

Monetary Transmission Mechanism in an Emerging Economy of the Republic of Tajikistan

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Abstract

This research examines the channels through which monetary policy variables affect macroeconomic variables in an emerging economy of the Republic of Tajikistan. The Granger Causality testing in VAR framework is employed to examine the effectiveness of transmission channels. Our empirical results revealed that the interest rate lacks the capability to influence aggregate demand and inflation. The dire consequences of low interest-elasticity of income are evident in the form of an ineffective monetary policy in Tajikistan. Monetary transmission does not trigger the growth cycles through real variables because the economy of Tajikistan is plagued with structural deficiencies including inefficient financial markets, lack of financially shrewd intermediaries; low capital formation and a high level of dollarization.

Key Words: *Monetary Policy, Dollarization, Tajikistan, Monetary Transmission.*

Introduction

The impacts of monetary and exchange rate policies on real sector have been a focus of attention of researchers and policy makers for many years. A majority of researchers agree that monetary policy affects real sector variables even some of the authors give an estimated time for a monetary policy to affect real economy. Likewise, Nelson (2007) refers that Friedman's estimate of two years for a monetary policy to influence inflation and aggregate demand has now become a standard rule of thumb. Intuitively, if an effective monetary policy brings fruitful effects of economic growth, than ineffective policy measures can induce devastating effects on real economy. In this context, our objective in this study is to test the channels through which real sector is affected by monetary policy variables, especially in transition countries like Tajikistan, where the process of price controlling is being shifted from the central authorities to a market-based system. Some of the other reasons to conduct this study are based on the evidence of continuous consumer price hikes in Tajikistan's economy and the patterns of global financial crises. Given the nature of globalized economies in this era, crisis in one country could have annihilating effects on other

countries. In most of the developing countries, the financial managers and policy makers are always concern about the prevention of such financial crises. To prevent such financial crises, a number of studies proposed traditional and non- traditional approaches like interest rate, exchange rate, and expectation channels.

One cannot undermine the role of central bank in forecasting and employing remedial measures in case of monetary shocks. The commonly used tool of monetary policy by central bank plays a pivotal role in prevention of shocks but uncertain elements of monetary policy cast doubts on effectiveness of policy prescription. As a common practice, central bank provides monetary policy inputs for macroeconomic stability. If the transmission channels actively pass-through the inputs to real economy, central bank can juxtapose the policy measures in a timely manner and vice versa. Nevertheless, central banks in transition economies face difficulties to achieve the desired macroeconomic goals through monetary policy. One of the main reasons is a passive behaviour of monetary transmission in such countries due to structural deficiencies like underdeveloped financial sectors, fragile financial intermediaries and the lack of consumer confidence on banking sector.

The economy of Tajikistan has similar characteristics of other transition economies and it comprises weaker effects of monetary policy variables on real economy. Hence, this research is motivated to highlight the important transmission channels that can be used to design an effective monetary policy in Tajikistan. It is important to develop an efficient monetary policy for Tajikistan because the financial sector in the country is underdeveloped with weak institutionalization, deficient security markets and imperfect competition. In the wake of such weak-form financial sector, monetary policy prescription on the basis of research findings will be helpful to stabilize the economy for rapid economic growth. Figure-1 below shows the general framework of monetary transmission mechanism.

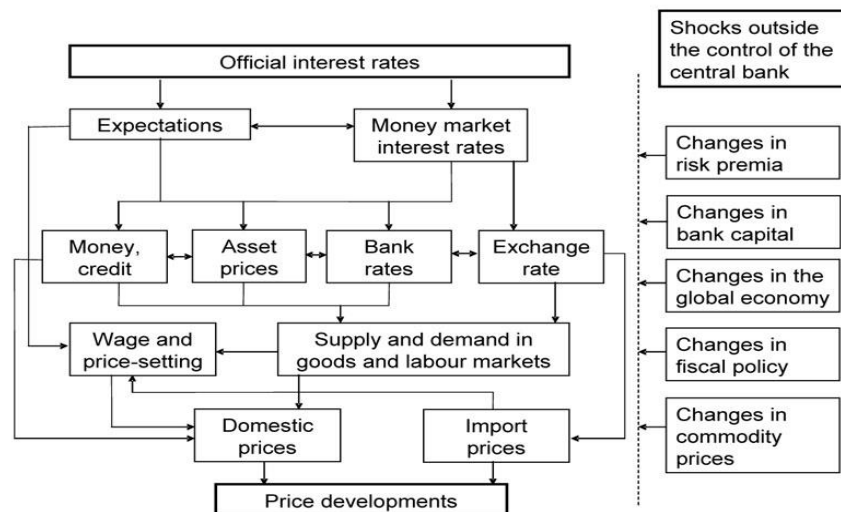


Figure-1: Monetary Transmission Mechanism

Source: European Central Bank

The main objective of this research is to reveal the channels through which the macroeconomic variables are affected with monetary and exchange rate policies in Tajikistan. The empirical findings would help to assess the effectiveness and reliability of existing monetary toolkits of central bank i.e. National Bank of Tajikistan (hereinafter bank).

The paper is organized in a way that section 2 describes the monetary policy in the Republic of Tajikistan; section 3 explains literature review; section 4 documents theoretical considerations; section 5 exhibits empirical estimation and models; section 6 discusses results and section 7 provides conclusions.

Monetary Policy in the Republic of Tajikistan

The history of monetary policy in Tajikistan is not so convincing because monetary policy has been ineffective due to common characteristics of transition economies. Weak financial sector prevails in most of the transition economies due to a shifting from centrally command economy to market based economy. One of the main issues in transition economies is the management of price control and output optimization. The main hurdle for transition economies is the process of transformation from an administrative price control to a market liberalization. Tajikistan’s authorities have put all efforts to stabilize price fluctuations in the country as monitoring mechanism for the analysis of money growth is proceeding under the IMF macroeconomic stabilization program. The National bank of Tajikistan uses a number of tools to curb inflation such as open market operations and exchange rate intervention etc. To reduce inflationary pressure, the bank does not sanction loans to private sector except for the purpose of emergency liquidity or in case of financial institutions’ monetary distress or failure. A major portion of the debt sanction is classified as short-term liquidity assistance. Notwithstanding, concentrated loans sanctioning used in stress scenario, and liquidity buffering send negative signals to credit markets. Shortage liquidity raises the interest spread in credit markets on the expense of economic slowdown.

Although, the bank regulates minimum reserve ratio that demands the commercial banks (taxing banks) to keep a portion of minimum reserves with the bank. The changes in reserves requirements are not frequently practiced to keep monetary policy intact without dismantling money supply. It is goof for Tajikistan because higher benchmarking of minimum reserve ratio has some drastic effects on already fragile equity markets. Historically, reserves ratio requirement has gradually declined from 20 percent to 3 percent for deposits in national currency and 9 percent for deposits in foreign currency. However, the bank whims the interest (refinancing) rates with the hope of transmission mechanism effect in inflation handling. That is why, a sharp declining trend of interest rates could be seen in figure-2 below:

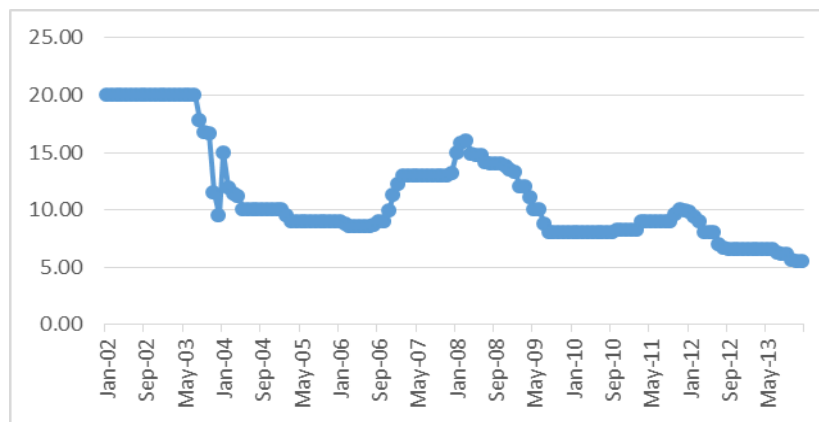


Figure-2: Trend of interest rates in Tajikistan
Source: Author’s compilation of National Bank of Tajikistan’s data

One of the main indicators of price instability especially in transition countries is exchange rate fluctuation. In general, exchange rate is used as an instrument for monetary regulation and it is considered an effective tool in inflation reduction strategy. However, it coordinates price expectation in conducting monetary

policy and “camouflages the reality in stabilization process” (Granville, 2013, see also Dornbusch, Sturzenegger and Wolf, 1990; Bruno, 1990). This is particularly true for countries with “lack of credibility in political and institutional arrangements” (Granville, 2013). In case of Tajikistan, the bank has constantly been involved in exchange rate intervention to stop sporadic fluctuations and to prevent monetary shocks. Strict monitoring of exchange rate has provided a little stability in exchange rate of Tajik currency (Somoni) which has never been collapsed since 2001. The government intervention in foreign exchange market is evident to smooth the exchange rate volatility. The Tajik national currency was relatively steady against the US dollar till 2007 and only depreciated simultaneously by 1% and 14% in real effective terms in 2008 (IMF, 2013). One significant factor that shattered the exchange rate stability in 2008 was the foreign exchange inflow, mainly remitted by Tajiks expats.

The official exchange rate of ‘Somoni’ is based on weighted average rate of all interbank and intra-bank market transactions. The deterioration in terms of trade of Tajikistan (being oil and energy importing country) was largely based on a rapid price hike of petroleum products that caused the exchange rate to depreciate for a considerable period of time. The depreciation started in 2010 due to the interruption in railroad trade by neighboring countries. In the last couple of years, the exchange rate policy is quite successful in bringing the reserve money growth, back to an appropriate level. Such policies have successfully adjusted the balance of payments and curbed the inflationary pressure. At the end of 2012, the stocks of foreign reserves were sufficient to cover approximately one and a half months of prospective imports (IMF, 2013). The bank continuously intervenes in foreign exchange markets with the aim of quick accumulation of foreign reserves. Although, regular monitoring had reduced the exchange rate flexibility, it could not be eliminated completely. Despite all efforts, customers’ confidence on domestic currency has been plummeting since 2005 as the deposits in foreign currency outpaced the deposits in local currency. Figure-3 below shows the picture of deposits in domestic currency and deposits in foreign currency in Tajikistan.

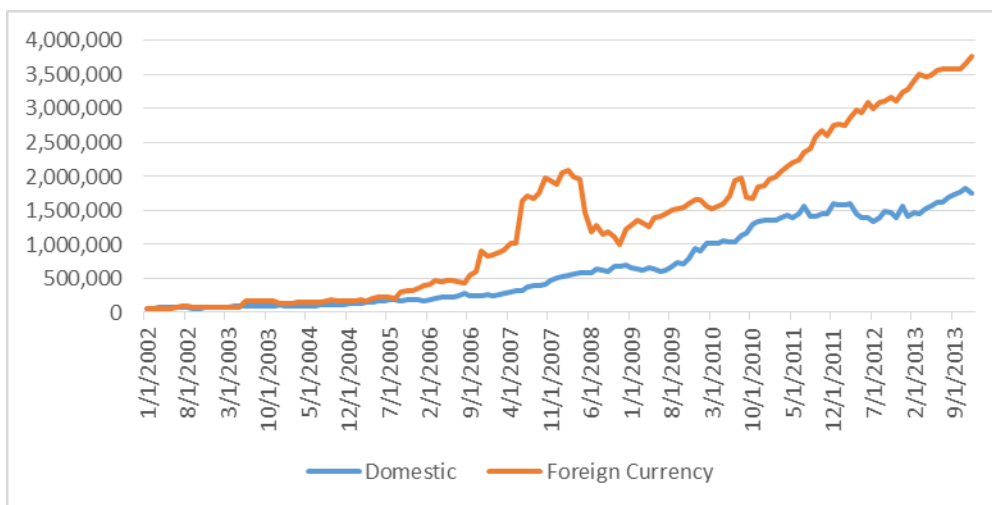


Figure-3: Deposits in domestic currency and deposits in foreign currency in Tajikistan
Source: Author’s compilation of National Bank of Tajikistan’s data

It is evident in above graph that the customers’ confidence had deteriorated after the Global Financial Crisis in 2007-08, and the upward trend of dollarization had started afterward. It is worth mentioning that consumers’ confidence plays an important role in spending decisions that ultimately hits economic progress. Figure-4 below shows the levels of dollarization in Tajikistan.

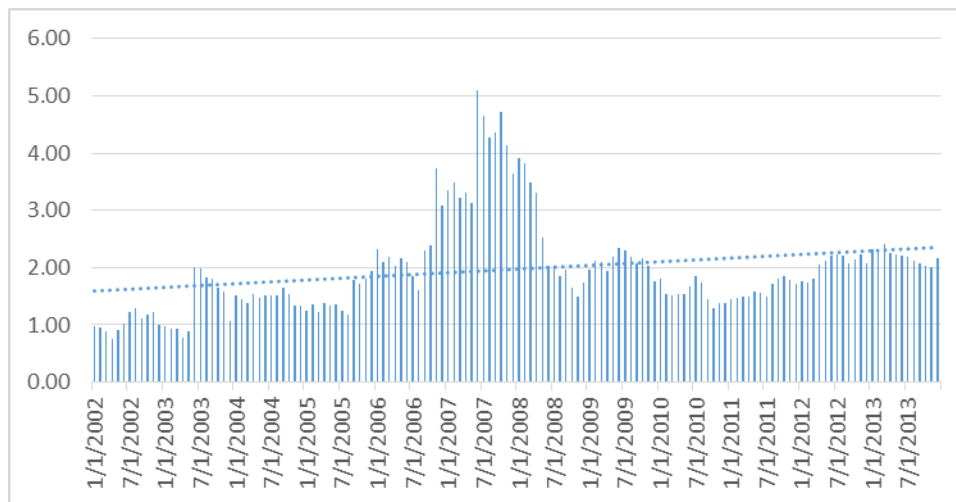


Figure-4: Dollarization in Tajikistan

Source: Author's compilation of National Bank of Tajikistan's data

The trend of dollarization is evident after 2005 which significantly jumped up after the Global Financial Crisis in 2007-08. As a matter of fact, the bank officially reported in inflation surveys that the practice of tight monetary policy through liquidity management has some serious backwash effects. This scenario exactly portrays what Sargent and Wallace (1981) argued i.e. “the capability of monetary authorities to combat inflation through the conventional monetary policy tools is limited, and in the long run, tight monetary policy may provoke current and future high inflations.” The limitations of monetary instruments for managing money supply could be linked with the lack of secondary security markets in the country. The deposit certificates of the bank and state treasury bills (issued by the Finance Ministry), offered in primary security markets, have a short-term maturity upto 128 days and 91 days respectively.

Monetary policy decisions to anticipate inflation with lack of financial instruments and ineffective primary markets, has been a problem for the bank. In addition, inefficient transmission mechanism and lack of monetary instruments do not support inflation targeting. This characterizes the usual attributes of transition economies where inflation persistence is vulnerable due to endogenous structural factors.

Literature Review

The effectiveness of monetary policy in macroeconomics, based on neo-classical thoughts, has extensively been discussed in applied studies. Previous studies to assess the effectiveness of monetary policy, conducted by Alturki and Vtyurina (2010) and Friedman (1972) paved the ways for general approaches. A substantial progress had led the ways to formulate complicated empirical models like monetary transmission mechanism (Taylor, 1995). Nevertheless, the sensitivity analysis, based on general framework provides some mixed results. By summing up conference papers, Kuttner and Mosser (2002) concluded that monetary policy has weak impacts on real economy. The speed of financial innovation like the growth of financial derivatives and focus on equity basis might be the causes of weak transformation of monetary variables into real variables. However, the effects of monetary policy might be different for developing or transition economies because the validity of the study rests upon the structural characteristics of developed economies only. While analyzing the interest rate pass-through in Euro Zone countries, Illes and Lombardi (2013) assert that the policy of keeping peculiarly low interest rates (near-zero interest rate) in some advanced economies could not stimulate the economy. The interest rate pass-through is limited for non-

financial firms because financial intermediaries demand high risk premiums in highly risky domains. Çiçek and Akar (2013) studied inflation dynamics in Turkey and found asymmetric speed of inflation adjustment process in different quantiles, before and after inflation targeting regimes. It is also validated that the persistence has significantly decreased after inflation targeting, implicitly adopted in 2002. Boivin and Giannoni (2006) concluded that the impacts of monetary policy on inflation and output were much larger in the post-80s. In supply shocks, post-80s policies were effective for the prevention of inflation fluctuations. Bernanke and Gertler (1995) invoked the invalidity of credit aggregates in forecasting of credit channel theory of monetary policy transmission. However, they agreed upon the mechanism of credit markets where cost differentials between internal and external funds stimulate the economy via investment channels. Egert and MacDonald (2009) while going through MTM in Central and Eastern Europe (CEE), concluded that the degree of exchange rate pass through has declined over time due to a parallel decline in inflation rates. The asset prices channel was also weak but the credit channel remained the strongest one among all channels especially for CEE where injection of new capital market funding was negligible. Mahajan, Saha, and Singh (2014) while framing inflation targeting in India, conclude that inflation targeting could not be beneficial for India because forecasting models that provide input to inflation targeting have failed to capture the dynamic relationship between monetary variables and real variables. Petursson (2001) used structural VAR approach to test monetary policy innovations in Icelandic financial markets. He found positive relationship between innovations in monetary policy and money market rates. Also, the propagation has occurred in different time-lags, initially from money markets to bond markets and simultaneously from bond markets to bank loan markets. He asserts that the bond rates are main determinants that explain marginal cost of fund.

To compare the traditional Keynesian interest rate channels of MTM in potential inflation targeting economies in MENA region with inflation targeting in emerging market economies, Mukherjee and Bhattacharya (2011) used panel data analysis and found significant links between interest rates and output because investment was highly elastic during the period under consideration. Also, the adoption of inflation targeting did not affect the interest rate channels. Mohanty and Klau (2005) exhibited that the exchange rate was quite responsive to interest rate in most of the emerging market economies. The interest rate channel significantly affected output and price levels in emerging market economies. Kandil (2014) investigates time series data of developing countries to identify the impacts of expansionary and contractionary monetary policy shocks on inflation and output growth. He concludes that the aggregate demand was triggered by monetary shocks due to capacity constraints that hampers the output adjustment and led to stimulate inflation.

Isakova (2008) illustrated that the explicit evidence of exchange rate pass-through to inflation, was impeded with high levels of dollarization. However, the output was not responsive to exchange rate innovations in Tajikistan. Moreover, with the help of VAR estimation, she asserts that bank lending, asset price, and balance sheet channels were insignificant but the changes in policy rates were effectively passed-through to market interest rates.

Interestingly, the study of MTM in Tajikistan has remained solicited by advance econometrics tools like vector error correction models (VECM) and auto regressive integrated moving average models (ARIMA). A majority of modern researchers used advanced econometric models to evaluate the effectiveness of transmission channels, including interest rate and exchange rate channels. However, the non-influential interest rates magnify the effects of exchange rates on inflation. Mishra and Montie (2012) consider the controversial influence on aggregate demand in the institutional framework, specifically financial structure and fundamentals of macroeconomic performance in low income countries. Therefore, this study investigates the empirical approaches for defining the chain effects pass-through of refinancing rate. Also, to analyze the relationships of monetary toolkit and aggregate demand, we use impulse response function of interest rate shocks to macroeconomic variables. Figure-5 below shows the chain effects of interest rate channel, followed by the orders of endogenous variables.

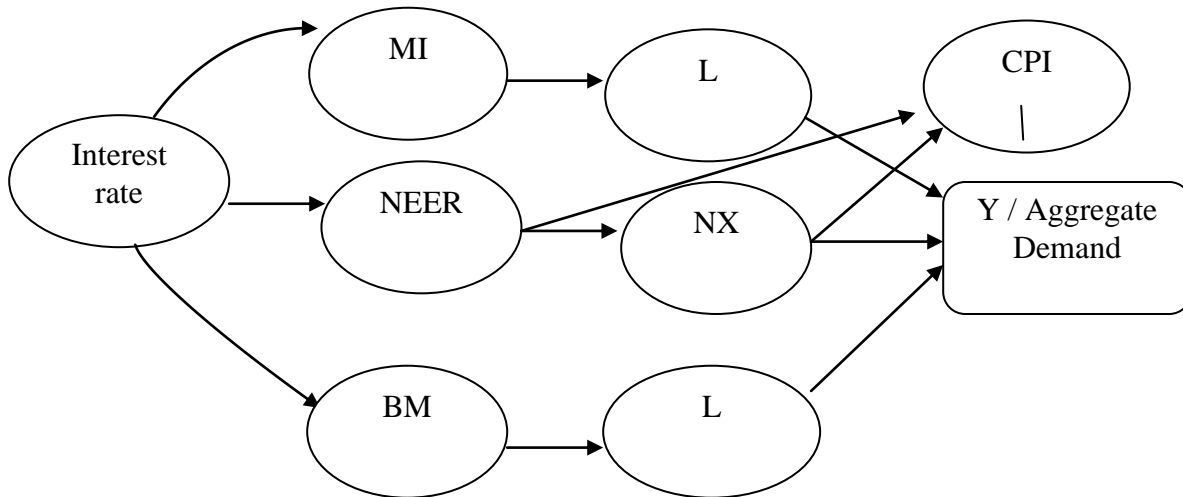


Figure-5: Chain effects of interest rate channel
(Linkages are taken to the base of Bank of England, file 4).

Theoretical Considerations

Monetary transmission mechanism describes the effects of changes in nominal (short term) interest rates or stock of money on output and employment. The conventional interpretation behind the linkage between these two, is interest rate channel which is based on traditional Keynesian IS-LM framework. However, interest rate channel could not be considered as the only channel that affects real variables. Other factors include exchange rate, assets prices and bank credit channels i.e. bank lending and balance sheet. According to the Keynesian theory, the changes in aggregate demand only affect output and employment but not prices (Blinder, 1986). Monetary policy instruments are used to influence aggregate demand. The equation-2 below shows the effects of expansionary monetary policy on aggregate demand:

$$\Delta M \Rightarrow \Delta i \Rightarrow \Delta I \Rightarrow \Delta Y \text{ --- (1)}$$

$$M \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow \text{ --- (2)}$$

It explains that an increase in money supply (M) by the central bank reduces the real interest rates and cost of capital (i) that attract the investors to initiate investment spending (I), leading to an increase in aggregate demand and output (Y).

In the present era of globalization, no economy can achieve growth and development without international trade, in open economies, the exchange rate channel of monetary transmission mechanism has an utmost importance. The effect of expansionary monetary policy on aggregate demand through the exchange rate channel is defined in equation-4 below:

$$\Delta M \Rightarrow \Delta i \Rightarrow \Delta FCV \Rightarrow \Delta NX \Rightarrow \Delta Y \text{ --- (3)}$$

$$M \uparrow \Rightarrow i \downarrow \Rightarrow FCV \downarrow \Rightarrow NX \uparrow \Rightarrow Y \uparrow \text{ --- (4)}$$

The equation-4 explains that an increase in money supply (M) leads to a decrease in real interest rate (i) causing thereby a depreciation of foreign currency value means dollar (FCV), leads to increase net exports (NX) and ultimately aggregate demand and output (Y).

The credit channels include bank lending channel and asset prices channel. The monetary policy affects the bank's ability to lend, that eventually affects the investment spending, and aggregate demand and output. The equation-6 below shows the impact of expansionary monetary policy on aggregate demand via bank lending channel:

$$\Delta M \Rightarrow \Delta BR \Rightarrow \Delta BAL \Rightarrow \Delta I \Rightarrow \Delta Y \text{ --- (5)}$$

$$M \uparrow \Rightarrow BR \uparrow \Rightarrow BAL \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow \text{ --- (6)}$$

An increase in money supply (M) increases the bank reserves and deposits (BR) that enable the banks to offer more loans as it increases the banks available loans (BAL) and allow the more investment opportunities (I) that ultimately increase the aggregate demand and output (Y).

Regarding the balance sheet channel or asset prices channel, the expansionary monetary policy can strengthen the firms net worth and ability to borrow (having a sound financial position). The mathematical relationship is explain in equation-8 below:

$$\Delta M \Rightarrow \Delta FEQ \Rightarrow \Delta CFL \Rightarrow \Delta I \Rightarrow \Delta Y \text{ --- (7)}$$

$$M \uparrow \Rightarrow FEQ \uparrow \Rightarrow CFL \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow \text{ --- (8)}$$

The equation-8 explains that an increase in money supply (M) increases the firm's equity prices (FEQ) that provides a more collateral for loans (CFL) and triggers borrowing and investment (I) which ultimately increase the aggregate demand and output.

Empirical Framework

The empirical framework is used to define the implications of monetary policy on real variables through different channels specifically on output and inflation. The Granger Causality testing in a VAR framework is employed, following the prominent studies on MTM, conducted earlier by Aragón and Portugal (2009), Seoane (2010), Bordon and Weber (2010), Mavromatis (2012), and Khemiri and Ali (2012).

The standard form of unrestricted VAR for m lags can be written as:

$$y_t = c + \alpha_1 \Delta y_t + \alpha_2 \Delta y_{t-1} + \alpha_3 \Delta y_{t-2} + \dots + \alpha_k y_{t-m} + \epsilon_t \text{ --- (9)}$$

(where y is a vector of length k and each α represents k x k matrix)

It can be transformed into the following equation:

$$Y_t = c + \alpha_i \Delta Y_{t-1} + \beta_i \Delta Z_t + \epsilon_t \text{ --- (10)}$$

(where Y_t represents endogenous variables vector, Z_t represents exogenous variables vector, and ϵ_t is a vector of uncorrelated disturbances with zero mean and constant variance i.e. $COV(\epsilon_i, \epsilon_j) = 0: (i \neq j)$).

The vector of endogenous variables Y_t include output (Y), consumer price index (P), broad money M2 (BM), refinancing rate (IR), real effective exchange rate (REER), market interest rates (MI) and net exports (NX).

The vector of exogenous variables Z_t include world wheat prices (WWP) and world oil prices (WOP). The exogenous variable (WWP) is included while taking into consideration, that the share of wheat in total

cereals imports is about 98 percent in Tajikistan (FAO, 2015). The variable (WOP) is used as a proxy for the impact of foreign remittances because a vast majority of Tajik population works in Russia (FIDH, 2011). The fluctuations in oil prices can significantly affect the Russian economy because Russia is the second largest oil exporting country in the world (EIA, 2013).

The monthly time series data for the period January-2002 to December-2013 is used. In consideration to have monthly data, the endogenous and exogenous variables are seasonally adjusted except net exports. The descriptive statistics are presented in table-1 below:

Table 1: Descriptive statistics of variables

	Y	P	IR	BM	REER	MI	NX	WOP	WWP
Mean	10858.25	100.8561	10.02042	871.6289	73.37040	23.92533	-678.2281	79.49465	250.3466
Median	6727.929	100.6648	9.108717	867.2065	71.83674	23.94442	-480.1500	76.13513	235.6123
Maximum	64110.13	105.8049	15.45997	1672.375	88.38054	30.07523	7.100000	121.5048	441.9820
Minimum	1663.530	99.64318	6.356655	232.1560	67.64590	17.40275	-2418.800	44.56575	143.8609
Std. Dev.	11499.67	0.762277	2.426019	422.8183	4.537452	2.734026	576.6109	22.08441	72.61012
Skewness	2.802350	3.261770	0.799213	0.112025	1.212903	-0.187325	-0.898729	0.185235	0.402732
Kurtosis	11.71102	20.33908	2.362214	2.064795	3.955175	2.783003	2.966779	1.693518	2.151978
Jarque-Bera	429.1780	1372.800	11.84695	3.699227	27.18759	0.749801	12.92783	7.376576	5.471655
Probability	0.000000	0.000000	0.002676	0.157298	0.000001	0.687358	0.001559	0.025015	0.064840
Sum	1042392.	9682.183	961.9604	83676.37	7043.558	2296.832	-65109.90	7631.486	24033.27
Sum Sq. Dev.	1.26E+10	55.20125	559.1289	16983652	1955.905	710.1154	31585607	46333.53	500861.7
Observations	96	96	96	96	96	96	96	96	96

As a first step, we check the order of integration in variables because stochastic disturbance, followed by a non-stationary series does not allow the convergence to long run average values. That is, a spurious result is returned when we regress a non-stationary time series to another non-stationary time series (Iqbal, 2011). To test the stationary properties of variables, we used Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The results are presented in table-2 below:

Table-2: Results of ADF and PP unit root testing

Variable s	Augmented Dickey-Fuller				Philips-Perron			
	At Level		Δ		At Level		Δ	
	Constant without Trend	Constant and Trend	Constant without Trend	Constant and Trend	Constant without Trend	Constant and Trend	Constant without Trend	Constant and Trend
Y	5.8163	4.5428	-11.2959*	-7.0331*	-4.3143*	-7.1140*	-26.0353*	-26.2283*
P	-5.3242*	-5.4849*	-18.8812*	-18.8169*	-8.0025*	-8.0297*	-32.2524*	-32.2069*
IR	-1.8462	-2.1785	-5.1301*	-5.1353*	-1.7382	-2.0064	-12.7317*	-12.7166*
BM	-1.9647	-2.4051	-12.4744*	-12.4345*	-1.9408	-2.3921	-12.4787*	-12.4478*
REER	-3.1889**	-1.7343	-10.1499*	-10.5994*	-3.1889**	-1.744***	-10.1350*	-10.6895*
MI	-2.5244	-4.8856*	-10.2459*	-10.3009*	-5.4956*	-9.2245*	-67.4908*	-115.6929*
NX	1.1553	-0.3113	-0.2316	-1.0606	1.7347	0.5444	-12.4417*	-13.1134*
WOP	-2.4893	3.4792	-6.6156*	-6.5820*	-2.0227	-2.6486	-6.6716*	-6.6387*
WWP	-1.8342	-2.2007	-7.8793*	-7.8340*	-1.1630	-2.1281	-7.8942*	-7.8493*

*, **, *** show 1%, 5% and 10% significance level

Note: The unit root testing for the order of integration revealed that all variables are non-stationary and become stationary after first differencing except net exports which requires double differencing. While, P and REER are stationary at levels at 1% and 5% level of significance respectively.

Empirical Results

Initially, we choose 12 lags to estimate VAR on the basis of optimal lag length information criteria. A majority of tests like ‘Likelihood ratio’ (LR), ‘Final prediction error’ (FPE), ‘Akaike information criterion’ (AIC) and ‘Hannan-quinn’ (HQ) suggested 12 lags, but ‘Schwarz information criterion’ (SIC) indicated 2 lags are appropriate. The lag exclusion test confirms the joint significance of VAR. The Portmanteau test for VAR residual serial autocorrelation confirms no-serial correlation with adjusted Q-Stat’s value of 1291.392 (0.00) at 49 degree of freedom (LM test is also conducted to check the robustness of the results).

The bivariate and multivariate Granger Causality tests are conducted to get the causality between refinancing rates and real economic variables. The table-3 below shows the results of Granger Causality tests.

Table-3: Bivariate and multivariate block Granger Causality

Effects on Output (Y)				
	Null Hypothesis	F-Statistics	Prob.	Results
Refinancing Rate(IR)	DIR does not Granger Cause DY	0.0660	1.000	Accept
Prices (P)	P does not Granger Cause DY	0.2656	0.9932	Accept
Money supply (BM)	DBM does not Granger Cause DY	0.0053	1.000	Accept
Exchange Rate (REER)	DREER does not Granger Cause DY	0.2649	0.9932	Accept
Markets Rate (MI)	DMI does not Granger Cause DY	1.8903	0.0435	Reject**
Net Exports (NX)	DNX does not Granger Cause DY	2.2403	0.0146	Reject**
Multivariate block	Block (IR, P, BM, REER, MI, NX)	58.105 ^a	0.8821	Accept
Effects on Prices (P)				
Refinancing Rate(IR)	DIR does not Granger Cause P	0.7096	0.7391	Accept
Output (Y)	DY does not Granger Cause P	0.4074	0.9579	Accept
Money supply (BM)	DBM does not Granger Cause P	1.4010	0.1768	Accept
Exchange Rate (REER)	DREER does not Granger Cause P	0.5484	0.8779	Accept
Markets Rate (MI)	DMI does not Granger Cause P	0.9809	0.4718	Accept
Net Exports (NX)	DNX does not Granger Cause P	0.1859	0.9988	Accept
Multivariate block	Block (IR, Y, BM, REER, MI, NX)	23.015 ^a	1.000	Accept
Effects on Exchange Rate (REER)				
Refinancing Rate(IR)	DIR does not Granger Cause DREER	0.7112	0.7375	Accept
Output (Y)	DY does not Granger Cause DREER	0.4365	0.9452	Accept
Money supply (BM)	DBM does not Granger Cause DREER	0.3554	0.9757	Accept
Prices (P)	P does not Granger Cause DREER	0.4224	0.9516	Accept
Markets Rate (MI)	DMI does not Granger Cause DREER	0.4344	0.9462	Accept
Net Exports (NX)	DNX does not Granger Cause DREER	0.6559	0.7893	Accept
Multivariate block	Block (IR, Y, BM, P, MI, NX)	65.767 ^a	0.6841	Accept
Effects on Net Exports (NX)				
Refinancing Rate(IR)	DIR does not Granger Cause DNX	0.5239	0.8950	Accept
Output (Y)	DY does not Granger Cause DNX	2.1709	0.0182	Reject**
Money supply (BM)	DBM does not Granger Cause DNX	0.0439	1.000	Accept
Prices (P)	P does not Granger Cause DNX	0.1378	0.9996	Accept
Markets Rate (MI)	DMI does not Granger Cause DNX	1.1538	0.3261	Accept
Exchange Rate (REER)	DREER does not Granger Cause DNX	0.2385	0.9958	Accept
Multivariate block	Block (IR, Y, BM, P, MI, NX)	106.522 ^a	0.0051	Reject*

Note: ^a represents χ^2 values. *, **, *** exhibit rejection of null hypothesis at 1%, 5% and 10% level of significance

The empirical results exhibit that there is a bi-directional Granger Causality between net exports (NX) and output (Y). It validates the point that Tajikistan may achieve a rapid progress through export-led-growth mechanism. A prime focus on exports could be used as an engine of growth. In addition, market interest rate (MI) also significantly Granger Causes to output (Y). Nevertheless, the lending channel is weakest effective channel of MTM in Tajikistan. Our empirical estimation could not find other significant links of monetary transmission mechanism.

The Granger Causality tests and Impulse Response Function explain that the transmission channels are not effective for output optimization and price controls in Tajikistan. Although, market interest rates have significant impacts on output (unidirectional causality), neither refinancing rate nor real effective exchange rate Granger Cause output (no causality). The Impulse Response Function shows that the interest shocks have no persistent effects on output (Y), inflation (P), real effective exchange rates (REER) and net exports (NX). The chain effects of interest rate channel are presented in figure-6 below.

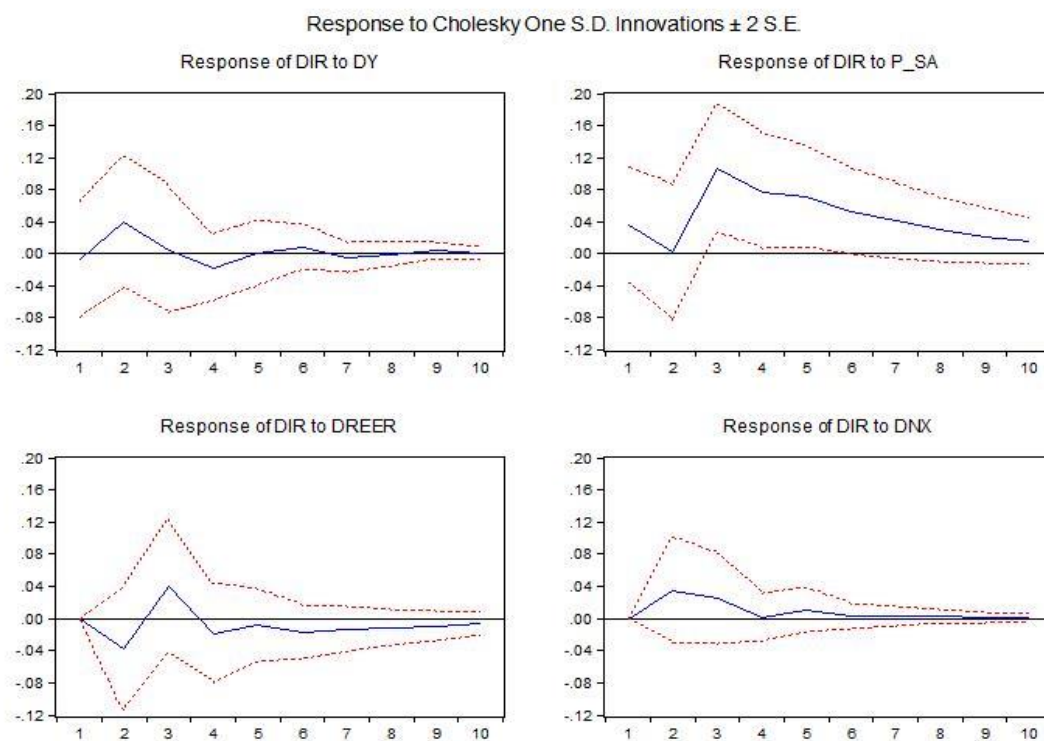


Figure-6: Chain effects of interest rate channels

Conclusions

The empirical results indicate the incapability of interest rate to influence either aggregate demand or inflation; such effect casts doubts on effectiveness of monetary policy in Tajikistan. The Granger Causality tests confirm the insignificance of monetary transmission channels for Tajikistan's economy. The only transmission channel that significantly affects the output was lending channel in our estimation. An ineffective monetary transmission upholds that the economy of Tajikistan is plagued with structural deficiencies including inefficient financial markets, lack of financially shrewd intermediaries, low capital formation, and a high level of dollarization. Though, there is a bi-directional causality between net exports and output but real effective exchange rate is not significantly correlated with output and prices. Also, refinancing rates or policy rates are not accommodative to subtle financial changes which are rapidly

occurring in the present era of economic financialization. Refinancing rate is often used for ad-hoc liquidity assistance with a focus to keep their values lower than the market interest rates. Despite the fact that the economy of Tajikistan experiences a high dollarization caused by foreign remittances, the interest rate channel is significantly ineffective and unable to stimulate the economic growth. In the absence of effective monetary transmission mechanism, the customers' confidence on banking is immediately required to reduce further dollarization in Tajikistan's economy. The dire consequences of high dollarization can induce the financial crisis similar to the Asian Financial Crisis in 1997.

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Appendix

The Graphical Pattern of Variables

The graphical pattern of variables

