vectors among the variables.

Table 3: Johansen co-integration test

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value 0.05	Prob.**
None *	0.7886	176.6035	128.1277	0
At most 1 *	0.6806	126.8662	97.6687	0.0001
At most 2 *	0.6252	90.3343	71.2153	0.0005
At most 3 *	0.5290	58.9294	48.8133	0.0033
At most 4 *	0.4213	34.8299	30.3930	0.0121
At most 5 *	0.3622	17.3251	15.8046	0.0262
At most 6	0.0875	2.93295	3.9183	0.0868

Trace test indicates 6 co-integration (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

In the below given table 4 the results co-integration are shown. At null hypothesis trace statistics values are greater than the critical values. The null hypothesis is rejected and there is co integration among variables. At Ho trace statistics 49.73732 is greater than critical value 47.1560 so reject the Ho. at most 5trace statistics 14.3921 is greater than critical value 14.549892 so reject the Ho. So there exists a long run relationship among the variables.

Table 4: Johansen co-integration test

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None *	0.7886	49.7373	47.1560	0.0203
At most 1	0.6806	36.5318	40.8791	0.1189
At most 2	0.6252	31.4049	34.5544	0.0959
At most 3	0.5290	24.0994	28.1360	0.1313
At most 4	0.4213	17.5048	21.5542	0.1495
At most 5 *	0.3622	14.3921	14.5498	0.0477
At most 6	0.0875	2.9329	3.9182	0.0868

Max-eigen value test indicates 1 cointegrating eqn (s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

4.4. Vector error correction model (VECM)
The co-integration test has shown the presence of two co-integrated equations. It means that there is a long term relationship between the desired variables. Vector Error Correction Model (VECM) has also been applied to check the disequilibrium factor. The coefficient-0.4707 shows that the variables are deviated from the equilibrium. The VECM results have also shown the short-run relationship among the variables.

4.5. Normalized equation
Normalized equation has been mentioned in the table 5 for check the variable's significance.

Table 5: Normalized equation

Independent variable	Coefficient	Standard error	t-stat
ERATE	-0.1381	-0.0067	20.5962
GEXP	0.1849	-0.0376	-4.9177
INF	0.6472	-0.0265	-24.3448
IRATE	-0.6116	-0.0423	14.4343
M2	0.3310	-0.0220	-15.0091
UNEMP	-1.5069	-0.0884	17.0301

GDP=25.43835-0.138167erate+0.18495gexp+0.64724inf-0.611635irate+0.33101M2-1.506901unemp

For overall model t stat is significant. Value of t-stat is greater than 2. The sign of coefficients is changed in the table below. It shows that GDP is positively related with M2, government expenditures and inflation. GDP is negatively related with interest rate, exchange rate and unemployment. 1 percent increase in M2 causes 0.33101 increase in GDP.1 percent increase in inflation causes 0.64724 increase in GDP.1 percent increase in government expenditures causes 0.18495 increase in GDP.1 percent decrease in interest rate causes -0.611635 decrease in GDP.1 percent decrease in exchange rate causes -0.138167 decreases in GDP.1 percent decrease in unemployment causes -1.506901 decrease in GDP. Due to increase in government borrowing for expenditure demand for money supply increases. Excess money supply causes increase in demand of goods and services and it causes the demand pull inflation. Low domestic interest rate is one of many factors, which depreciates exchange rate. A depreciated currency makes exports cheaper and imports expansive, which makes a surplus balance of trade. With increase in GDP the unemployment declined as -25.43835.

4.6. Diagnostic test
This test is used to diagnose the variables. The following table 4.6 explains the overall significance of the variables. R-square shows the variation in dependent variables due to independent variables.

Table 6: Diagnostic test

R-squared	0.7432	0.9020	0.4226	0.9075	0.5997	0.576675
Adj. R-squared	0.7395	0.8040	-0.1546	0.8151	0.1995	0.1533
Sum sq. resids	44.2731	774.0326	37.5922	32.93	131.8627	106.2809
S.E. equation	1.7180	7.1834	1.5830	1.4816	2.9649	2.6618
F-statistic	2.9659	9.2061	0.7320	9.8167	1.4985	1.3622
Mean dependent	-0.2451	-0.3822	-0.0335	-0.0708	-0.0111	0.0290
S.D. dependent	2.4192	16.2274	1.4732	3.4457	3.3139	2.8928

The above table shows that R –squared is 0.743211. It shows that 74.32 percent variation in GDP growth due to independent variables i.e. exchange rate, M2, Interest Rate, Govt. Expenditure, Unemployment and Inflation. The adjusted R-square is less than R-square because it adjusts the residual. F- test shows the overall significant of the model.

5. CONCLUSION

The objective of this study is to confirm the long run association between monetary variables and GDP. This study investigates how much money supply, interest rate and inflation rate impacts the GDP growth rate in Pakistan. The most important result of this study is that money supply growth is an important factor which causes inflation, and money supply growth is due to loose monetary policies of state bank of Pakistan (SBP). If SBP effectively applies the monetary policies the government can achieve not only its short term objectives but also long term growth and prosperity. The central bank requires that the quantity of money should be increased or decreased to control inflation. A well-organized monetary policy results a strong degree of interest rate smoothing. With the help of interest rate smoothing the governments can gradually decrease inflationary pressures, and thus decreases interest rate and output volatility. Changes in the interest rates affect the demand for consumption and savings of the people and also change the investment pattern of the businesses. Interest rates volatility affects consumption and saving of the people of any country and investment patterns of the business as well. The increase in aggregate demand for the output boosts up the production cycle; generating employment, as a result increase investment spending on the existing industrial capacity.

References

Ahsan, I., & Anjum, S. (2013). Impact of money supply (M2) on GDP of Pakistan. *Global Journal of Management and Business Research Finance, 13*(6), 1-8. *view at Google scholar*

Altavilla, C., & Ciccarelli, M. (2007). Inflation forecasts, monetary policy and unemployment dynamics evidence from the US. *Working Paper Series, 725,* 1-34. *view at Google scholar*

Atesoglu, H. S. (2008). Monetary policy rules and U.S. monetary policy. *Journal of Post Keynesian Economics,* 30(3), 403-408.

Bjornland, H. C. (2008). Monetary policy and exchange rate interactions in a small open economy. *The Scandinavian Journal of Economics*, *110*(1), 197-221. *view at Google scholar*

Cambazoglu, B., & Karaalp, S. H. (2012). The effect of monetary policy shock on employment and output: The case of Turkey. *International Journal of Emerging Science*, *2*(1), 23-29. *view at Google scholar*

Chaudhary, S., Qamber, Y., & Farooq, F. (2012). Monetary policy, inflation and economic growth in Pakistan: Exploring the co-integration and causality relationships. *Pakistan Journal of Commerce Society Science*, *6*(2), 332-347. *view at Google scholar*

Fatas, A., Ilian., M., & Ros, A. K. (2007). Quantitative goals for monetary policy. *Journal of Money, Credit and Banking, 39*(5), 1163-1176. *view at Google scholar* / view at publisher

Georgantopoulos, A. G., & Samis, A. D. T. (2010). The interrelationship between money supply, prices and government expenditures and economic growth: a causality analysis for the case of cyprus. *International Journal of Economic Sciences and Applied Research* 5(3), 115-128. *view at Google scholar*

Goldfajn, I., & Gupt, P. (2003). Does monetary policy stabilize the exchange rate following a currency crisis. *IMF Staff Papers, 50*(1), 90-114. *view at Google scholar* / view at publisher

Hameed, I., & Ume, A. (2011). *Impact of monetary policy on gross domestic product*. *MPRA* Paper No. 35562, posted 25. December 2011 21:01 UTC. *view at Google scholar*

Hussain, K. (2009). Monetary policy channels of Pakistan and their impact on real GDP and Inflation. *CID Graduate Student and Postdoctoral Fellow.* Vol Working Paper No. 41, October 2009. *view at Google scholar*

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169-210. *view at Google scholar* / view at publisher

Kemal, M. A. (2006). Is inflation in Pakistan a monetary phenomenon?. *The Pakistan Development Review*, 213-220. *view at Google scholar*

Khalid, A. M. (2005). Economic growth, inflation, and monetary policy in Pakistan: preliminary empirical estimates*. The Pakistan Development Review, 44*(4), 961–974. *view at Google scholar*

MacKinnon, J. G., Haug, A. A., & Michelis, L. (1999). Numerical distribution functions of likelihood ratio tests for cointegration. *Journal of Applied Econometrics*, 563-577. *view at Google scholar* / view at publisher

Martin, C., & Mila, C. (2004). Modelling monetary policy: inflation targeting in practice. *Economica, New Series,* 71(282), 209-221. *view at Google scholar* / view at publisher

Muco, M., Sanfey, P., & Taci, A. (2004). Inflation, exchange rates and the role of monetary policy in Albania. *European Bank for Reconstruction and Development,* Gusht. *view at Google scholar*

Roberts, J. M. (2004). Monetary policy and inflation dynamics. *Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs.* Federal Reserve Board, Washington, D.C. *view at Google scholar*

Smyth, D. J. (1992). Inflation and the growth rate in the United States' natural output. *Applied Economics*, *24*, 567-570. *view at Google scholar*

Vasicek, B. (2009). Monetary policy rules and inflation process in open emerging economies: evidence for 12 new EU members. *William Davidson Institute Working Paper Number 968.* *view at Google scholar* / view at publisher

Wimanda, R. E., Turner, P. M., & Hall, M. J. (2012). Monetary policy rules for Indonesia: which type is the most efficient? *Journal of Economic Studies*, *39*(4), 469-484. *view at Google scholar* / view at publisher