Evaluating the Impact of Monetary Policy in Tajikistan with an Application of Vector Autoregressive Approach

by

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A List of Abbreviations

ADF	Augmented Dickey Fuller
ATMs	Automatic Teller Machines
BoP	Balance of Payment
CAB	Current Account Balance
CPI	Consumer Price Index
ECB	European central Bank
ECF	Extended Credit Facility
ECM	Error Correction Model (Mechanism)
ERM	Exchange Rate Mechanism
ETF	Electronic Transfer of Funds
FEVD	Forecast Error Variance Decompositions
FOMC	Federal Open Market Committee
FRS (Fed)	Federal Reserve System
GDP	Gross Domestic Product
GNDI	Gross National Disposable Income
HDI	Human Development Index
IFS	International Financial Statistics
IMF	International Monetary Fund
KPSS	Kwiatkowski-Phillips-Shmidt-Shin
LHS	Left hand scale
LIBOR	London Interbank Offered rate
MPC	Monetary Policy Committee
NDA	Net Domestic Assets
NDC	Net Domestic Credit

NFA	Net Foreign Assets
NBT	National Bank of Tajikistan
OMO	Open Market Operations
PP	Phillips-Perron
PPI	Producer Price Index
RHS	Right hand scale
RM	Reserve Money
SME	Small-Medium Enterprises
SVAR	Structural Vector of Autoregressive
UK	United Kingdom
US	United States
USA	United States of America
USD	United States Dollar
USSR	Union of Soviet Socialists Republic
TJS	Tajik Somoni
TALCO	Tajik Aluminum Company
TBs	Treasury Bills
VAR	Vector Autoregressive
VAT	Value Added Tax
WEO	World Economic Outlook
WWII	World War Two

Abstract

Macroeconomic stability of a country is importantly depends on a degree of the monetary policy effectiveness. In turn, a degree of monetary policy impact is determined on efficacy of the monetary impulses and its transmission mechanism to the economy, as well as from a variety of other factors. This research attempts to examine the impact of the monetary policy in Tajikistan by developing a standard vector autoregressive (VAR) model. Defined current monetary policy framework and its potential transmitting channels made it possible to test dynamic interrelationship of those identified systems' six monetary and real sector variables and to explain the extent of monetary policy impact to the market. However, the analysis showed that National Bank of Tajikistan (NBT) is constrained in using or targeting a qualitative variable that is its policy interest rate. The empirical results revealed a meaningful effect or correlation between monetary policy and other macroeconomic variables in the benchmark VAR model. Particularly, the operating target, i.e. reserve money, is effective in influencing inflation in the sense that expansionary monetary policy imposes positive responses of prices in the short-term. It was also found that exchange rate shocks have such positive impact on the level of prices. Moreover, it suggests that reserve money have positive short-term effect in real output. In view of the current monetary policy objective, in order to maintain stable level of prices, other things being equal, it is necessary for NBT to keep the growth of the reserve money more moderate.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

During the first decade of transition in Tajikistan after gaining independence, the economy underwent a severe period of recession and hyperinflation. According to the official data, during 1990s real GDP on average fell 5.5 percent annually, whereas inflation on average rose 47.6 percent annually. Effective macroeconomic management was impossible due to political and social instability. After achieving socio-economic stability in 2000s and afterwards macro-policy management improved (particularly of monetary and fiscal policies); a relatively balanced budget, control in the level of liquidity and somewhat control in inflation were observed. Establishing the new national currency – Somoni – also improved the monetary circulation and, in turn, contributed to the economic stability. All this was reflected in GDP growth and lower rates of inflation, which on average from 2000-2012 period were 8.1 percent and 14.5 percent, respectively.

Despite such achievements the bulk of the population is still living below the poverty line. The government failed to increase the domestic productivity base, job places and employed people. Looking forward it is worth noting that the above-mentioned growth was mainly achieved by other, non-fundamental factors boosting domestic demand and consumption expenditures. In turn, low productivity and diversification caused high external demand and a persistent negative trade balance.

Moreover, import dependency makes the economy vulnerable to various external factors (imported inflation, shocks) therefore limiting the effectiveness of economic policy. Besides, the institutional and structural shortcomings within such objective obstacles like a high level of dollarization of the economy, underdeveloped financial markets, and weak financial intermediation are also limiting policy efficiency. In such circumstances much depends on the degree of macroeconomic policy effectiveness.

Alongside other economic issues, inflation is considered to be of vital importance to the population of Tajikistan. It is believed that it not only affects the real income of households but also distorts the overall economic activity. A monetary principle based on empirical evidence suggests that being mainly a monetary phenomenon, the fundamentals of inflation generally lay in monetary disturbances (Mishkin, 2009; Walsh, 2010). Hence, the task of maintaining price stability is usually given to the central banks as they are in fact the money supply monopolists. There is also evidence that long-run stable prices positively influence the real economic dynamics and contribute to the real economic growth of the country. Thus, monetary authorities, by keeping directly their task "on-line", indirectly promote economic growth. In Tajikistan, without exception, the National Bank of Tajikistan (NBT) conducts monetary policy with the main aim to achieve stable level of prices.

However, there is no clarity about to what extent NBT can impact real economic dynamics taking into account its main objective. Moreover, how are the policy framework of NBT and its "on-line" tools affecting the market?[1] Of course,

[1] By market it is assumed mainly prices and output.

there other impediments and factors influencing the market which NBT obviously cannot control, but it is again assumed that the long-run pattern of level of prices is determined by monetary factors. It's assumed that the transmission effect of monetary policy in Tajikistan is characterized as underdeveloped, and the mechanisms for market-based regulation and its instruments remain weak.

1.2 Objective and significance of study

Nowadays, economic policies of any government have the ultimate goal of increasing the state and population's well being which is ensured by maintaining stable and long-run economic growth, steady employment levels, as well as low and moderate level of prices. Monetary policy is an essential part of economic policy and assists in achieving these goals. Here, the effectiveness of the afore-mentioned economic goals depends to a large extent on the successfulness of adopting monetary policy and its regime. In turn, understanding how monetary policy works and the degree of its impact demands a systematic knowledge of the links between monetary and other macroeconomic variables' interactions, as well as its effectively transmitting tools. This is particularly important to developing countries where institutional and structural characteristics are nascent and volatile.

The main purpose of this research is to find and assess the extent of the monetary policy effectiveness in Tajikistan, investigate and evaluate specific monetary transmission channels affecting the economy. For the appropriate

evaluation, among the objectives of the study is to undertake an in-depth historic-theoretical guide of the issues related to monetary policy and empirical foundations with its further methodological application.

The research also will aim to make suggestions regarding enhancing policy implementation and provide recommendation to the policymakers. Determination of the current monetary policy framework of the National Bank of Tajikistan and its evaluation compared to other existing regimes, as well as assessment of the conditions for its effective implementation are important parts of the research. Taking it into account, the topic is not much paid attention in the modern literature as regards to Tajikistan. Therefore, a detailed analysis and evaluation of the impact of monetary policy in such a developing country like Tajikistan is important to present scholarship. Moreover, it may also give possible important information for future research on the topic.

1.3 Scope of the research

Since the purpose of the research is to reveal the effect of monetary policy to the real sector, the quantitative method with an application of standard Vector Autoregressive (VAR) approach will be conducted. The VAR allows examination of the dynamic interrelationship among monetary policy and non-policy macroeconomic variables and the ability to find the degree of the policy innovations' impact. Hence, the methodology is explanatory and will be examining the cause and effect relationship and the endogenous variables thought to be correlated with other

variables. For example, between money and prices or exchange rate and output implying the research to be variable-oriented.

The study also attempts to make an in-depth review of the theoretical and practical bases underlying towards effective monetary policy implementation. A detailed analysis of macroeconomic developments in Tajikistan, with special analysis of the current monetary policy framework, to support the VAR investigation and to draw policy implications is an important part of the study.

It should be noted that the adopted VAR models themselves do not draw inferences about optimal monetary policy for NBT. Rather, the study attempts to evaluate its effectiveness, based on the obtained evidence about the response of macroeconomic variables to the monetary policy innovations. One of the limitations of the study is a relatively short span of the time-series which do not optimally allow distinguishing between time (short-run and log-run) effects of monetary policy. Therefore, the empirical investigation is being concentrated mainly on such short-term effects.

1.4 Structure of the thesis

The thesis is divided into six chapters. Chapter 2 overviews the development of the theoretical-historical economic thought regarding the role and objectives of monetary policy and concludes the main principles in the way of effective monetary policy implementation. Further, it reports on the operating instrumentation of how the monetary authorities directly conduct their policy. It reviews in detail the links

between monetary and other macroeconomic sectors, emphasizing the transmission mechanism of monetary policy. Lastly a review and descriptive analysis of the various monetary regimes has been undertaken in detail.

Chapter 3 analyzes the issues related to the current economy of Tajikistan, in particular the monetary policy – its framework, development and the obstacles preventing its effective implementation. Chapter 4 explains the methodological aspects, the model to be specified, the data to be utilized and its appropriateness. Chapter 5 reveals the empirical results of the study with its supporting discussions. And finally, chapter 6 comes up with the conclusion and policy implications.

CHAPTER 2

LITERATURE REVIEW

2.1 Monetary policy: the objectives, role and historical thought

Thinking about the role and purpose of monetary policy requires an understanding of what actually monetary policy is. Being an integral part of the overall government economic policies, monetary policy [which is traditionally the work of the central banks] executes a crucial role in achieving macroeconomic stability and promoting growth of the country. It is common knowledge that the objective of monetary policy principally is going to be managing the money supply in order to achieve a mix of moderately low inflation and stable economic growth (Mathai, 2009).

Nevertheless, the role and objectives of monetary policy in economic policy have been raised by many scholars, who at certain stages of economic thought belonged to the most influential theoretical schools. Different views on this issue have proponents of classical economic theory, Keynesians, monetarists, members of the new classical macroeconomic school, etc. As Friedman (1968, p.1) stated:

"There is wide agreement about the major goals of economic policy: high employment, stable prices, and rapid growth. There is less agreement that these goals are mutually compatible or, among those who regard them as incompatible, about the terms at which they can and should be substituted for one another. There is least agreement about the role that various instruments of policy can and should play in achieving the several goals".

The Classical School of economics with the well-known principle of "invisible hand" assign an insignificant role to the government policy based on the thesis of free-market economy and self-regulation mechanism. Accordingly the economy existed in a state of general equilibrium (any deviation is transitory), meaning that the economy naturally consumes whatever it produces [supply equals demand]. In classical economics the real and nominal variables are detached, i.e. changes in the quantity of money (money supply) will not affect the real variables (employment and real output) due to the assumption of economy working at full employment level. This idea becomes known as classical *dichotomy.* It was noted implicitly by Pigou (cited in Dixon 2001) as "money acts as a 'veil', behind which the real economy operates (Pigou, 1941)", as well as in Hume's statements (Henderson 2010, pp. 141-145). Hence, as the monetary variables (see central bank) have no effect on the real economy the classics believed that the money was *neutral* affecting only nominal variables such as inflation, wages, and exchange rates (Patinkin, 1987). It is clearly described by classic economists (D. Hume, J.S. Mill, A. Marshall, A.C. Pigou, and I. Fisher) within a quantity theory of money, which main idea [considered the long-run neutrality of money] is that in order to keep the level of prices low it is necessary for regulators to control the money supply.

On the other hand, taking account that in classical models (e.g. so called Cambridge and Fisher's equations) other variables such as output, employment, and velocity are assumed to be constant, i.e. do not respond to demand arising from output functioning at potential level, monetary expansion will further push prices to

grow. For instance Fisher's equation, which is known as the quantity theory of money states

$$M \times V = P \times Y,$$

where V = 1/k (the proportionality factor), is the income velocity of money (M), the ratio of money income to money stock. In other words, it is the number of times that money circulates while creating nominal GDP. So if V is assumed to be constant, whenever the economy is assumed to be at full employment (i.e., Y_f is fixed), there is a direct relation between the M and P (prices).

Eventually, the created excessive demand (through the Fisher effect) while raising all nominal variables (inflation, interest rate, wages, and exchange rate) will not affect real variables. Thus, the principle of money neutrality is a core factor in monetary analysis of the classical theory.

The Great Depression of the 1930s, with severe fall in output and rise in unemployment on a global scale, showed the market failure and the classical *laissez-faire* policy unable to overcome the crisis. John Maynard Keynes[2] for the first time cast doubt on and refuted classical fundamentals and reexamined the role of economic policy as well as gave renewed impetus to the development of economic theory and to the formation of the Keynesian school of thought.

Keynes overturned the classics' proposition about the role of the government in general and of monetary policy in particular. Contrary to the Walrasian approach of market-clearing prices and full employment equilibrium, in Keynesian theory there is a market failure. Market forces cannot achieve equilibrium because of the

[2] In the "*General Theory of Employment, Interest and Money"* (1936).

deviations in an *effective* or aggregate demand caused by wage and price rigidities that create *involuntary* unemployment. According this, the decision making process in the economy sometimes leads to inefficient macroeconomic outcomes which in turn require policy responses to lessen the extent of business cycle volatility and to stabilize output (O'Sullivan & Sheffrin, 2003; Blinder, 2008). Because of the Keynesians belief that causes of depression are insufficient demand, the view of the necessity of activist government policies, generally fiscal, to stabilize aggregate demand 'being the driving force behind macroeconomic fluctuation' and to prevent future depressions became the prevailing view for at least the next four decades after the Depression (Snowdon et al., 1994; Smiley, 2008).

In Keynes's view the interest rate appears as an exclusively monetary element affected by the money supply and the demand for money (not by saving and investment as in the classical model). Keynes' determination of output (Y) is an expenditure approach where Y is a function of C (consumption, both private and public) and I (investment), that is Y = C+I (in a closed economy). Since consumption is more or less a stable variable (depending on income), investment depending on business expectations and an uncertain future is rather volatile. Uncertainty also affects the level of demand for money-liquidity preference and thus, the money supply. Therefore, any change in money supply via a change in the interest rate will in turn affect the level of investment and eventually the output. In this respect Keynes showed that money (monetary policy) can influence not only nominal (prices and wages) but also real variables, and the principle of non-neutrality of money was proved. Moreover, in determining the theory of prices Keynes (1936), assuming the

case of nominal wage rigidity, argued that in the short run if there is a high elasticity of supply and not a situation of full employment where the economy is below its potential level of production (e.g. recession), the increase in the quantity of money will reflect in output growth and increasing employment but not in prices; otherwise 'when there is full employment, prices will change in the same proportion as the quantity of money'.

Similarly, this was found in the influential "Phillips curve" - A. W. Phillips (1958), later modified by work of Paul Samuelson and Robert Solow (1960) and stated the long run trade-off between inflation and unemployment. Generally, it shows an inverse relationship between inflation and unemployment rates: in the period of high unemployment inflation is low and vice versa. In this case by affecting the aggregate demand, monetary and fiscal policies' expansion or contraction will constantly lessen the rate of unemployment by accepting a higher rate of inflation or to maintain a lower inflation rate at the expense of higher unemployment and probably relatively smaller rate of output growth (Hoover, 2008a).

It should be noted that Keynes considered fiscal policy explicitly as demand-side affecting total spending directly (by expenditures) and indirectly (by taxes) (Tobin, 2008); and more powerful and effective than that of monetary policy measures especially because fiscal policy finds a more rapid adjustment of equilibrium, particularly during crises periods, although both of those policies have effect on aggregate demand. This thought was expressed in both *General Theory*[3] and in its interpretation by the Hicksian IS/LM model, in other words "with a

[3] *General Theory of Employment, Interest and Money* (1936)

relatively inelastic IS curve and a relatively elastic LM curve Keynesianism became synonymous with 'fiscalism" (Snowdon et al., 1994; Snowdon & Vane, 2005). Keynes' theoretical competitor Friedman (1968) to some view controversially expressed the role of monetary policy in 'Keynesian era' that:

"*Money did not matter. Its only role was the minor one of keeping interest rates low, in order to hold down interest payments in the government budget, contribute to the "euthanasia of the rentier," and maybe, stimulate investment a bit to assist government spending in maintaining a high level of aggregate demand*".

However, before the *General Theory,* Keynes' view on monetary policy considered the stabilization of the price level as the government's main policy, and for this the central bank must adjust *interest rates* in the period of price fluctuation.[4] Nevertheless, according to Alan Blinder (1988), a prominent Keynesian economist, nowadays these are dead issues and moreover, it is widely accepted that the monetary policy should, either in principle or in practice be responsible for stabilization policy.

The post WWII dominance of Keynesian theory in practice resulted in a widespread adoption of government economic policies (fiscal stimulus and 'cheap money' policies) and as a result in a *golden age of capitalism*. However, during 1970s macroeconomic instability emerged in the world economy (Nixon shock in 1971, oil crisis in 1973) and challenged the Keynesian discretionary policies. In this period many economies experienced stagflation - both high rising rates of unemployment and accelerating inflation, which contradicted the Phillips curve, that the classic Keynesians were unable to explain. As Snowdon and Vane (1996, 1999)

[4] See: *A Tract on Monetary Reform* (1923) and *Treatise on Money* (1930).

expounded, this stagflation indicated the fall of the Keynesian revolution and the spring of monetarists [Friedman, 1956, 1968; Friedman & Schwartz, 1963] and of the new classical counter-revolutions [Lucas, 1974; Lucas & Sargent, 1978].

Contrary to the Keynesian theory defining fluctuation in aggregate expenditure/demand as a main source of instability and the special role of fiscal policy, the monetarist school emphasizes the role of monetary disturbances and money aggregates in the business cycle fluctuation and the role of monetary policy; moreover, it considers that the Great Depression of 1930s was caused by a massive contraction of the quantity of money not by the fall of investment (Friedman & Schwartz, 1963).

If the Keynesians have focused on interest rates for the study of monetary policy, monetarists in their analysis relied more on the quantitative measures of money supply. Moreover, monetarists ignored the possibility of monetary expansion, since such policies have a temporary effect and would lead to a rise in prices and interest rates, because "inflation is always and everywhere a monetary phenomenon in the sense that it can be produced only by a more rapid increase in the quantity of money than in output" (Friedman 1963, 1968, 1970).

Milton Friedman (1968) challenged the traditional Phillips curve and developed the 'expectations-augmented Phillips curve' [Edmund Phelps (1968), did similar work independently] with an implication of the non-existence of a long-run trade-off between unemployment and inflation rather than in the short-run, i.e. the long-run Phillips curve is vertical. In the long run, monetary policy cannot control real variables but only nominal ones, i.e. it is emphasizes the long-run monetary

neutrality from a somewhat classical point of view. But monetary action can affect real variables in the short run is temporary, given a gradual response of the prices to a change in money per se and only after this (in the medium term) the effect of monetary policy will be reflected in the rise of prices. This theoretical evidence plays a very important role in understanding how monetary policy works and obviously now is part of conventional wisdom in macroeconomics (Bernanke, 2003; McCallum, 2008).

According to Snowdon & Vane (2005) expectation plays the main role in the monetarist analysis since that while inflation is unanticipated, monetary authorities can cut the unemployment rate below the natural rate. After, the public anticipates the unemployment will return to its natural level so obviously only expansionary policy in the long run will create inflation. Here, in order to increase output monetarists argue the government should undertake supply-side policies but not demand-side (Snowdon & Vane, 2005).

The role of monetary authorities in implementing monetary policy is, according to the monetarist school, to adhere to some [monetary] rule rather than discretion to "prevent money itself from being a major source of economic disturbance" (Friedman, 1968). The rule of targeting some nominal variable such as the exchange rate, the price level (inflation) or the monetary aggregate would avoid either inflation or deflationary outcomes and maintain the stability of economic activity. Friedman (1962, 1968) in particular emphasized monetary targeting as a more convenient tool for central banks and asserted that the money stock should

grow steadily "month by month, and indeed, so far as possible, day by day, at an annual rate of X per cent, where X is some number between 3 and 5".

Nowadays the criticism question is on exploiting the monetary aggregates. Money growth targeting regimes among developed countries have showed inadequacies as the monetary policy stance due to financial innovation and institutional change [which can affect the money growth as well]. Thus the link between monetary target and goal (inflation) is unstable and weak, contrary to more successful evidence, like inflation (the price level) targeting regimes (Bernake, 2003; Svensson, 2007). But nevertheless, policies based on monetarists' theory helped reduce inflation not only in developed market economies (e.g. UK, Japan, France, Italy), but as also helped dampen hyperinflation in many developing countries.

Debate between Keynesians and classics resumed with the counter-revolution of a new classical school of macroeconomics. It turned back to assertions of equilibrating role of the markets and a debate of the ineffectiveness of monetary policy (Lucas, 1972; Sargent & Wallace, 1975, 1976). The *rational expectations* hypothesis followed: full wage and price flexibility with a quick market clearing process.

New classics suggest that economic agents make their choices based on their assessments and/or expectations about the future using all available information in the most efficient way so that they maximize their utility or profits. Moreover, it implies that rational people will range their expectation in such a way as to eliminate those being systematically false over time (Sargent, 2008). As a result such an optimization behavior will continuously tend the market forces to "clear" and to be in

an equilibrium level. For instance, according to Hoover (2008b) taking the labor market in a case of involuntary unemployment, Keynes rejected the cutting of wages to a level the unemployed will accept as a way of stabilization. But the new classical theory oppositely has considered Keynes's view as irrational because firms by paying workers a lower wage might have raised their profits at the expense of unemployed since they stand ready to take the employed workers' places at relatively lower wages.

The new classics positioned themselves that any demand-side policies do not have real-side effects and proposed supply-side policies to stimulate real economic dynamics. In their 'policy ineffectiveness proposition' (Sargent & Wallace, 1975, 1976) monetary policy is, if *anticipated* by economic agents, ineffective (neutral) even in the short run (super-neutral) and any policy's effort to stabilize economy will be devoured by the rational market participants anticipating these actions and adapting their inflation expectations (Snowdon at al., 1994). However, accordingly to Lucas (1975, 1977) the real sector (output and employment) fluctuations are caused by shocks to aggregate demand only from *unanticipated* changes in money supply which have a short-run real side effect. This 'unanticipation' of economic agents is an outcome from wrong expectations about the relative prices, and as a result they are willing to accept the effect of nominal rise/fall in money to produce more/less (output) and to increase/decrease work (labor) until they are aware of that change were in general prices. But such temporary policy non-neutrality cannot be conducted systematically since it was induced by wrong anticipation (Hoover, 2008b). Thus, in general monetary policy is also considered ineffective in

influencing real variables and its primary task was defined in maintaining price stability.

Kydland and Prescott (1977) went further developing a modified new classical model based on the so-called *dynamic time inconsistency* of policy problem. This is a situation where anticipated monetary policy, for instance, of keeping interest rates in line with an announced certain level of inflation, is believed and accepted by the private sector according to their expectations. In that case authorities that are unconstrained in their policy will at certain times find an incentive to renege on promises made to the public, for example by increasing money supply to accelerate real growth dynamics and hence creating more [surprise] inflation. Since in the model economic agents are also rational, they will realize a 'cheat' between the expected (announced) and actual policy and will optimize their expectation appropriately reducing the effectiveness of the monetary authorities' actions as well as credibility to the optimal policy. Here, as the time inconsistency problem is the problem of discretionary and thus inflationary biased monetary policies influenced by the governments, a strong view appeared for importance of central bank independence and its commitment to some *rules* of 'game' to conduct the policy optimally and to gain the credibility (Barro & Gordon, 1983; Bernanke & Mishkin, 1992).

In concluding the summary of the new classical macroeconomics it should be noted that the policy-ineffectiveness proposition regarding the monetary forces in affecting real output is formerly but not presently accepted. Mishkin (1982) and Gordon (1982) showed that in the short run, monetary policy is non-neutral even if it

is anticipated or unanticipated, and therefore, taking into account lack of alternatives for the monetary policy in the long run, "it may be of considerable use in the short run" (Hoover, 2008b). In that vein, Taylor (1989) emphasized that although proposition about rational expectations is very influential, "fully flexible prices and market clearing was something that made little sense… even as an empirical approximation; wages do seem to be sticky at least for a few quarters…".

Furthermore, contrary and as a response to the new classical theory, the New Keynesian economists developed models which particularly emphasized market imperfection and the short run stickiness of wages and prices (Mankiw, 2008). For example, in the case of monetary expansion or contraction, demand for goods and services will rise or fall. Since there is a lag between policy impulse and price response, prices and wages adjusts comparatively slower i.e. do not rise or fall as quickly as the market could cleared. So the effect of increased/decreased demand will be reflected in rise/fall of output and employment. According to Cooper and John (1988) and Mankiw (2008) several factors rationalize such behavior of prices like (i) "menu cost", that implies that for firms adjusting prices and wages are costly and time-consuming; (ii) staggering of prices, implies that individual firms adjust their prices unevenly; (iii) coordination failure, occurs when firms fail to get a more favorable outcome because they do not coordinate their decision making; (iv) efficiency wages theory explaining the real wage rigidity, where current high workers' wages and hence high productivity prevails over firm's reason to lower wages due to a possible loss in productivity and profits.

Thus, according to new Keynesians view, money is non-neutral and monetary policy can temporary influence real economy. Accordingly, an active monetary policy intervention should be directed counter-cyclically, eliminating market imperfection (either demand or supply shocks), rather than allowing excessiveness in managing the economy ("fine-tuning") or a laissez faire based policy of sticking to some fixed rules (Snowdon & Vane, 2005; Mankiw, 2008).

Theoretical debate between various economic schools through their practice has led to the formation of a position accepted by most economists. The main controversies within modern macroeconomics on the role of monetary policy in particular, more referred to the Keynesian and monetarist standpoint where the debates are generally not on the goals but on "priorities, strategies, targets, and tactics" (Tobin, 2008). As Tobin further noted these distinctions are based on views as to what monetary policy should prioritize: price stability or full employment? Or the choice of strategy by central banks: should it be a monetarist rule-based approach, keeping a constant level of money supply growth or a Keynesian implicitly active policy, damping market distortions and shocks?

Nowadays, many central banks, for example the U.S. Federal Reserve (FRS, Fed), conduct monetary policy without explicitly setting any quantitative target for inflation but consider it important to promote "maximum employment" and price stability[5]. Meanwhile, some, like the European Central Bank (ECB), are more conservative, determining the primary objective of maintaining price stability as a "single monetary policy for which it is responsible", promoting "without prejudice to

[5] See: The Federal Reserve System: Purposes & Functions, 2005.

the objective of price stability" to general economic policy objectives of maintaining full employment and economic growth.[6] In parallel, the Fed's monetary policy seems Keynesian, while ECB's somewhat monetarist. This position reflects much more to these countries' experiences of depression and hyperinflation in the period before and after WWII (Tobin, 2008).[7]

Nevertheless, conventional wisdom is that the primary goal of monetary policy, taking into account its ability to effectively control the level of prices in the long run, should be ensuring price stability. What is important is that low and stable inflation is consistent with stability and efficiency of the economy as a whole, which is reflected in sustained and higher GDP growth (see Fischer, 1993; Taylor, 1996, 1998). Moreover, low and stable prices over time not only contribute to economic growth, but also smoothen the economy's sensitivity to different shocks (Bernanke, 2003).

Goodfriend and King (1997) outlined several major historic-evolutionary conclusions about the role of monetary policy, which are "consistent with the public statements of central bankers from a wide range of countries". First, that money is not neutral and monetary policy has real effects on economic dynamics due to a slow adjustment of prices. Second, that in the long-run monetary policy is neutral ('little trade-off between inflation and real variables'). Third, that inflation seriously affects the nation's welfare due to its distorting impact on economic performance. Fourth, that credibility plays a significant role in effective implementation of monetary policy.

[6] See Treaty on European Union and the Treaty on the Functioning of the European Union, 2008 *Official Journal of the European Union, 5, p. 10.*

[7] Tobin (2008) similarly noted Fed's and Bundesbank's policies in scope of the early 1980s recession.

In line with this Mishkin (2007a, 2007b, 2009), based on theory and practice, cited several main monetary principles that are nowadays common knowledge and interdependent with the effective implementation of monetary policy. It firstly states that monetary expansion is the main source of inflation, so that in the long-run there is no alternative between unemployment and inflation, and that low and stable inflation contributes to sustainable growth; Secondly, monetary authorities should take into consideration the role of expectations; and adjust their interest rates against inflation (e.g., Taylor rule); Thirdly, as monetary policy is exposed to the problem of time-inconsistency, central bank independence and 'commitment to a strong nominal anchor' are important prerequisites in the effectiveness of monetary policy; and lastly, financial instability leads to cyclical disturbances and weakens the real economic dynamics.

Thus, the monetary policy role consists in controlling the money supply [as a body having prerogative to issue money] so to achieve macroeconomic balance by 'supporting output at its potential level in an environment of stable prices' (Goodfriend & King, 1997). Hence, maintaining price stability of neither deflation nor inflation is fundamental for central banks and has a smoothing effect on aggregate demand and further steady economic growth. It cannot directly have real effect on the economy in the long run that is central banks cannot persistently expand or contract the money supply; otherwise such policies will either boost inflation or create deflation. Attempts to use its tools permanently to accelerate economic dynamics, as evidenced by numerous historical examples, have led to negative consequences. In the short run as a demand-side policy it is associated with

achieving balance in the economy, and in eliminating serious fluctuations in the business cycle. For example, during the slack when there are deflationary processes and such important measures like consumption, investment and productivity slow down increasing the amount of unemployed. However, whenever an economy reaches its full employment of output, policymakers should act carefully since excessive demand will create inflation.

It should be noted that expectation is a very important factor regarding conducting monetary policy (Mishkin, 2011). To what extent will the policy be effective and credible is interdependent on the expectations and behavior of economic agents. Bernanke (2003) noted about the importance of anchoring of inflation expectations:

"*When the public is confident that the central bank will maintain low and stable inflation, shocks such as sharp increases in oil prices or large exchange rate movements tend to have at most transitory price-level effects and do not result in sustained inflationary surges*".

2.2 Monetary policy implementation: its instruments and transmission mechanism

So far it has been more or less defined that the ultimate objective of central banks' monetary policy in the long run is predominately achieving price stability (a low and stable level of inflation). Supporting economic stability, growth and employment through the instrumentality of countercyclical monetary policy to offset economic fluctuations has been the other objective of central banks. There are some

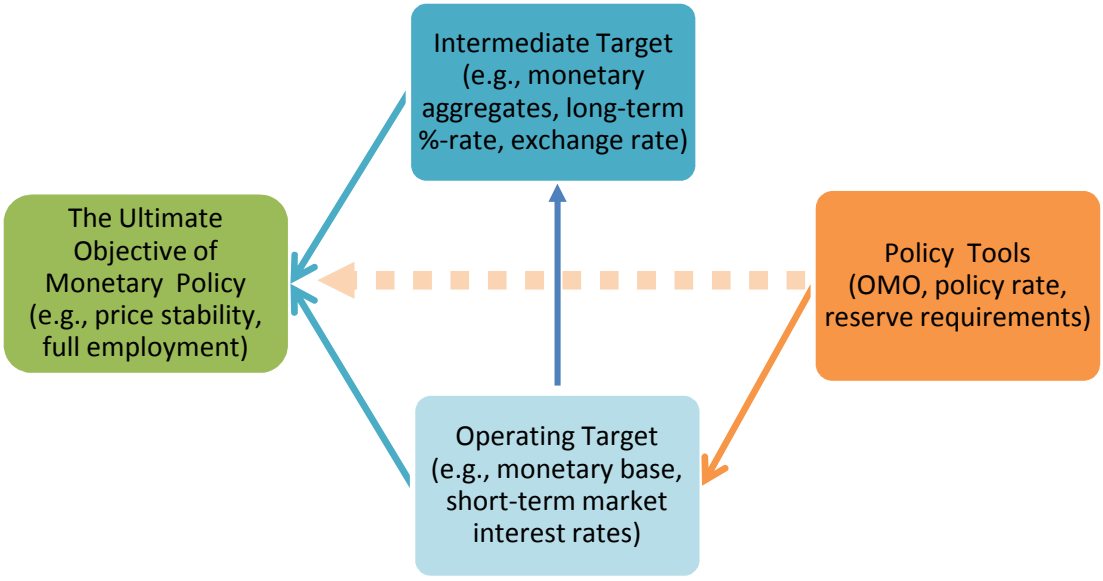
other objectives like stability of interest rates, foreign exchange and financial markets (Mishkin, 2007b, p. 395). But what are the other policy procedures of the monetary authority and how does it affect the economy?

In order to reach their objectives, central banks try to affect different targets that are classified as operating targets and intermediate targets that in turn will affect the final target (Khan, 2003; Mishkin, 2007b). *Intermediate targets*, such as monetary aggregates or long-term interest rates, are more consistent with the long run objectives of monetary policy and central banks do not affect them directly. While *operating target* or instruments being more functional and flexible to use is directly affected by the policy tools.

In Figure 2.2.1, monetary policy is defined as the control of an operating target (e.g., reserve money or short-term interest rate) that the monetary authorities carry out by manipulating of day-by-day tools with the view of achieving a desired operating target, intermediate target and ultimately a goal. A central bank's tactics are based on its main elements such as, policy implementation tools and operating targets that are fairly called "nuts and bolts" of monetary policy (Samuelson & Nordhaus, 2010).

In turn, monetary policy strategies consist in achieving the intermediate targets and ultimate targets. In other words, central banks use policy tools daily to affect short run operating targets, which then influence medium term intermediate targets, and finally achieve long run goals. The reason of such time horizon is that the relation between policy actions and prices is less direct because prices respond to monetary impulses in a longer term with certain time lags (Friedman, 1968).

Figure 2.2.1 Conventional monetary policy frameworks



As it was noted, monetary authorities through their influence on monetary base[8] or short-term resources can affect an intended monetary stance, e.g., by controlling the monetary base authorities can affect the level of money supply in the economy. Monetary policy is traditionally realized through a variety of tools to achieve the objectives. The main monetary policy tools are generally subdivided into open market operations, discount policy rate, and reserve requirements. There are also such instruments like foreign exchange intervention and even unpopular ones, such as different direct quantitative intervention (e.g., restrictions, lending).

It is necessary to point out that as a practice subject to a current stance, monetary authorities using policy tools aim to influence operating targets such as

[8] Also known as reserve money or high-powered money. By the IMF (1997) definition it 'includes mainly issued currency held both in banks (cash in vault) and outside banks (currency in circulation), plus bank and nonbank deposits with the monetary authorities. It excludes the deposits of the government and nonresidents with the monetary authorities'.

monetary base or short-term interest rates within the interbank money market (Mishkin, 2007b). For instance, the Fed targets the federal funds rate (the interbank interest rate), the Bank of England focuses on official bank rate (Repo rate), the ECB targets refinancing rate, the Swiss National Bank sets target for the three-month Swiss franc Libor rate[9], and the Bank of Japan uses the uncollateralized overnight call rate as a policy stance ([10]). All above-mentioned central banks most commonly use repo transactions (repurchase agreements) to control the interest rate targets and the money supply.

The *open market operations* that implies buying and/or selling securities in the open market is probably the most effective instrument in achieving determined operating target and the level of system's liquidity. In general, various governments' bonds, and also bills issued by the central bank, act as a securities. As the case may be, an authorized body within the central bank (e.g., monetary policy or open market committees) takes a decision regarding purchasing of securities or even foreign exchange, in case of prevention the deflationary processes and recover economic activity; or selling, in case of preventing inflationary pressures or smoothening economic overheat. Purchasing transactions increase the monetary base and thereby money supply in the form of an increase in currency in circulation (if newly printed currency is used to pay for the government securities) or an increase in deposit banks' accounts in the central bank (if purchased from commercial banks), and moves interest rates downwards. In turn by selling available securities it shrinks reserve money and money supply, and finally moves interest rates upwards.

[9] The Libor is a reference interest rate in the interbank market for unsecured loans published daily by the British Bankers' Association.
[10] Information retrieved from the stated central bank's official websites.

While open market operations allow for monetary authorities to take the initiative to influence market rates, the *discount policy* is a tool that arranges conditions at which banks can get liquidity at a rate assigned by the central bank itself. Under this facility commercial banks that have temporary or severe shortages of liquidity can borrow from the central bank. Increasing the interest rate makes borrowing more expensive, referred to as a tightening of monetary policy; conversely, in reducing it, central banks make borrowing for banks more favorable, and thus this increases the monetary base and the money supply. Needless to say one of the important duties of central banks is acting as a lender of last resort. Particularly it is considered to be an effective instrument during banking crises, allowing direct provision of liquidity to commercial banks (Mishkin, 2007b).

However, within this tool as it was mentioned above, the real initiative is not on the side of policymakers and it is not fully controllable, thus limiting effectiveness of policy in influencing the level of liquidity in the economy. The initiative is on the commercial banks' side because they make the decisions whether to borrow or not. Therefore, taking into account development of financial markets, most central banks have been limiting discount rate transactions (IMF, 1997).

The authorities for controlling the money supply also use another tool called *reserve requirements* - a regulation that every depository institution must hold a certain percentage of its attracted deposits within a central bank's account. Central bank sets this percentage, which is called the reserve requirement ratio. An increase in this ratio impels the banks to keep a larger amount of reserves for the same amount of deposits. This on the one hand will be reflected in an increase of monetary

base, and from the other hand it will reduce the amount of loanable funds for banks. Finally, creation of money through the effect of the money multiplier will fall and hence will restrict money supply. Decreases in the reserve requirement ratio have the inverse effect i.e. will ultimately expand the money supply.

It is worth to note that reserve requirement, though being viewed as an important policy tool and used effectively in the past, nowadays has been losing its importance. Some central banks of the world (like Switzerland, Canada, Australia, New Zealand, Japan, and the United Kingdom) have already eliminated reserve requirement for the use of open market operation or set them at a low ratio (Sellon & Weiner, 1997; Woodford, 2001). Moreover, as these and other developed countries' central banks have abandoned operating targets of controlling monetary base for the use of short-term interest rates, the importance of reserve requirements as a policy tool has declined. Accordingly the reason is that (i) it distorts the banking system since it acts as a tax on banks and lowers competitiveness; (ii) financial and technological innovations[11] have led to a situation where banks in some countries (e.g., US, Canada) can circumvent costly reserve requirements; (iii) it is not reasonable to increase the reserve requirement because banks are already biased to keep more than this as vault cash in order to maintain increased demand for ATM use, and as Fed's contractual clearing balances[12] (Mishkin, 2007b).

[11] This is related to the development of "sweep accounts" that allows financial institutions to sweep extra money overnight from the deposit accounts that are subject to a reserve requirement (checking accounts) to accounts that are not.

[12] "Contractual clearing balances are those established by a depository institution to provide protection against overdrafts in its account with its Reserve Bank" (FRB: Federal Reserve Banks Quarterly Financial Update, September 2012).

Monetary policy transmission channels

As it was considered in the previous section, monetary policy within a different time (lags) has important effects on aggregate demand, and therefore on both output and prices. In the short to medium run, due to the phenomena of prices' stickiness, it may affect real variables and the effect on nominal variables will appear after this, in the medium term. But in the long run the monetary policy efforts to increase employment are futile since it will result only on changes in prices.

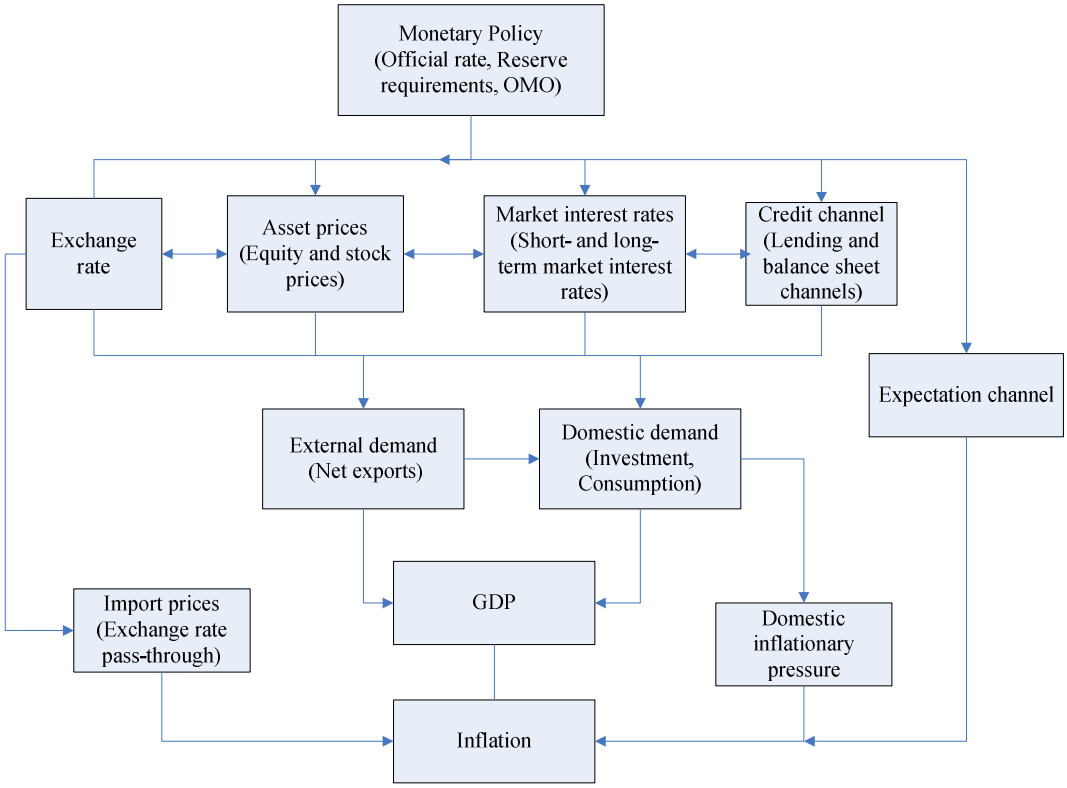
Monetary policy implementation assumes to affect a number of variables before the policy will be reflected in its ultimate objective, e.g., inflation. In that respect, this process, notably monetary transmission channels, shows how central bank actions in controlling an operating target such as money supply or interest rate influences the final target such as the level of prices, output and employment (Ireland, 2008). Thus, the transmission mechanism of monetary policy applies to the entire process through which monetary policy affects the macroeconomic variables, such as GDP and inflation.

Economic literature (for instance, Mishkin, 1995) defines a number of channels of monetary transmission that in turn impact aggregate demand components such as investment, consumption, expenditure and net exports (see Figure 2.2.2). They are: (1) the interest rate channel; (2) other asset price channels like exchange rate, equity and stock prices; (3) credit channels (including bank lending and the balance sheet channels).

It should be noted that in contrast to advanced economy countries, where these channels of monetary transmission operate substantially, in less developed

countries in view of shortcomings of banking and underdevelopment of financial systems only some of them are applicable.

Figure 2.2.2 Stylized monetary policy transmission mechanism



The conventional Keynesian model views the *interest rate channel* as a backbone in the monetary transmission mechanism whereby money supply affects economic activity (Snowdon & Wane, 2005, pp. 63-64). Mishkin (1995) pointed out that the central bank, in order to stimulate (or contract) the economy, increases (or decreases) the money supply, which lowers (or raises) the real interest rate and in turn stimulates (or depresses) consumer and investment spending and therefore GDP.

I.e. with any policy induced change in the money supply (M) the equilibrium in the money market will change the short-term nominal interest rate (i) which in turn, taking into account that prices are sticky, will be reflected in the reduction of both short-term and long-term real interest rates (i_r). Boivin et al. (2010) noted that the real interest rate[13] is the driving force in the transmission mechanisms. For instance, a decline in the real interest rates (i.e. reducing the cost of capital) will lead to an increase in investment (I) and consumption (C), as well as household spending on durable goods. As a result, with increasing aggregate demand output (Y) will grow:

$$+\Delta M, -\Delta i \rightarrow -\Delta i_r \rightarrow +\Delta I,C \rightarrow +\Delta Y$$

In most developed market economies the effect of this channel is decisive and plays the main role in decision-making on monetary policy, especially among the inflation targeting countries, since raising the central bank policy rate on short-term market rates through interest rate channel by reducing economic activity (aggregate demand) in the end will affect inflation (π):

$$-\Delta M, +\Delta i \rightarrow +\Delta i_r \rightarrow -\Delta I \rightarrow -\Delta \pi$$

Subject to the current stance, the monetary policy expansionary/contractionary actions with a fall/rise of the interest rates lead to devaluation/appreciation of the exchange rate (e). As a result, through the *exchange rate channel*, depreciation of the national currency will make domestic goods cheaper than that of foreign and lead to net exports contributing to higher growth. Conversely, in case of the appreciation, net exports and hence GDP growth, will be lesser:

[13] Real interest rate linearly defined as: $i_r \approx i - \pi,$, where i - nominal interest rate and π - the rate of inflation.

$$\Delta M, \Delta i \rightarrow \Delta i_r \rightarrow \Delta e \rightarrow \Delta NX \rightarrow \Delta Y$$

It should be noted here that countries (e.g. Tajikistan) that are externally vulnerable with high exchange rate pass-through and low productive capacity such a policy of devaluation will boost inflation, though with some improvement of the trade deficit. Moreover, it may affect the balance sheets of economic agents who have debt or liabilities denominated in foreign currencies and are subject to currency risk, which is the case of underdeveloped dollarized economies. The depreciation/devaluation will increase the value of their liabilities as they were utilized in national currency, resulting in a loss of agent's (individuals, firms, banks) net worth. In general, such environment of uncertainty and asymmetric information deteriorates business activity and banks' lending. As a result the monetary authorities will be faced with an inverse effect - the costs of borrowing will raise, investment and the GDP will fall.

Other asset – equity price channels emphasized by Mishkin (1995) through which monetary policy affects economy is the so-called *Tobin q-theory* of investment, developed by J. Tobin (1969) and *wealth effects.* According to Tobin's *q,* defined as the ratio of the market value of capital to the replacement cost of capital, the activist monetary policy will lead to higher demand and a rise in stock prices; this will increase the market value of firms' capital relative to the cost of capital (e.g. additional capital like physical capital) and the *q* ratio. Consequently, investments increase as firms have more capital [and do not need to issue new stocks] and find it cheaper to involve in deferent projects.

The *wealth effect* explains how monetary easing and a further rise in the stock prices of firms, including households' shares in capital and real estate, increases their financial wealth and according to Modigliani (1971) their lifetime resources, therefore leading to more consumption spending.

There are two other important channels: the *bank lending channel* and the *balance sheet channel* classified as credit channels. An expansionary monetary policy will increase reserves and deposits of the banks, which in turn will make the desired access for the bank's loans easier as the interest rates are relatively lower. This is favourable for low-capitalized firms that consider bank borrowing as a primary source of capital for investment spending or even for individuals to obtain consumption loans for expenditures on durable goods and services. As a result, more investment projects and consumer spending will lead to increased aggregate demand and hence, GDP. At the same time it implies the banks to be well suited in the face of asymmetric information problems (Mishkin, 2007b).

Monetary tightening assumes to worsen the *balance sheets* of firms and households' net worth through the change in stock prices making borrowing at desired interest rate difficult due to increased risks of bank's lending related with the decline in economic agent's net worth (adverse selection and moral hazard problem). As a result domestic demand as well as inflationary pressure will be dampened. In contrast expansionary monetary policy raises the stock prices and net worth of the firms together with lending, investment, and GDP growth.

Public expectations play a special role in the effective conducting of monetary policy. It is believed that consistent announcement of its current and

ultimate objectives, thereby building credibility, is an important tool to influence inflation expectations. If economic agents have confidence in the central bank, this channel can be expected to be the fastest and strongest. Indeed, many developed countries central bank's policies are based on anchoring or managing expectations since the public forms their own budgets according to the official inflation forecasts or to their own expectations. In case of existing confidence in the central bank, an announcement of lowering the inflation target below the current rate will assure the public to form their budgets accordingly without increase in wages. In this case the direct effect appears to influence prices and inflation to stay low since in low inflation environment all economic agents increase wages and prices more modestly than in the economy with high inflation, otherwise it may worsen the competitiveness of their products.

The monetary transmission mechanism is necessary but not sufficient condition for the effectiveness of monetary policy. Obviously its action should be based on the appropriate monetary regime, which determines the priority of the monetary policy goals. Conversely, the choice of the monetary regime depends on the efficiency of the monetary transmission; otherwise, if the monetary regime is based on a weak transmission mechanism then policy will be ineffective. One can conclude that clear understanding of the mechanisms through which monetary policy affects the economy is very important to the authorities for successful realization of policy.

2.3 Monetary policy regimes

The fall of the traditional Keynesian model of economic steering and inflation spurt of 1960-70s gave an impetus to a new thread in monetary research, the role of monetary policy, and importance to curb inflation in particular. As it was pointed out earlier, most economists and central bankers henceforth recognized the significance of maintaining price stability permanently and distortions that bears inflation, and not the least that monetary authorities in their policy conduct have expansionary incentives, that are inflationary biased (see the policy time-inconsistency problem). All these factors have led to awareness of the fact that monetary policy, to be implemented effectively, should be based on rule (see Barro & Gordon, 1983), i.e., should be systematically predictable.

Here, as many scholars of the field like Mishkin (2007a, 2007b, 2009) and Khan (2003) emphasized, the role and necessity of targeting some explicit *nominal anchor*, such as monetary aggregates, inflation rate or even exchange rate is critical for monetary authorities. One of the advantages of sticking to a nominal anchor is that by keeping the target to a predictable constant level not only helps to insure monetary transmission that is stable prices and output, but also lowers inflationary expectations.

However, this implies that monetary authorities should choose a credible monetary regime (i.e. nominal anchor) and appropriately operating and intermediate targets (interest rates, monetary base or aggregates) to be sufficiently measurable, controllable and effective (Mishkin, 2007b). Hence, a credible "nominal anchor"

ideally operates as a communicational instrument forming low inflationary expectations and therefore makes monetary policy more effective (Khan, 2003). In turn, if monetary policy tools are not effective then the transmission mechanism and policy outcomes will be weak.

It must be noted, that sufficient tools of monetary policy implementation and credible monetary regime (nominal anchor) on the one hand, and the institutional structure, existence of capacious and lively financial markets, both of interbank money market and public funds on the other hand are the crucial factors in effective implementation of monetary policy. Moreover, active moving towards transparency and accountability must be on default undertaken by the modern central banks [as they are now largely independent] in order to minimize negative consequences of discretionary policies and try to form positive expectations about policy conduct (Mishkin, 1999, Walsh, 2005).

Thus, the monetary policy regime determines the strategy of the monetary policy whereby an intermediate target or a goal by itself acts as the main policy indicator. In theory and practice of conducting monetary policy, countries have been utilizing several types of monetary regimes as a nominal anchor with more or less degree of success (Mishkin, 1999, 2007a; Stone & Bhundia, 2004).

In general, the four major types of regimes are: (1) exchange rate targeting regime; (2) monetary targeting regime; (3) inflation targeting framework; and (4) an implicit nominal anchor regime.

Table 2.3.1 Overview of monetary regimes

Regime	Anchor	Clarity
Exchange rate targeting	Exchange rate	High
Monetary targeting	Money aggregate	Medium
Inflation targeting	Inflation rate	High
Implicit nominal anchor	Price stability	Low to medium

Source: Stone & Bhundia (2004)

Exchange rate targeting regime

Exchange rate targeting as a policy regime has a long historical record in conducting monetary policy. The Gold standard, in which the unit of the national currency was defined with reference to gold, and the Bretton Woods monetary system of gold-dollar standard, were the sort of pioneers of targeting the exchange rate. In early 1970s, after the crises and the end of the Bretton Woods System member countries moved to more flexible regimes and exchange rate as a targeting regime switched over to developing countries.

This regime is defined as fixing the value of the national currency, either legislatively or by international agreement, to the value of another foreign currency (mostly U.S. dollar or euro) or a basket of foreign currencies. It implies that a foreign country has a large and stable economy with low inflation history and a credible monetary policy. It assumes that the monetary authority will actively intervene in the foreign exchange market to keep the exchange rate at its fixed rate. According to IMF (2006) as of July 31, 2006 de facto 111 countries out of 187 were used one or another subtype of the fixed exchange rate arrangements.

As a monetary regime, fixed exchange rates can be either hard pegs or soft pegs subject to the degree of binding commitment (Table 2.3.2). IMF (2006) and Stone et al. (2008) divides *hard pegging* regime that covers currency board arrangements, full dollarization, currency unions; and *soft pegs* which include fixed pegs, pegged exchange rate within horizontal bands, crawling pegs, and crawling bands.

Table 2.3.2 Types of exchange rate regimes

Fixed exchange rates (Exchange rate anchor)		Flexible exchange rates[14]
Hard fixed	Soft fixed (pegs)	
- Currency Board - Full dollarization - Currency/Monetary Unions	- Fixed peg - Pegs within horizontal band - Crawling peg - Crawling band	- Managed floating - Independently floating

Source: IMF (2006)

For instance, under the *currency board* regime, a monetary authority is explicitly committed to fix the exchange rate with the anchor currency and stands ready to exchange national currency to foreign at a specified exchange rate (IMF, 2006). This accordingly requires the currency board to keep sufficient foreign exchange reserves to back the monetary base, i.e. issue one unit of national currency for each amount of foreign exchange it keeps as reserve assets. This in turn strictly

[14] Flexible exchange rates are not part of the exchange targeting regime and included only for completeness. In their case other monetary regime acts as a nominal anchor, e.g. monetary targeting or inflation targeting

ties the monetary authority's discretionary power. Hong Kong SAR, Estonia, Bulgaria, Brunei, etc are examples operating under such a regime.

Under the *full dollarized* regime the other country's currency used and circulates as the only legal means of payment (e.g., Panama and Ecuador using U.S. dollar) and in *currency/monetary unions* member-countries have and use the same legal tender or peg shared currency to some strong currency (e.g., Euro zone, CFA franc zone, East Caribbean dollar).

According to IMF (2006) under *fixed peg regime,* monetary authority pegs its currency against a single currency, a weighted basket of currencies or some union's currency (e.g., euro) within ±1%-2% bounds, usually by means of direct foreign exchange market intervention or indirectly (e.g., interest rate change). *Pegs within horizontal bands* is the same as fixed pegs with the difference being that margins are more than ±1%. The other two are: *crawling pegs,* in which the peg is gradually adjusted over time subject to change in set of indicators (e.g., inflation); and *crawling bands,* where the exchange rate is allowed to fluctuate within the band which is itself adjusted periodically.

A flexible exchange rate which is nothing to do with exchange rate targeting regime, is divided into *manage floating* exchange rate, where authorities often intervene in the foreign exchange market with no predetermined targets; and independently or *free floating*, where exchange rate is determined by market forces and even if central banks intervenes, that only to minimize short-term leaps.

In general, the advantage of the fixed exchange rates as a targeting regime is that it serves as a 'roadblock' for high-level inflation as it imports credibility from an

anchor country with low inflation. The confidence gained from elimination of exchange rate volatility enables 'peggers' to anchor inflation expectations in line with foreign inflation and thus, provide price stability in quite long periods. Moreover, it is easily understood by the public, the exchange rate targeting helps avoid the problem of time-inconsistency (Mishkin, 2007b). However, the central bank's independence to conduct monetary policy is completely null or very limited.

The benefits of soft exchange rates (pegs) as a target for monetary policy are those that were outlined in the previously with the exception that it allows some limited room for monetary policy flexibility. But soft pegs can be very vulnerable to shocks like speculative attacks and to those shocks in the anchor country that may result in severe financial crisis (e.g., ERM crises, Asian and Latin American crises). It follows that soft pegging central banks usually have a less strong commitment to a fixed exchange rate than the hard pegs.

Moreover, according to Mishkin (1998), exchange rate pegs are more dangerous in developing countries as it may exacerbate financial security and lead to severe crisis because of the excess dollarized liabilities of financial institutions expressed in domestic currency and hence, debt contracts denominated in foreign currency will make vulnerable both financial and nonfinancial market participants creating balance sheet problems for any exchange rate devaluation.

The experiences of the 1998 East Asian crises demonstrated how the negative outcomes of exchange rate pegs can lead to a currency and financial crises in developing countries. An ex facte currency stability and minimum risks together with highly opened capital account created in these countries favourable environment for

huge capital inflows (including speculative) from abroad and lending boom (including property and stock markets bubble), and in turn exposures to exchange rate risk of the economic agents (IMF, 1998). With inadequate rules and financial oversight, a condition that exists in most developing countries, it led to deterioration in the quality of banks' loan portfolios and overheating pressures in the economy. The negative investors' expectations about the commitment of the authorities to stabilize the financial system and external imbalances resulted in a series of attacks and massive outflow of capital. Under this pressure, the foreign exchange reserves of Asian countries quickly began to run out, and they were forced to announce the collapse of exchange rate targets and allow large devaluations. Further with the devaluation currency crisis became a full-scale financial, as debts denominated in foreign currencies increased in local currency, which caused a significant number of bankruptcies.

Hard fixed regimes, with explicit institutional commitment, usually remain valid for long periods and ensure greater degree of exchange rate credibility relative to soft peg regimes. They are associated with lower inflation performance, more economic stability and growth, since they reduce transaction costs and exchange rate risk related interest premium, and hence increase international trade and encourage investment (Gosh et al., 1998; Rose, 2000; Frankel 2011).

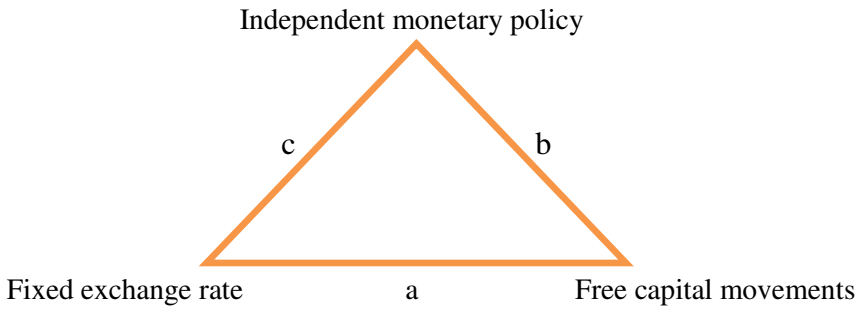
The main disadvantage of fixed exchange rate regimes is that monetary authority in general is powerless to control the money supply appropriately and thus the ability to pursue an active and effective monetary policy (Obstfeld & Rogoff, 1995). This is aggravated with the free flow of capital when domestic interest rates

are closely tied to interest rates to the anchor country. In that case domestic monetary conditions will be fully attributed to the policies of the country to which the exchange rate fixed since any difference in the interest rates will be smoothed due to exchange rate parity and changes in capital flows.

The relationship between the exchange rate regime, international capital flows and monetary policy is illustrated (Figure 2.3.1) by so-called 'impossible trinity' or 'policy trilemma' of Mundell and Fleming developed in 1960s which serve as an important framework in choosing the exchange rate regime.

The idea of the 'impossible trinity' is that a country cannot at one time (i) adopt a fixed exchange rate, (ii) liberalize international capital flows, and (iii) implement sovereign monetary policy. It can only run any two of these policies like: (a) fix the exchange rate, have an open capital account, and let the money supply adjust; (b) float the exchange rate, have an open capital account, and retain monetary autonomy; (c) maintain capital controls, fix the exchange rate and use monetary policy domestically.

Figure 2.3.1 The impossible trinity triangle[15]



[15] Source: http://en.wikipedia.org/wiki/File:Inconsistent_Trinity.JPG

In 1990s - the period of massive liberalization of the movement of capital, where there has been a clear conflict between fixed exchange rates and independent monetary policy - this trilemma has reached its apogee through the scope of series of crises worldwide (Fischer, 2003).

Taking into account the not-very-good reputation of soft pegs that played a crucial role in the birth of the biggest financial crisis of the 1990s, some scholars reasonably propagated the view that the number of countries using pegged exchange rate regimes are decreasing and will gradually decrease and as experience has shown, in today's world of high mobility of capital, pegs are not sustainable and more prone to crises (Fischer, 2001). This followed with the argument in favour of the bipolar view that for countries with free capital movements the viable choice is between hard forms of exchange rate regime or adopting some floating rate regimes. Certainly nowadays in practice most such economies have either floating exchange rate or are operating under a common currency (currency union).

Fischer (2001) accurately concluded that the choice of hard peg regimes is viable for countries experiencing continuous inflationary pressures or for countries that are financially integrated with each other. Otherwise countries with more monetary stability, and with no reason to join to some currency union, should adopt some sort of flexible exchange rate regime as a good shock absorber.

Here it should be noted that for developing countries that commonly have underdeveloped and weak institutional framework with a long history of inflation, floating exchange rates may have adverse balance sheet effects, leading to deterioration of the financial and economic state of the country (Calvo & Mishkin,

2003). This is due to problems of liability dollarization and external vulnerabilities (like to sudden stops of capital inflow). In addition, devaluating the exchange rate with the purpose of increasing competitiveness may have no real side effect (as in the case of Tajikistan) but only a high and costly pass-through effect from exchange rate to inflation, which developing countries are very cautious about (Bordo, 2003).

Mussa at al. (2000) argued that transition to a more flexible exchange rate regime smoothens the effects of external negative shocks to the economy more than a pegged exchange rate regime. This in turn leads to sustainable growth in the long run. In support of this, Edwards & Levy Yeyati (2005) found evidence that floating exchange rate regimes create environments for the countries to "grow faster than countries with fixed exchange rates". Needless to say, such regimes are fully consistent with independent monetary policies and most developed and increasing developing economies are adopting such kind of exchange rate policies.

Calvo and Mishkin (2003) have concluded that in emerging countries, given the state that they are in, the choice of exchange rate regime doesn't play a significant role at all. Instead monetary authorities in these countries must concentrate on eliminating the existing problems by means of improving the institutional base (fiscal, financial and monetary institution) leading to a more sustainable macroeconomic condition and in perspective to a more advanced form of nominal anchor like inflation targeting.

Monetary targeting regime

A monetary targeting regime assumes setting and adhering to some certain money aggregate as an intermediate target of the monetary policy and keeping an aggregate at a constantly low growth path in order to achieve a desired final goal: price stability and stable economic activity. It was first proposed by the monetarist school, in particular by Milton Friedman (1962, 1968) who believed in the money growth target rule as a more convenient tool for central banks. Traditionally this approach was used in economies that were too large and could not fix their currency as a nominal anchor (Mishkin, 1999). Starting from the 1970s, monetary targeting was used in most advanced countries like the UK, Germany, Japan, USA, Canada, etc.

This kind of Friedmanian rule implies that the monetary authorities use as a target the most effective money indicator (e.g., M1, M2, M3 or base money) so that it would have a strong relationship with a goal variable. Central banks usually have direct control over operating targets such as base money and indirect control over broader monetary aggregates such as M1, M2 or M3.

Among the main reasons that central banks chose this type of nominal anchor is that it allows flexibility in monetary policy in terms of independence and utilized all monetary policy tools for adjusting the volume of money supply. Also contrary to exchange rate targeting regimes it assumes the market will determine the exchange rate, i.e. to have a floating (or managed floating) exchange rate which acts as a shock absorber, and so monetary policy concentrates on controlling the price level on the basis of domestic economic condition. Another positive feature of monetary targeting is that the information about the targeted growth rate of aggregate is known and

publicized every month, helping the public receive a signal about the current policy state and prospects for inflation and hence, to create necessary expectations (Mishkin, 1999). Following this is the importance of transparency, making monetary targets public, and accountability, communication with the public as to whether the target is met or not, plays a crucial role in identifying the effectiveness of this regime.

However, monetary targeting can be effective only if there is a stable and effective relationship between monetary aggregates and the ultimate goal – e.g., inflation. Stability and predictability of changes in the velocity of money, which is a reflection of demand, is one of the key elements of the transmission of monetary policy decisions. If there is an unstable relationship, then this transmitting channel is ineffective, reflected in differences in targeted and final variables, breakage of inflation expectations and thus, in monetary authorities failure to maintain price stability (Khan, 2003). The more there is financial development and innovation the less stable is the velocity of money, thus weakening the central bank's power to control monetary aggregates.

Numerous studies have shown (Bernanke & Mishkin, 1992; Friedman & Kuttner, 1996; and Estrella & Mishkin, 1997) that in most developed countries adopted monetary targeting regime, its abandonment and its failure as a nominal anchor was due to unstable relationship between money and inflation and unpredictability of the demand for money. By the late 1980s most developed countries, except Germany and Switzerland, abandoned monetary aggregates and

returned to interest rates as a policy stance indicator. This in particular refers to developing countries undergoing processes of financial liberalization (Khan, 2003).

Nowadays the criticism is that a money growth targeting regime among developed countries has showed its inadequacy as the monetary policy stance. This is due to such things like financial innovation and institutional change making correlation between monetary target and goal weak and unstable contrary to more successful evidence like in an inflation targeting regime (Bernake, 2003; Svensson, 2007). Thus, most such countries in recent years have switched to inflation targeting framework over targeting a monetary aggregate.

In conclusion it is reasonable to quote a prominent scholar Alan Blinder (1999):

"A modern central bank should think of its overnight interest rate, not any monetary aggregate, as its principal policy instrument. With financial innovation virtually certain to continue, and with the lines between banks and other types of financial institutions blurry and getting blurrier, I see no reason to suspect that this abandonment[16] *will end soon. A modern central bank should think of the main linkages in the transmission mechanism as running from its policy rate to other interest rates and financial prices (such as longer-term interest rates, exchange rates, and stock market values), and then on to aggregate demand".*

Inflation targeting framework

Inflation targeting is a monetary policy regime whereby a central bank officially announces an explicit target for inflation and commits to achieve this target in the medium term. It was pioneered by New Zealand, which in 1990 first publicly

[16] abandonment of monetary targeting

announced the inflation projection, followed in 1991 with Canada and by 2010 around 25 countries had adopted an inflation targeting regime (Svensson, 2011). There it recommended itself as a highly effective strategy in achieving price stability and moderately high growth rates.

As Khan (2003) and Mishkin (2007b) emphasized, the first important characteristic of inflation targeting is announcement as a primary objective of monetary policy to maintain a pre-defined numerical target or range for inflation for a specified time horizon. The second pillar is that transparency and accountability plays an integral, even more than any other regime role in the successfulness of the regime.

Another important feature of this strategy is that inflation forecast plays a significant role in monetary policy realization (Svensson, 2011). Indeed, given the existence of time lags between policy implementation and its effect on the final variables, the forecasted data makes it much easier for policymakers, since based on the forecasts it can respond in a timely and appropriate manner to any deviation from the targeted inflation rate.

As evidence from the inflation targeting countries shows, they usually target inflation around 1-3% range or some numerical target from this range with CPI or the core CPI being as an operational target. As Mishkin (2007b) suggests, the reason that numerical targets are chosen above zero percent is that deflation can harm economic ability to grow as recently in the case of Japan. However, among the inflation targeters from emerging economies and developing countries (e.g.,

Armenia, Brazil, Ghana, and Turkey) the range is usually higher due to their still sensitivity to various shocks and less effective transmitting mechanism.

Svensson (1999) introduced “strict” and “flexible’ inflation targeting, where flexible inflation targeting put some weight on a variable, e.g. output gap, not typically viewed as a strict inflation targeting variable. Unlike the exchange rate or monetary targeting regimes inflation targeting isn’t constrained to fixing and controlling only one variable as in exchange rate or monetary targeting. Instead it assumes to be able to use all existing measures and choose the appropriate ones to achieve the target (Mishkin, 2007a). In fact this regime, though having strong commitment, in practice, leaves the possibility for stabilization in the short term and responds to the demand shocks (Svensson, 2011). It implies more operational flexibility in policy implementation having an optimal policy rule - a final target to be achieved. However, since inflation targeting depends mostly on the interest rate transmitting channel, the ultimate goal is usually achieved, in the case of most advanced economies)by means of an operating target, usually the short-term nominal interest rate.

Through transparency, the central bank makes clear the rules and procedures of its policy implementation in order to form inflation expectations. It means the central bank will persistently communicate with the public, publicize various reports either on its own or in mass media regarding current and prospects of monetary policy and inflation outlook, including forecasts for inflation and other indicators with the aim to create positive inflationary expectations. At the same time inflation targeting implies the monetary authorities to be accountable or responsible for the

taken commitment both for improvement of the undertaken strategy (eliminating time-inconsistency problem) and legislatively up to dismissals of central bank governors (e.g., in New Zealand). Logic for such actions is that in a created highly transparent environment any failures to reach the target will worsen the economic agents' inflation expectations and credibility to the policy, which may result in even higher rates of inflation.

Batini and Laxton (2007) outlined several key preconditions that emerging economy countries should have or perform before adopting inflation targeting regimes. First, legally assigned *institutional independence,* including autonomy from government's pressure (e.g., debt monetization) in monetary policy decision making. Second, a well-developed *technical infrastructure* that implies that the central bank have modeling capacity and the data for inflation forecasting. Third, the appropriate *economic structure* that requires fully deregulated prices, less sensitivity to the changes in exchange rate and commodity prices, and minimum dollarization. Fourth, *a healthy financial sector* that suggests sound banking system and developed capital markets. If there is sufficiently capacious financial market, the interest rate transmitting channel of the monetary policy will work effectively in achieving the targeted inflation.

Eichengreen et al. (1999) stressed that due to the fragility and lack of meeting necessary preconditions to adopt inflation targeting, emerging market economies should stick with some conventional monetary regime, such as an exchange rate or money targeting. However, as the experience of many developing countries shows

for the successful implementation of inflation targeting these conditions should be considered as desirable, but not mandatory.

Based on the aforementioned precondition, Batini and Laxton (2007) found interesting evidence from 21 inflation targeting and 10 non-targeting countries. They found that not one of the inflation targeting countries had met all these preconditions before adopting inflation targeting. Also they empirically found that lack of precondition is not an impediment for adopting inflation targeting and its success. Moreover, introducing an inflation targeting regime improves institutional and technical capacities. While transition, consequently, countries should focus on the institutional and technical bases of inflation targeting regime in order to maximize its potential benefits.

In conclusion it should be noted that many scholars have argued in favor of such monetary policy that is implemented within a rules-based framework, with inflation targeting as a central banks optimal strategy in achieving the price and output stability.

An implicit nominal anchor regime

Central banks that implicitly fix some nominal variable but are not explicitly committed are categorized under implicit nominal anchor regime. This type of regime leaves vital room and autonomy for central banks since they may use as nominal anchor inflation or output and employment that are all available information subject to their efficacy for monetary policy. Some authors called this strategy as "just do it" (Mishkin, 1999) or "eclectic" (Carrare & Stone, 2003) inflation targeting.

Among the central banks using a monetary regime with an implicit nominal anchor, such as the U.S. Federal Reserve System, ECB, Bank of Japan, Swiss National Bank etc. inflation usually is low level for quite a long time (Stone & Bhundia, 2004).

In contrast to inflation targeting that is characterized as 'constrained discretion' (Hammond, 2011), implicit nominal anchor regimes are less obliged with the rules probably because they are more worried about real growth and employment stability. In addition, though they are clearly committed to price stability as one of the main goal(s); one difference is that they are not institutionally committed to an inflation target as the overriding objective of monetary policy.

The practice of FRS has shown a shift from money targeting via a certain implicit anchor to a form comprising some elements of inflation targeting. Usually under this regime a central bank does not announce the targets for inflation. However, as Stone and Bhundia (2004) argue, some of these countries have numerical inflation targets (like Switzerland), but their degree of clarity is low and therefore commitment is implicit. Mishkin (1999) emphasized that the problem here is in lower transparency, as it is not sufficiently clear how to assess the central bank's monetary policy and predict its behavior. This reduction of transparency implies a decrease in the accountability of a central bank to the public and in turn increases the time inconsistency problem.

CHAPTER 3

MONETARY POLICY IN TAJIKISTAN

This chapter aims to consider and analyze issues related to monetary policy, its developments, and the implication for the transmission mechanism in Tajikistan. In order to do so, it is necessary to introduce the current issues of the real sector of the economy. The aim of the following section is to argue that the main problems that face the economy of the Republic of Tajikistan are more structural issues of the supply-side factors than of demand-side policies, which obviously important in stabilizing short-term fluctuations. An important implication is that because the economy is mainly suffering from real shocks, an appropriate approach for the government is to understand the importance of the supply-side policies (e.g., more incentives for the private sector, small and medium-sized enterprises in the form of tax eases, etc.) to achieve stable economic development.

3.1. Macroeconomic background

The Republic of Tajikistan (hereinafter Tajikistan) is a mountainous, landlocked country located in the Central Asian region. According to the Statistical Agency under the President of the Republic of Tajikistan's (hereinafter Statistical Agency) 2010 census, during the most recent decade (2000-2010) Tajikistan's population has increased from 6.127 million to 7.565 million, which is an average growth rate of 2.5 percent per year. During the period of 2000-2012, the economy of Tajikistan has been growing steadily with an average real GDP growth of 8 percent

annually. GDP per capita in 2012 reached over 900 US dollars in current prices, 5.7 times larger than in 2000[17].

For almost 70 years Tajikistan, as a part of the former USSR, was linked to a centralized economic system governed from Moscow. The locally produced materials were exported to other industrialized republics and exchanged for other goods. Endowed with huge potential for hydro-electric power generation as well as mineral (e.g., gold) deposits, the country mainly specialized in agriculture and hydropower and was tasked with producing raw materials (e.g., cotton, aluminium). Up to its independence, the RT had a relatively high HDI, though with the lowest per capita income and the highest proportion of material poverty in the USSR (World Bank, 2000). As such, Tajikistan was a net recipient and subsidized from the 'centre', i.e. the central government in Moscow.

Following the collapse of the Soviet Union (the USSR) in 1991, Tajikistan declared independence and moved from being a centrally planned economy into a transition period towards a market-oriented economy. However, this structural change from a closed [from the global economy] to an open economy did not go smoothly. Disintegration of existing inter-republic networks of supply links and demand sources of production, distribution, and consumption adversely impacted the country (Pomfret, 2003). Moreover, in the initial years, the complicated process of implementation of reforms towards a market economy was made more difficult by severe socio-political disturbances (the 1992-97 civil conflict), disrupting the whole economy. As a result, decline in output, massive job losses, extremely high prices,

[17] *Source*: IMF, WEO Database, April 2012.

fiscal deficits, and misguided government policies were observed. The country's economy experienced a series of transitionary shocks and a period of deep recession (1991-1996), a drop in living standards and widespread poverty; it is estimated that real GDP fell by more than 60 percent cumulatively, before somewhat positive growth was achieved in 1997 (Gurgen et al.,1999). In addition to the aforementioned supply shocks, the liberalized prices for most goods, the circulating Soviet (until January, 1994) and Russian (until May, 1995) rubles as a legal tender, the fiscal deficit financing, and concurrently unconstrained rapid growth in the amount of money led to a sharp devaluation and hyperinflation in 1991, 1992, 1993, and 1995.

With socio-political stability coming closer, the government gained more power and more concentrated on economic problems. In 1995 a new currency – the Tajik Ruble was introduced, in 1996 the IMF stabilization program was adopted and the institutional and structural reforms (e.g., privatization, liberalization and land reform) continued. In 1997 an agreement was reached to end the civil war and thereafter the economy slowly began to recover.

3.1.1. Real sector overview

Gross Domestic Product (GDP)

Tajikistan's economy is highly dependent on its main commodity products – cotton and aluminum, which according to the official data in 2012 represented about

70 percent of total exports[18]. The other critical source of the country's income is remittances of the working migrants from abroad through the banking system, which as of the end of 2012 reached USD 5.76 billion[19]. Most of these transfers are spent domestically in Tajikistan in the consumption of household's daily food and other consumer goods. This causes increasing domestic demand of imported products fueling a trade deficit. Therefore, having an extremely narrow productivity base and undiversified exports, the economy of Tajikistan is highly vulnerable to various internal or external shocks.

Although only 8 percent of the country's territory can be used for agricultural purposes, Tajikistan remains a mainly rural economy with agricultural production representing the biggest non-service share of GDP (23.3% in 2012). (Figure 3.1.1) The main agricultural goods produced and exported are cotton fiber and dried fruits, while grains and vegetables are produced for domestic consumption. Aluminum, electric power, and textiles are among the basic productions of industry, though this has been declining since 2005.

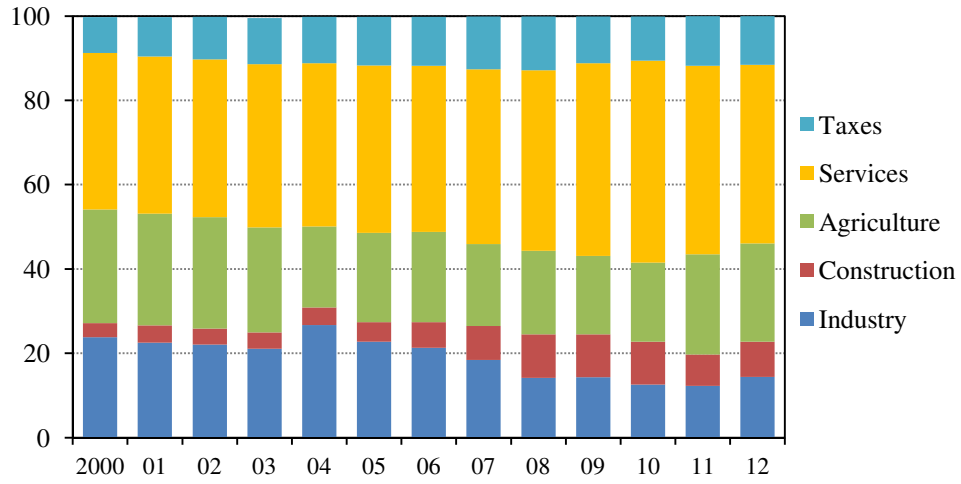
Construction is another developing sector of the economy. This has gradually increased with capital investments mostly directed to the industrial sphere (e.g., construction of the hydropower plants) by the government sector, transport communication with the attraction of foreign funds and the private sector's housing construction nearly making 75 percent of the total investments.

As it is observable in the graph (Figure 3.1.1), the share of the services sector has been increasing throughout the 2000s. About half of the services (more than

[18] *Source*: Statistical Agency.
[19] *Source*: National Bank of Tajikistan.

20%) are represented by the private sector's retail trade turnover and the other half by residential services, and transport and communication.

Figure 3.1.1 Share of industries in GDP (GDP=100)

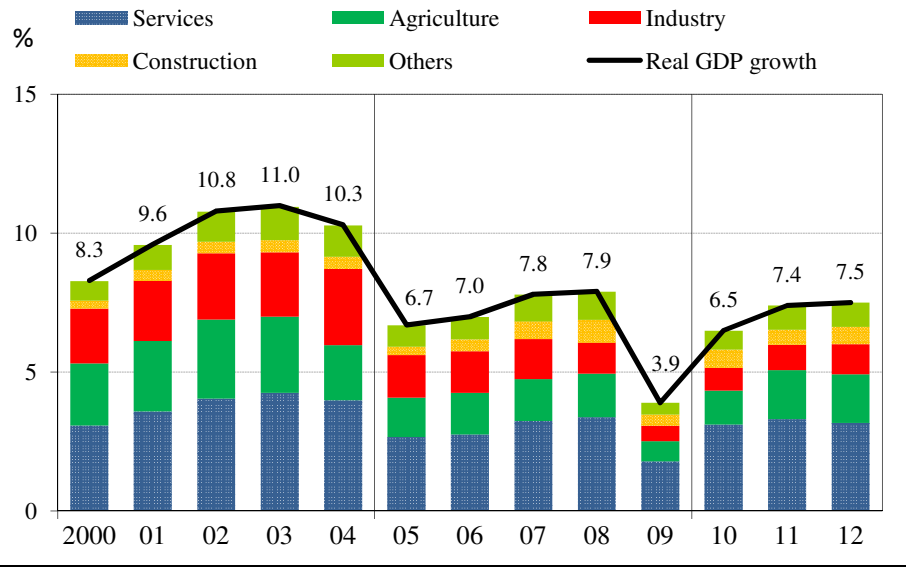


Source: Statistical Agency.

During the 2000-2012 period the economy of Tajikistan has been showing fairly high rates of real GDP growth. But as it is shown in Figure 3.1.2, there is a relatively higher GDP growth rate in the first five-years (2000-2004) of this period, averaging 10 percent. This followed a deep recession in the 1990s which arose as a result of the structural shocks related to the transition from planned to market economy, as well as political instabilities. So the rapid growth of 2000-2004 mostly reflects the recovery effect of the economy due to a low starting point along with macroeconomic stabilization and implemented reforms. As a result of such steady growth, the poverty rate had declined from 82 percent in 1999 to 64 percent in 2003[20].

[20] On less than 2.15 USD per day in terms of PPP; source: Statistical Agency survey 2009.

Figure 3.1.2 Contribution of the sectoral composites to GDP growth



Source: Statistical Agency, author's calculations.

Data on the next five-year term (2005-2009) indicate lower but robust growth averaging 6.7 percent. If to look to the structural composites of GDP during the second five-year period since the year 2000, a major decrease is observed in the share of industrial and agricultural production. Among the possible reasons of such slowdown are problems with the supply of electricity, decreased planted areas of agricultural crops as well as unfavorable seasonal conditions which resulted in reduced yield capacity of both the raw cotton and cotton-fiber (lint cotton) - one of Tajikistan's important agroproducts[21].

However, a further slowdown in 2009 to GDP growth of just 3.9 percent substantially worsens the overall picture. It was due to the adverse effect of the global economic crisis that oppressed demand in sectoral dynamics and economic

[21] IMF staff representative statement (February 6, 2006, IMF country report 06/62), Agency on Statistics report "Tajikistan in numbers 2011".

activity through a fall in the world commodity prices. This then caused reductions in such “wealth channels” like remittances (more than 30% decline) and main exporting goods like cotton (28% decline) and aluminum (46% decline). All together these factors led to sharp exchange rate depreciation, a government sector loss of revenue and banking sector liquidity problems. Nevertheless, the poverty rate continued to steadily decline, reaching 40 percent in 2009. However, despite this achievement the level of poverty still remains the highest in the Europe and Central Asian region.

After the 2009 dip, the 2010-2012 periods show a gradual path of the economy’s recovery with an average 7.1 percent of GDP growth. This is due to increased production in the agricultural sector, trade, construction and manufacturing industries. Furthermore, such factors as a return to pre-crisis levels of migrant workers’ remittances inflows increased domestic demand, as well as favourable world commodity markets prices for cotton and aluminum, contributed to the economic growth of the country.

Despite of having large stocks of water resources (about 70 percent of the total in Central Asia) and thus having advantages in producing cheap and environmentally friendly energy, the economy and population of Tajikistan, almost since its independence, suffers from a lack of electricity in the winter periods (from November to April). Currently it is operating several big hydroelectric power plants with about four gigawatts capacity but due to the fact that the sources of their reservoirs’ recharge are the rock-basin’s water of the Pamir Mountains there is a persistent lack of water flow during cold seasons.

During the period where Tajikistan was in the Soviet Union as well as sometime after independence, when an integrated system of energy distribution existed, Tajikistan met the electricity and energy demand with the help of other member countries and conversely supplied them electric power during the summer period when it usually has a surplus. With the collapse of this system as political difficulties emerged between regional countries, Tajikistan is faced with a critical problem for the economy. There is also serious mismanagement from the government's side; otherwise it might be possible to effectively use the current energy output, at least for minimum needs.

Comparatively low costs of electricity historically led the country to specialize in such power-consuming fields like aluminum production. The state-owned monopolist enterprise Tajik Aluminum Company (TALCO) consumes about 38-40 percent of the total electricity output[22] with preferential prices lower than what other consumers pay.

Indisputably, as the biggest industrial company of the economy, it has a significant contribution as it provides employment for more than 10 thousand people and pays taxes to the government budget. However, it is useful to illustrate the overall picture of this sector. One nuance is that TALCO works through tolling contracts, where a foreign "tolling" company purchases and supplies the raw material (alumina) to TALCO for processing. After processing, the foreign company sells this processed raw product (primary aluminum) in the world market. So TALCO only does processing-related services, i.e. it does not actually produce aluminum per se in

[22] *Source:* PRSP for 2010-2012.

that it just performs services in converting alumina and is paid a fixed amount from which it remits taxes to the state budget. Here, as the main portion of export proceeds of aluminum produced by Talco is diverted to an outside company[23], the official Statistical Agency's figures of exports, which include total volume of the produced primary aluminum, do not make sense. Moreover, according to the Acts on the state budget of Tajikistan, published each year, the budget revenues from TALCO usually constitute only 3-4 percent from the overall revenues (due to very low tax rates). From this one might conclude that the Tajik aluminum industry is not contributing as much to GDP as it seems to be: consuming nearly half of the electric power in the country (even though there is sharp shortage) the economy earns only one third of the potential that aluminum production can earn. Thus despite widespread opinion to the contrary, the degree of dependency of the country's economy on aluminum production and its prices in the world market may be overstated.

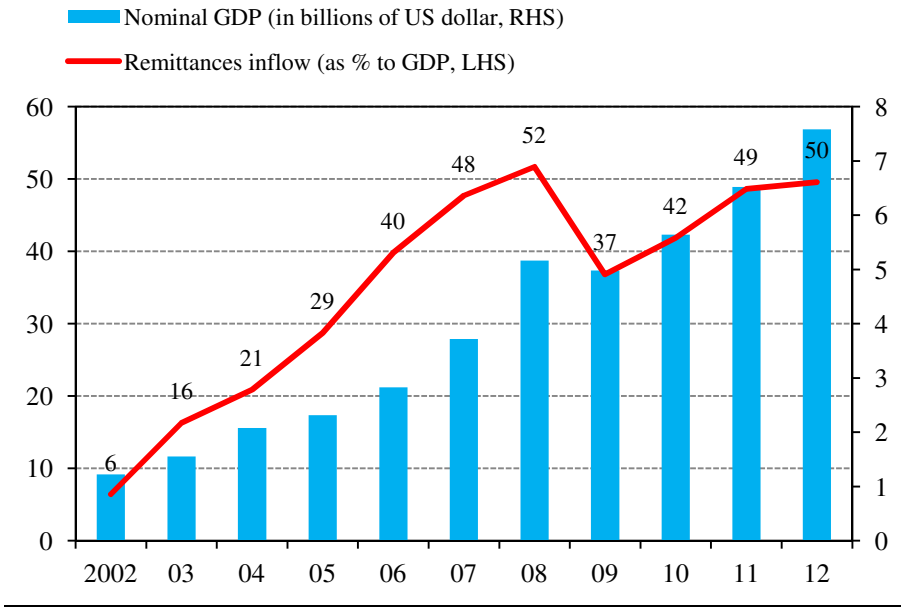
What is not overstated is the significance of workers' remittances from abroad, which has contributed strongly to the recent decade's GDP growth and in particular in increase of GNDI. Given existing internal problems such as lack of workplaces, low purchasing power wages, and high prices of consumer goods, this source of income has become permanent for the Tajik people who are motivated to go abroad to support their families. According to estimates, more than 1 million migrants (predominately young men) are working abroad, mainly in the Russian Federation.

Tajikistan is a leader in the world among countries that are recipients of migrant workers' remittances according share of GDP. As it shown in the below

[23] According to some estimates around 70%. See for example, "IMF attacks Tajikistan Aluminum Co -- orders international audit" (*Source*: http://www.mineweb.com/mineweb/content/en/mineweb-base-metals?oid=62257&sn=Detail&pid=504)

figure this increased steadily from 2002 to 2008 and after the 2009 crisis slowdown resumed its growth to constitute 42% of GDP in 2010, 49% in 2011, and 50% in 2012. It should be noted that those are remittances sent and registered via banks, but there are also others that come unofficially, outside the banking system. In recent years, remittances exceed other forms of capital inflows into the country by many multiples and appear to be the main source of foreign exchange inflow to the country.

Figure 3.1.3 Migrant's remittances to Tajikistan and GDP



Source: NBT and Statistical Agency, author's calculations.

It is estimated that cash inflow of migrant workers has contributed to the reduction of poverty in Tajikistan (World Bank, 2009), especially the rural households as it is estimated that more than 70% of the total Tajik migrant workers are from rural areas. However, Tajikistan is among the countries that are most dependent on migrant's remittances and these significant inflows have led to the

typical effect when inflow of “easy” money decreases incentives to work in farmlands at least for the rural households. Furthermore, in the environment of uncompetitive job places and low wages, the population is willing (and to some extent forced) to go abroad, which shrinks the domestic labor market capacity especially of the young and healthy. Here lies the main threat to the economy: this dependence makes the country vulnerable to various exogenous shocks to the economic and political conjuncture of the host country, as roughly 90% of migrants are working in Russian Federation. What if these huge inflows suddenly stop? There only one thing might happen: a deep financial and economic crisis.

For other sources of further economic growth (e.g., manufacturing industry, SME’s and opportune job places) it is extremely necessary to develop hydroelectric energy resources in order to utilize existing natural resources for the manufacture processing, attract foreign direct investments and create work places to lessen the inherently risky dependence on working migration.

The government has underlined energy independence as its strategic target and has taken steps to attract investments both domestic and foreign to implement several power generation projects (like the Roghun hydroelectric power plant), but there remain implementation problems because of politics and ineffectual government implementation.

Starting from 2013 the government has also implemented tax reform with more incentives to the private sector, intended to stimulate long-run productivity. Particularly, the number of taxes has been reduced from 21 to 10 percent, the VAT threshold for small enterprises has been increased from 200 000 to 500 000 TJS, and

corporate income tax rates have also been reduced. Finally, tax concessions are widely used and import of modern technologies and machineries are exempted from taxes and duties.

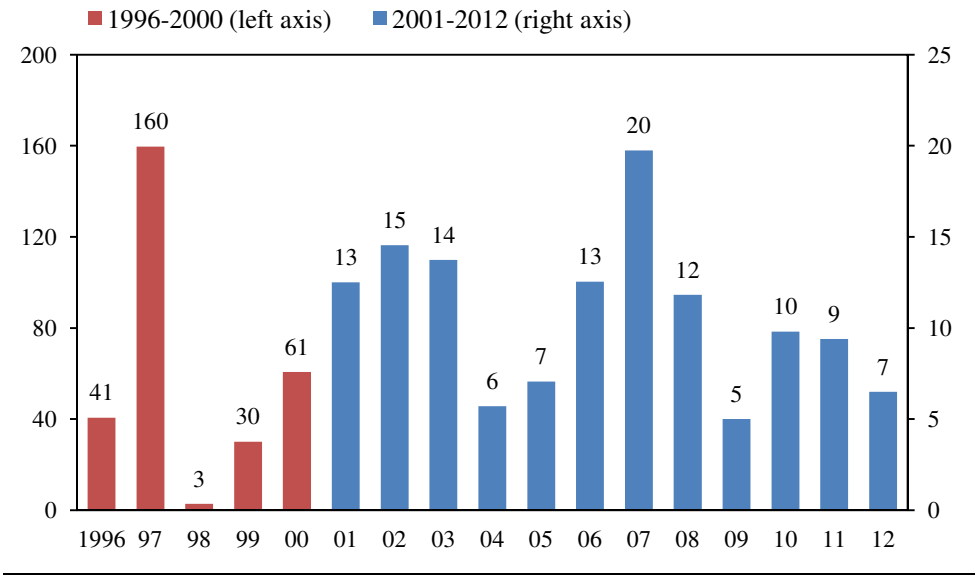
Obviously, there are many potential obstacles affecting the economic development of the country. Adverse geography, resource endowments and landlockedness, surrounding instability of the region, low level of the human capital, institutional, structural and managerial shortcomings are all challenges but are beyond the scope of this research. Overall, as a small, open and low-income country, Tajikistan's economy is fragile and highly vulnerable to external factors such as world commodity (agricultural) prices and working migrant's remittances. To address these issues, the government needs to continue to undertake structural reforms, in particular related to the main sectors of the economy for further effective resource utilization and productivity.

Inflation

After periods of hyperinflations in the 1990s as a result of various transition period shocks, such as price liberalization, political instability and macroeconomic policy (monetary and fiscal) mismanagement, in the 2000s Tajikistan undertook macroeconomic stabilization measures. More prudent monetary and fiscal policies and reforms have succeeded in achieving sustainable lower rates of inflation. While in the 1996-2000 periods the average CPI inflation rate was 59 percent, in 2001-2012 it has been reduced to 11 percent on average (Figure 3.1.4).

This is consistent with the rates of inflation threshold of 11-12 percent estimated for developing countries (Khan and Senhadji, 2001), but there are concerns. Firstly, that on average it tends to the upper limits and secondly that given the variability and impact of the world food prices on domestic inflation, prices are highly volatile. This second concern affects the most vulnerable groups of the population and in the long run reduces efficient allocation of resources. Consequently, maintaining the stability of prices is one of the critical tasks for the government in keeping the socio-economic balance in the country.

Figure 3.1.4 Inflation rate in Tajikistan (in %, e.o.p)



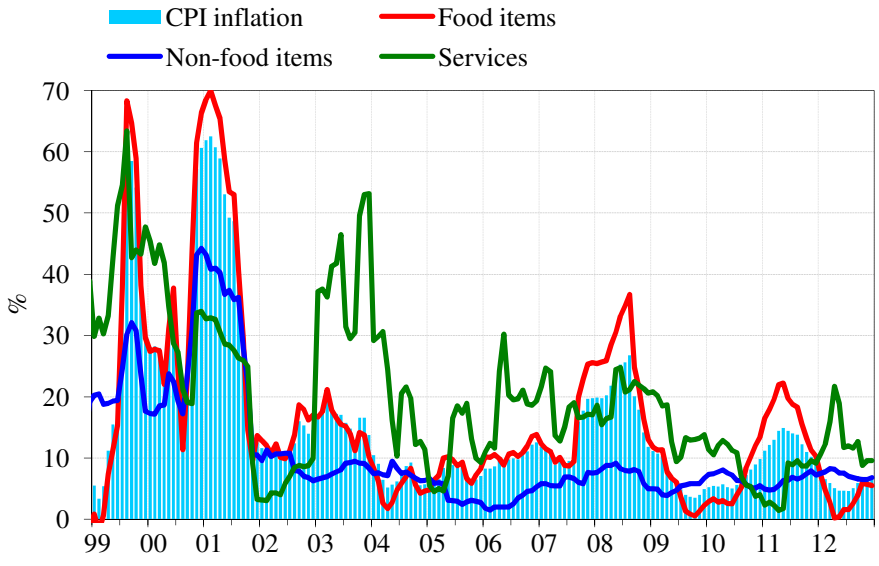
Source: Statistical Agency.

The CPI basket in Tajikistan consists of 360 items of goods and services. Food's weighting is the largest share at 61 percent; non-food and services weightings are 26 percent and 13 percent respectively. Obviously such a large share of food products reflects the low income of the population. In general, main part of their

income is spent on staple food products such as breadstuff and cereal (flour, bread, and rice), beef, vegetable oil, fruits and vegetables (apples, potato, onion, and carrot), and sugar, i.e. goods of first priorities. As bread products, rice, vegetable oil and sugar, all import-dependent products, occupy about 35 percent of the CPI basket, and since bread is traditionally the main food for the Tajik population, any small change in prices of these products will significantly change the level of prices in the country.

As it can be observed from figure 3.1.5, the major factor in CPI changes is the price changes of food products. Services such as housing, transport and communications also have significant influence. Until the middle of 2001 the high rates of headline inflation, which is annualized, reflects mainly the effect of past hyperinflationary periods. Since then, several spikes are more related to the situation in the world commodity markets, notably the 2002-03 and 2010-11 food prices' shocks and the most severe 2007-2008 spike.

Figure 3.1.5 Inflation rate and its components (annualized)



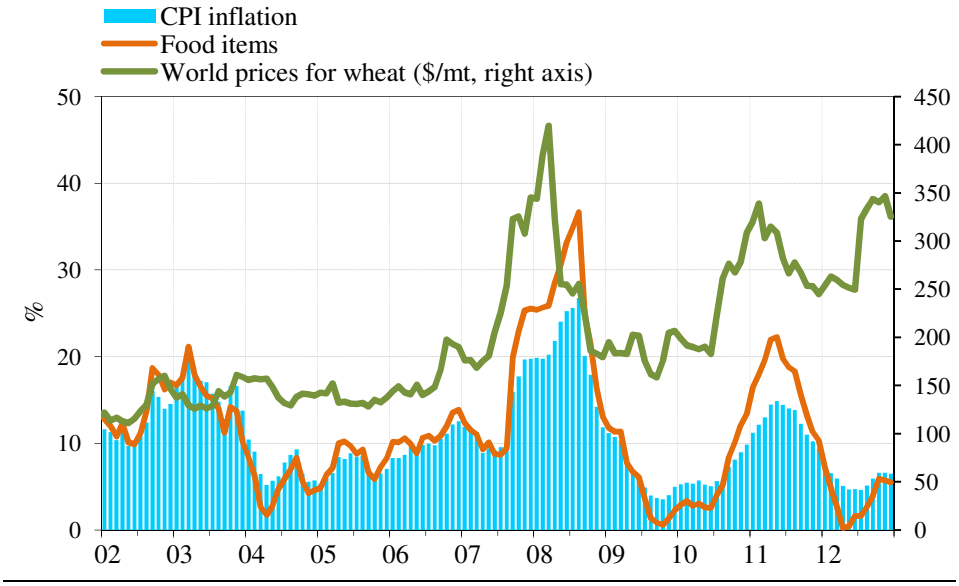
Source: Statistical Agency.

Obviously the factors impacting the inflationary processes in Tajikistan have a mainly non-monetary character, and are more related to domestic consumer market peculiarities. Notably, the importing of inflation, either from trading partner countries or as a result of rises in world commodity prices. This is aggravated by food constituting 16 percent[24] of total imports and that generally imports are used for consumption. Moreover, reliance on production of mainly one agricultural good (cotton) at the expense of others has limited the domestic market (however, in recent years this situation is improving). Hence, as a net food importer, Tajikistan's domestic consumer market is very sensitive to world commodity prices. Moreover, in line with this Al-Eyd at al. (2012) found empirical evidence that food prices are the main contributor, though having mainly short-term effects, to the increase in inflation in Tajikistan.

This can be seen in the chart below (Figure 3.1.6). As it is shown, there is high pass-through or correlation, possibly with a lag, from world wheat prices to domestic food prices and hence, headline inflation. As it was noted earlier, wheat and its products have a large fraction in the structure of population spending and thus in CPI (about 14% weight belongs to flour). Given that domestic market prices of these products depend on import prices, it makes the overall picture clear, i.e. in any policy implementation, analysis or forecasting of this relationship should take this into consideration.

[24] As of 2012.

Figure 3.1.6 Tajikistan's inflation rate and food prices relation with world wheat prices



Source: Statistical Agency and World Bank commodity price data.

The fundamental problem of persistently high inflationary pressure is apparent to the naked eye: low level of domestic production of goods and services in the environment of increasing demand pressures (mostly from remittances and nominal wages' increases). And eventually the supply-side problems, real sector's low productivity and hence, a large productivity gap, will be reflected in the external sector imbalances and persistent exchange rate volatility.

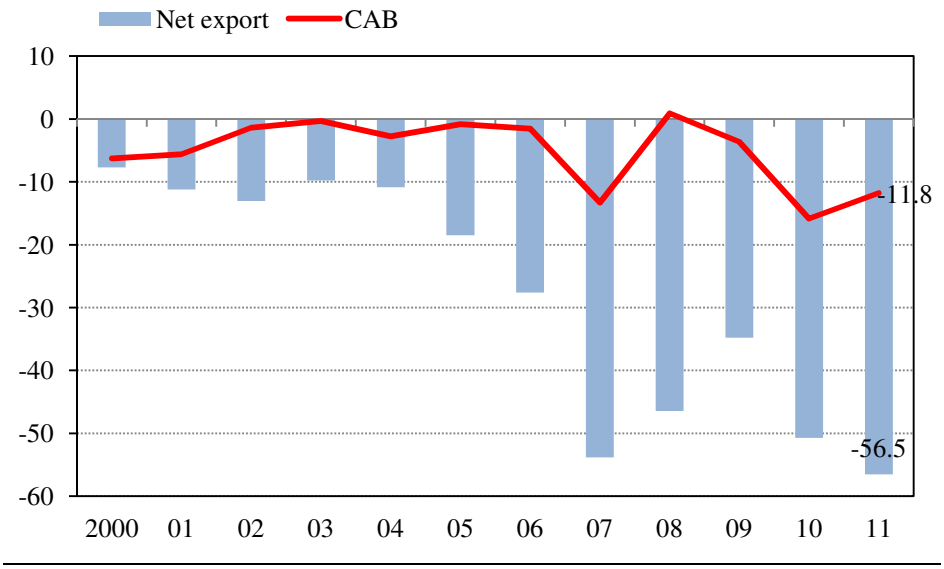
3.1.2. External sector overview

Initially the low competitiveness of goods produced in the country in the world markets and low output growth with higher rates of domestic consumption are

widely seen as the main reasons of external sector imbalances. Blanchard and Milesi-Ferretti (2010) argued "*in many cases current account reflects underlying domestic distortions. It is then in the interest of the country to remove those distortions and, in the process, reduce imbalances*".

For more than a decade, Tajikistan (as a developing but low income country) has been running a negative current account deficit. Temporary crises (as recent global food and financial crises) worsened the disequilibrium of the external balance almost in all developing countries and each of them represents a special case, but in case of Tajikistan specifically, a systemic crisis has lead to such a negative current account balance.

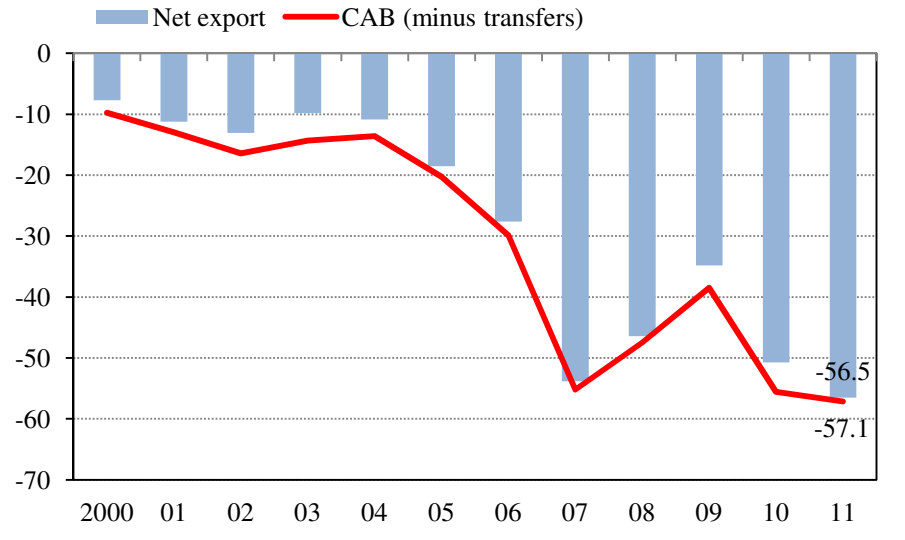
Figure 3.1.7 Tajikistan: Current account balance (CAB) and Net exports (as % of GDP)



Source: Balance of Payment and Statistics Department of NBT.

From the system of national accounting definition, the current account is equal to savings minus investment ($S - I = CAB$). It also shows the relationship between aggregate income and domestic demand in the economy ($GNDI - A = CAB$). From the above chart one can see that with a negative current account balance Tajikistan consumes or demands more than it saves or earns. Here, the main part of the imbalance relates to the huge trade deficit that in 2011 amounted USD 3.8 billion or 57 percent as compared to GDP. The source of this disparity is reflected in net exports[25]. This negative trade balance historically consists of two components - the need for imports, which reflects the inability to produce certain goods in the country and satisfy the domestic demand, and the lack of exports, again caused by limited domestic market and low competitiveness of production.

Figure 3.1.8 CAB (excluding transfers) and Net exports (as % of GDP)



Source: Balance of Payment and Statistics Department, NBT

[25] NBT as a body delegated to draw up the country's Balance of Payment, reasonably does not include (in contrast to the State Statistical Agency) alumina and primary aluminum in the import-export operation figures.

It should be noted that objective factors such as lack of energy resources, higher transportation costs and artificial barriers on trade, instability in the region, issues of human resource development, corruption, inequality, large role of government contributes to this situation.

In contrast, net current foreign transfers from abroad, particularly private flows from migrant workers' remittances, interrelates and plays a crucial role in financing the huge trade deficit and without this cash flow the overall picture would have been more severe (Figure 3.1.8).

Two questions arise here: first, is the current account deficit excessive? In short, the answer is yes. As it was shown (Figure 3.1.7), during the last five years Tajikistan has been experiencing deficits of on average 8.7 percent of GDP. This exceeds the conventional threshold of minus 4 percent. And, this imbalance occurs due to the high negative export-import gap, and is mainly caused by the problem of competitiveness rather than an excess of savings gap caused by high productivity and growth rates.

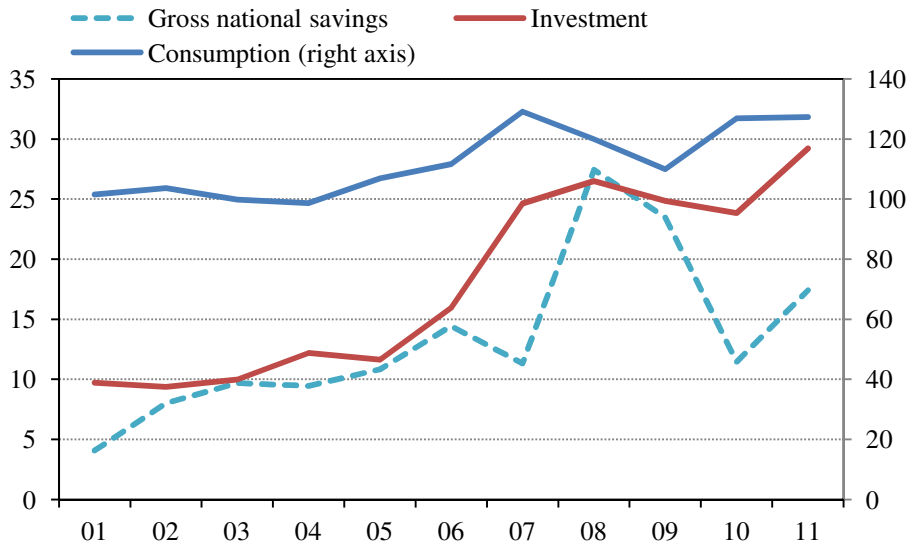
Second, is the current account deficit sustainable? The answer is related to the ability of the country to generate possible future trade surpluses notably such factors like rate of economic growth, rate of investment, export performance and trade openness.

Tajikistan is a relatively open country in terms of trade openness with the volume of foreign trade of more than 70 percent of GDP. But this is contrasted by having a very insignificant and at the same time undiversified export structure (mainly primary commodities). A factor that generally accepted to contribute for

long-run growth is the import of machinery and equipments. According to the official data during last five years (2008-2012) the import of these items made on average 12 percent from the total imports. This is obviously low, and even among developing economies where this number is usually much higher. Taking this into account it can be argued that in prospect the economy's ability to generate trade surpluses and expand output is very limited.

According to national accounts statistics, GDP growth during 2000–2012 was on average 8 percent, which is quite high. As the figure 3.1.9 shows, this growth was achieved mainly due to higher consumption, which exceeds the GDP. Whereas the rates of investment though have increased substantially in the last five years, is not sufficiently high which during last decade was on average 18 percent as compare to GDP and with average value of 26 percent of GDP during last five years.

Figure 3.1.9 National Account Indicators 2000-2011 (in % of GDP)



Source: Statistical Agency and author's estimation.

The other question is how vulnerable is the country to external shocks? Already discussed above are the huge role of transfers in the economy and high import dependence. During the recent global financial crisis, mainly due to a fall in the inflow of remittances and export revenue, GDP shrunk and the exchange rate weakened by more than 25 percent. Also, the world commodity shocks in 2007 and 2010 resulted in a rise in prices for many primary products in the domestic market, so the country faced a high inflation period. As a result, the vulnerability of the country lessens the effectiveness of programs directed to reduce the level of poverty.

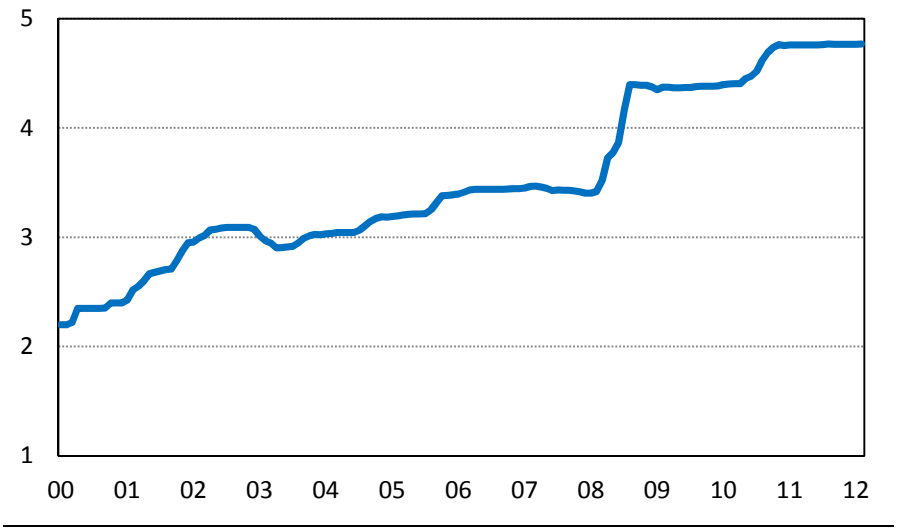
Another issue is debt sustainability. Tajikistan has moderate ratios of public and publicly guaranteed external debt to GDP: 28.5 percent in 2012 and 31 percent on average from 2008-12. Taking into account the dependence of domestic growth on remittances and world commodity prices, possible slowdowns can worsen debt-servicing abilities.

One more indicator of sustainability is the exchange rate, which has a fundamental relationship with the current account trends. Tajikistan monetary authorities have been adopting a sort of flexible managed floating exchange rate system. This regime does not necessitate building a high level of international reserves. The empirical evidence shows that flexible exchange rate regimes are better shock absorbers than fixed ones (Edwards, 2004). As Tajikistan remains highly vulnerable to external factors and spillovers this policy seems a prudent shock absorber and is constantly supported by the IMF. Gradually the Tajik Somoni exchange rate against the US Dollar has been slowly weakening, with some excess fluctuation during large-scale crises (Figure 3.1.10). One can say that the nature of

this volatility hides in the current or trade account imbalances and more exactly in "*underlying domestic distortions*".

However, due to Tajikistan's production capability and manufacture exports at very low levels, this exchange rate policy is less effective as an export promotion and obviously it is difficult to stimulate what is absent. Moreover, there is evidence suggesting that exchange rate volatility worsens gains from trade and has a pass-through to inflation that decreases credibility to monetary authority's policy (Calvo & Reinhart, 2000).

Figure 3.1.10 Tajik Somoni exchange rate (1 USD)



Source: NBT.

The exchange rate devaluation only worsens the level of confidence in the financial system. This raises risks and the value of asset prices and in such an import-dependent country like Tajikistan, an exchange rate pass-through to inflation will be

inevitable. In addition, export promotion under policy of depreciation makes worth off the producers oriented to domestic market, and currently it is hardly feasible.

Therefore, despite the very serious problem of almost no competitive manufacturing industries in Tajikistan, it shouldn't be solved by exchange rate policy. In view of the above adverse effects in the medium term, it makes sense to maintain and improve the competitiveness of Tajik producers by other means, e.g., by supply-side policies.

Real exchange rate volatility has a negative impact on long-term economic growth. Therefore, in cases of temporary fluctuations associated with capital flows and changes in world commodity prices, it may be necessary to smoothen the market in order to avoid crises.

A persistent current account deficit causes short-term adjustments, in view of insufficient international reserves. The problem of an increasing volume of imports over exports challenges the government greatly to implement policies to improve export potential. A continuation of the current situation will cause the economy to suffer as a whole. Policies should attempt to encourage an increase in capital investments, diversify of exports, import substitution and revival of industry.

3.2. Monetary policy: its framework and developments

The monetary authority responsible for the country's monetary policy is the National Bank of Tajikistan (hereinafter NBT), established in June 1992. As a central

and reserve bank it develops and conducts monetary policy independently while legally accountable before the Lower chamber (Parliament). In accordance with Article 5 of the Law "On the National bank of Tajikistan" (amended and approved in 28 of June, 2011), the principal goal of the NBT is to "maintain price stability over the long run". By doing this, NBT contributes to the sustainability of economic growth as well as the welfare of the population. Article 5 also obliges the NBT other complementary tasks, such as to maintain stability of the banking system and assist in efficient and regular work of the payment system, which in turn are very important in insuring real economic dynamics. It is the NBT's own responsibility to define how these goals and tasks are put into practice. NBT's monetary policy framework is based on a monetary targeting regime. According to this regime, the ultimate target, which is price stability, is to be achieved by controlling the level of reserve money or monetary base (also called high-powered money) being as operating target of monetary policy. To achieve this target it plans to implement the IMF-supported monetary program (IMF financial programming model). This program implies to meet "performance criteria" or "indicative targets" (prepared by the IMF and agreed on both sides) imposing floors on net foreign assets (NFA)[26] and ceilings on net domestic assets (NDA)[27] of a monetary authority's (NBT) balance sheet (Mussa & Savastano, 1999). As factors affecting money stock, any change in NFA and NDA must be reflected in reserve money ($\Delta NFA+\Delta NDA=\Delta RM$). Under the program arrangement and conditionality, the IMF makes disbursements (available financing)

[26] NFA include gold, foreign exchange, holdings of SDRs, foreign correspondent banks, foreign investments.
[27] NDA include net domestic credit (NDC) - claims on government sector, banks and the economy

for adjusting the short-term balance of payments fluctuations and avoiding possible currency crises.[28]

The IMF-supported program is based on a monetarists' view of the monetary approach to the balance of payments stabilization. According to this view contributed by Frenkel and Johnson (1976) a monetary expansion (ΔNDC), assuming that the economy is in its full employment condition, will disturb the money equilibrium in the market. The excess domestic liquidity will increase external demand for goods and services and hence to the foreign exchange. Increased demand to foreign currencies will increase the quantity of domestic currency in the market causing its depreciation. This in turn will transmit to domestic prices and rise in the rate of inflation. As a result higher domestic prices will increase demand for domestic currency and overall will be reflected in the new money market equilibrium. Moreover, currency depreciation makes foreign goods expensive and reduces import demand, which improves current account.

Thus, this model suggests the short-run balance of payments and exchange rate deviation as a monetary phenomenon coming from demand-side policies. To continue this approach, it needs to be noted that countries having structural BoP problems that is, driven by fundamental domestic factors (e.g., low levels of productivity) are more likely to experience currency depreciation pressures.

As it was discussed in chapter two, the monetary targeting regime assumes there is a stable and predictable demand for money (e.g., velocity). However, nowadays this kind of stable relationship between money and inflation or output is

[28] As a low income country Tajikistan implements the IMF Extended Credit Facility (ECF) mechanism which implies concessional financing.

rarely observed or even broken due to the financial developments and innovations. As a result the central bank has to revise its publicly announced targets for monetary aggregates, which in turn will worsen its credibility with the public and change inflation expectation.

So, within the program the NBT projects and determines the growth of indicative quantitative targets (NFA and NDA) and hence, the monetary base (money supply) on a quarterly basis and in some cases (e.g., shocks or recession) it redefines these numerical targets to achieve its desired policy goals, i.e. price stability. This probably explains the difference between projected targets of and actual reserve money. The deviation from the targets is shown in Table 3.2.1 according to the NBT's projection and the actual data on reserve money. In most of the years there are slightly deviations from the actual data except for 2003, 2008, 2009, and 2011 which is mostly related to increased demand for money as a result of non-monetary shocks (this is also discussed in detail further below).

Table 3.2.1. Projected and actual change in reserve money (in %, period average).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Target /1	18.0	14.0	10.0	18.0	18.0	16.0	18.0	22.0	22.0	20.0
Actual	29.8	18.3	9.0	22.7	21.7	43.5	27.7	25.5	30.5	23.6

/1 According to the publishing "Projection of Monetary Policy of the Republic of Tajikistan" (retrieved from the NBT web page: http://nbt.tj/en/monetary_policy/projection.php)

To control its quantitative operating target - reserve money and hence liquidity level in economy, the NBT uses, though with different success and effectiveness, the following operational tools in order of their significance:

- Open market operations (NBT bills, treasury bills);
- Reserve requirement;
- Foreign exchange market operations;
- Policy interest rate (refinancing rate).

Moreover, it acts as a lender of last resort providing liquidity to the banking system, and can directly (but only in exceptional cases) set quantitative restrictions on banks (e.g., rate or amount of lending, some banking operations).

It should be noted that for decision making processes on monetary policy an interdepartmental consulting authority – Monetary Policy Committee (MPC) regularly (usually every month) operates and presents the decisions regarding monetary policy stance and implementation (e.g., OMO, foreign exchange, reserve requirements ratio, refinancing rate) to the NBT Board for a final decision. The results are published on the NBT web site.

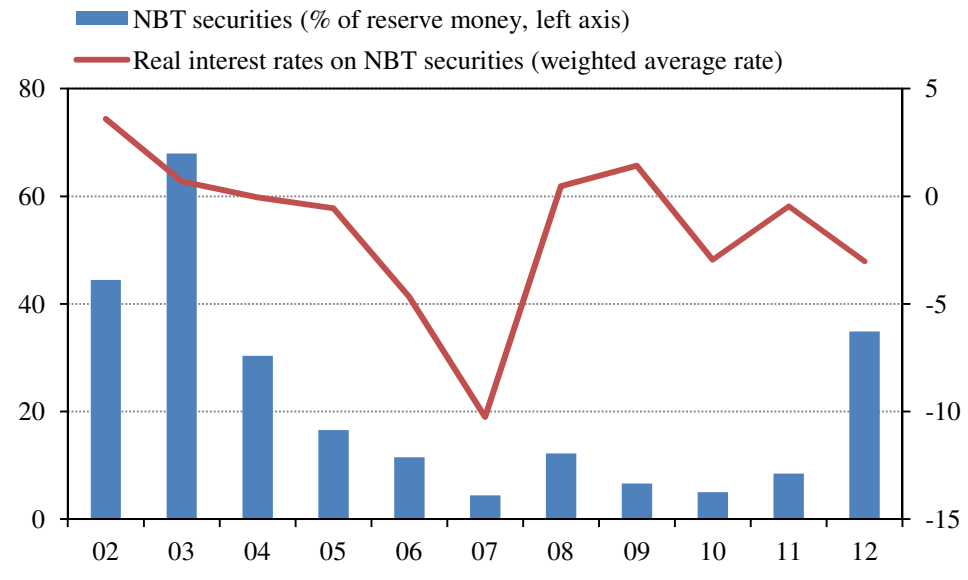
For implementation of monetary policy objectives the NBT frequently conducts *open market operations*. Actively used instruments are used for this purpose. NBT securities (recently the NBT's certificate of deposits) for the first time were issued in 2001 and became *sui generis* a permanent short-term security instrument helping the NBT to manage the money supply.

Generally they have 7, 14, 28, and 56 days of maturity but with 3, 91 and 182 maturity days of circulation are issued as well. As it is shown in Figure 3.2.1 in

2002-2004 periods the NBT actively used this instrument but later until 2012 the amount of NBT securities as compared to reserve money has decreased significantly and most probably were insufficient since inflation on average was rather high (11%). Nevertheless, in 2012 monetary authorities considerably engaged in open market operations showing more commitment to meet its target and principal objectives.

In line with the NBT securities, NBT also deals with the government securities -Treasury bills (TB), issued by the Ministry of Finance (MoF). These were issued for the first time in 1998. From 200 MoF suspended its issuances and in 2009 resumed again. However, their volumes [likewise NBT securities] are limited. This narrows open market operation and monetary policy implementation. For instance TB's share as compare to the NBT securities made only 6% in 2009, 35%, 22%, and 5% in 2010, 2011, and 2012, respectively.

Figure 3.2.1. Operations with NBT securities



Source: NBT.

It should be noted that either primary or secondary equity market in Tajikistan is rudimentary and there is a lack of competitiveness in the existing shallow market with the absence of market pricing mechanism (IMF, 2008). For instance, the average weighted interest rates of NBT securities are low and often negative in real terms (Figure 3.2.1). Government and banks are not enthusiastic to develop and participate in open market operations as alternative sources of funding.

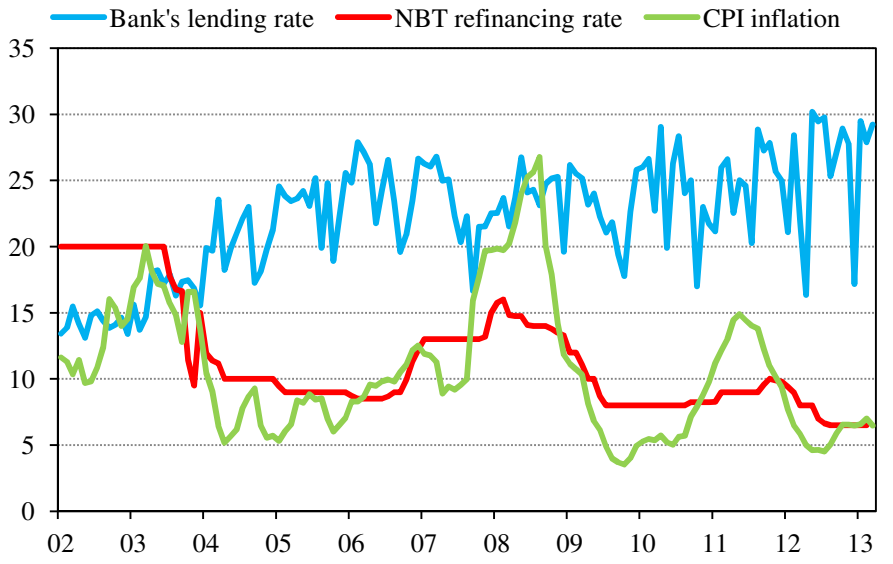
One of the instruments for NBT is *reserve requirements* regulation. According to the NBT's Instruction №194 "On the banks' reserve requirements on deposits" all deposit-taking banks in Tajikistan are required to hold a fraction of their balances' deposits within the related accounts in NBT. This fraction is changed by the MPC very rarely according to the macroeconomic situation in the country. It implements separate requirements for the reserve ratios, i.e. for national currency deposits and for foreign ones. Currently banks must hold 5 percent of their national currency deposits and 7 percent of foreign currency deposits with the NBT. One point is that required deposits are unremunerated i.e. the NBT does not compensate banks for their reserves being held and another is that being a passive instrument it stabilizes the money multiplier during short-term fluctuations where the NBT's forward looking real forecasts do not work effectively.

Operations in the foreign exchange market have a place in the NBT monetary policy toolkit and have two purposes; first, to stabilize the exchange rate of somoni whenever there is sharp fluctuation and second, to manage the level of liquidity in the economy to maintain the plan for reserve money. These operations are held either directly by intervention or indirectly via ETF facility in the interbank foreign

exchange market, including swaps. NBT recently used such operations rather widely but not so much at present, for instance in 2007-12 periods only direct interventions with US dollar on average constituted 12 percent of the reserve money[29].

And lastly, the *refinancing rate* of the NBT also determined by the MPC, de-jure serves as a policy rate whereby NBT makes lending to the banks available at lower or higher rates. By doing so NBT in principle must impact the market lending rates, but banks do not change their lending conditions. De-facto NBT interest rate is symbolic where market interest rates do not reflect to any policy induced changes in interest rate (Figure 3.2.2).

Figure 3.2.2. NBT's refinancing rate and Bank's lending rate (in %, annually)



Source: NBT; Statistical Agency.

From the above graph it is clear that NBT sets [rather symbolically] its policy rate in line with the change in annual inflation, without influencing the market

[29] Data obtained from the NBT statistics staff upon request.

interest rates as the monetary transmitting channel suggests. The key here is the real interest rate since changes in real interest rates encourages potential debtors to increase (or decrease) their investments and consumption, and hence affect aggregate demand. And from a monetary policy view, this transmission must not be at the expense of high inflation over a change in interest rates. However, in case of Tajikistan the link between policy rate and market rate is disconnected and it can be concluded that this instrument doesn't impact economic dynamics. Of course there are many obstacles for monetary transmission, but as its primary task, the NBT must find a mechanism of how to affect market interest rates.

It is purposeful to outline the monetary policy developments according to objectives and strategies at different stages of economic development in Tajikistan. Following independence, the transition period of the 1990s and its problems have put monetary policy aside from the direct obligations. In general it has been focused on the needs of economy since the country experienced deep recession during 1991-1996.

The practice of direct lending to the economy and financing the government budget deficit at the expense of the NBT were widely used by government. Hence, the NBT's independence was limited and along with other structural [non-monetary] factors (e.g., adjustment of wages for inflation, liberalization) and objective transitional processes such unconstrained actions led to a severe inflation period averaging more than thousand percent from 1992-1997 (Table 3.2.2).

Table 3.2.2. Real GDP growth and CPI inflation (in %)

	1992	1993	1994	1995	1996	1997	1998	1999
Real GDP	-29.0	-11.1	-21.4	-12.5	-4.4	1.7	5.3	3.7
Inflation	1364	7344	1.1	2144	40.5	163.6	2.7	30.1

Source: IMF, WEO database; NBT.

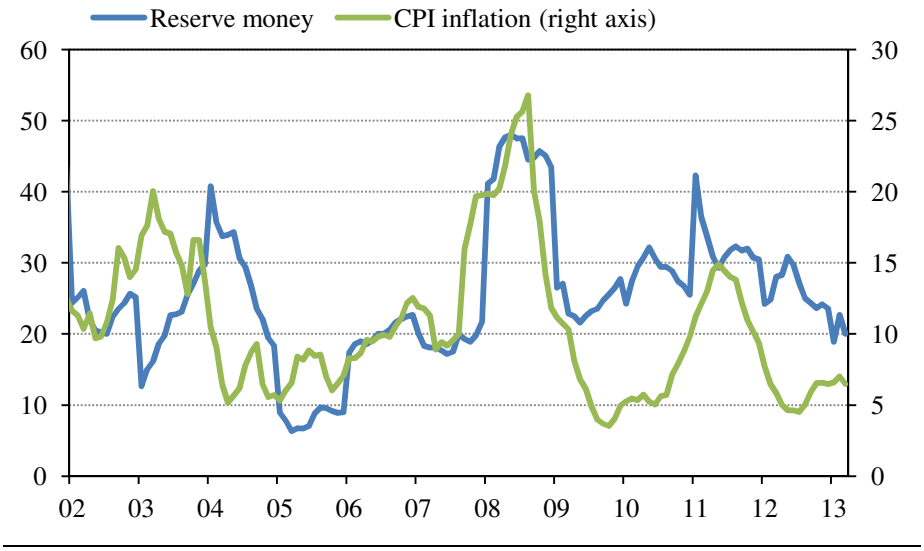
In December 1996 a Law "On the NBT" was established and it defined more power to the NBT and less dependence on the cabinet while still being accountable before parliament. As a result, direct lending and government sector financing decreased which was reflected in lower rates of inflation and positive GDP growth. As a step to further improve monetary policy, a new national currency - Somoni was introduced in October of 2000 after the period of currency reforms. The NBT put in practice a managed floating exchange rate regime. As a small open economy with low domestic productivity Tajikistan, suffers from persistent trade deficit and external vulnerability that overstates exchange rate factor reflecting domestic disturbances. These reasons along with low NBT capability in terms of international reserves, have led Tajikistan to adopt a kind of flexible exchange rate regime in order to adjust to various shocks. It assumes to set the exchange rate according to the market demand and supply and as it is "managed" NBT may intervene in the foreign exchange market whenever sharp fluctuations occur.

It is precisely these facts that explain NBT's monetary policy per se has improved and is more independently directed to maintain its main duties. As a result the growth rates of money supply and the monetary base were significantly less than in previous years, reflected in lower inflation rates. Although since 2000s a balanced

macroeconomic policy has brought relatively lower inflation, prices in general remained volatile and unstable.

Now it is worth to analyze the NBT's policy-induced changes in the monetary operation target, i.e. reserve money, and the consequences shown in Figure 3.2.3. Here, reserve money is shown as the period-to-period average percentage change and inflation as annual percentage change of CPI. Reserve money consists of cash money in the circulation plus bank and nonbank deposits held at the NBT.

Figure 3.2.3. Reserve money and inflation rate (change in %, annually)



Source: NBT, Statistical Agency and author's calculation.

During January 2002 – March 2013 the average annual growth of reserve money was 25 percent. This money growth rate is rather high, taking into account that Friedman (1962; 1968) - the "father" of monetary targeting rule - suggested the annual growth rate of money supply to be from 3 to 5 percent, otherwise excess money supply will bring economic disturbances. To note one of the monetary

principles (see Chapter 2) monetary expansions in the long run is to be the main source of inflation. It can be alleged that Tajikistan is a developing economy and to assume that in such countries the rate of money growth as usual leads the real economic dynamics and shows expansionary vein of the monetary authorities.

However, the question is whether money is treated here as exogenous or contrary endogenous - there may be inverse causation from change in prices to money supply growth. If we look at the abovementioned figure, a brief analysis of the graph will show some relationship, though not strong between money supply and inflation. In 2002-2006 they have a similar path but in 2003 until June NBT brought down reserve money growth below 20 percent reflecting to increased inflationary pressures and then increased it further, possibly responding to a rise in demand for money. One of the explanations is that in 2001 there was a 20 percent exchange rate depreciation of somoni to US dollar. And taking into account the NBT's principal objectives of those times according to previous (1996) Law "On the NBT" (Article 3) was to "achieve and maintain stability of the purchasing power of the national currency", NBT such aggressively cut money supply to stabilize the somoni's exchange rate and eliminate inflationary pressures.

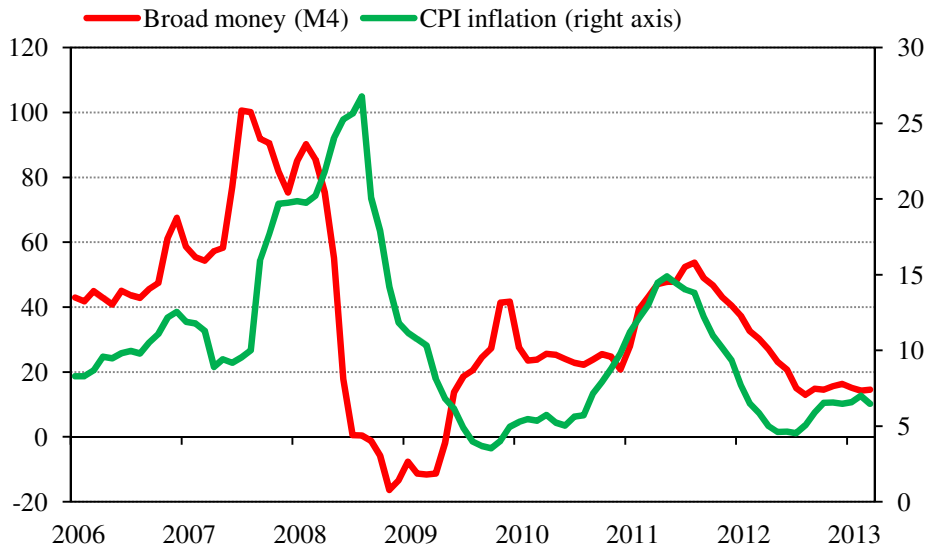
From 2006 to 2009 there is relatively stronger correlation where a sharp change from the middle of 2007 to end of 2008 was caused by the world food crisis and Tajikistan experienced a severe inflationary spike up to 50 percent annually. So here it might be said that monetary policy was endogenous or passive in curbing increased money demand and responding to external shock.

From 2009 to 2011 the lines in the graph break off their relationship as inflation goes down but reserve money goes up. The only probable explanation to this is that it was the effect of the global financial crisis and recession with sluggish demand in the world and as a result reduction in prices of the world commodities. And here on the one hand, of the economy's slowdown and on the other hand favourable inflationary processes, the NBT did its job (as did most central banks in the world) by implementing short-term countercyclical policy resulting in monetary expansion to support the banking system and boost domestic aggregate demand. As a result there is multidirectional movement between two lines in the above graph.

Further, from 2011 till present the relationship is weaker and unstable however with a positive downward trend between reserve money and inflation. In 2010-11 there was another spike in prices from the world food commodity prices so that here money also treats as endogenous with inflation determined by non-monetary factors.

At the next graph (Figure 3.2.4) similar, but much smooth correlation can be seen between another monetary aggregate (broad money (M4)) and CPI inflation. A visual overview of the M4 aggregate average change, which is the sum of stock of money supply (in domestic currency) and deposits in foreign currency, gives almost the same as in previous graph but with a clearer evidence of relationship. The only exception is that the variables have correlation with some leads and lags. Taking into account that foreign exchange deposits constitute about 40 percent of the structure of broad money, one might say that this factor, notably dollarization, plays a significant role in inflation determination.

Figure 3.2.4. Broad money[30] and inflation rate (change in %, annually)



Source: NBT, Statistical Agency and author's calculation.

Thus, according to such plain analysis it can be concluded that there seems to be correlation between money and prices in Tajikistan. However, for more evidence it is necessary to undertake some statistical testing to find the extent of such relationship between variables (such analysis is shown in chapter 5 of this research).

3.3. Obstacles for monetary policy transmission

In developing countries, due to institutional and structural conditions, the impact of monetary policy on the economy is characterized by a greater degree of uncertainty than in developed countries. Typically, such economies have a lower degree of developed financial markets compared to developed economies in terms of

[30] Data on broad money is available only from 2005.

competitiveness, size, capitalization, and the degree of involvement of economic agents (Checetti, 1999). As a transitional economy Tajikistan, is characterized by the presence of such factors that reduce the effectiveness of monetary transmission mechanisms associated with market imperfections, government policies, as well as structural factors.

Tajikistan's financial sector is mainly represented by the banking system. There are 16 commercial banks, 126 micro-credit and non-bank credit institutions, as well as one deposit insurance fund, where about 80 percent of their total assets belong to commercial banks.[31] Most of the assets are highly concentrated among several banks. Having rather weak financial indicators, bank assets share to GDP during 2005-12 averaged 30 percent (Table 3.3.1.). In this condition of a weak domestic capital market, bank deposits constitute the main sources of funding and have significantly increased in recent years. However, foreign exchange deposits dominate the structure of deposits, creating foreign exchange risks and result in high interest rate spreads and cost of borrowing.

Table 3.3.1. Selected financial sector indicators of Tajikistan (in %, average)

	M2 /GDP	Bank Assets /GDP	Bank Deposits /GDP	Somoni Lending /Deposit %-spread	Dollarization /1	Average Inflation
2005-2008	11.3	33.6	3.5	9.1	71	12.8
2009-2012	13.6	28.5	10.3	7.3	63	7.7

/1 As a % of foreign currency deposits to total deposits
Source: NBT, Statistical Agency, and author's calculation.

[31] *Source:* IMF (2013) – "Financial sector in Tajikistan" (presentation for principals group meeting).

An outline of the obstacles for the transmission of monetary policy was partially detailed in the above section. They are mainly related with the impotence of the *interest rate channel* – the main toolkit of the modern central banks according to Blinder (1999). Rudimentary or virtually non-existence of equity and stock exchange markets leaves limited scope for the open market operations which in turn leads to decisions on interest rate changes and makes *other asset price's channel* and *balance sheet channel* inoperative. Now let us reconsider what are the impediments and why these channels are not effectively transmitting to the economy.

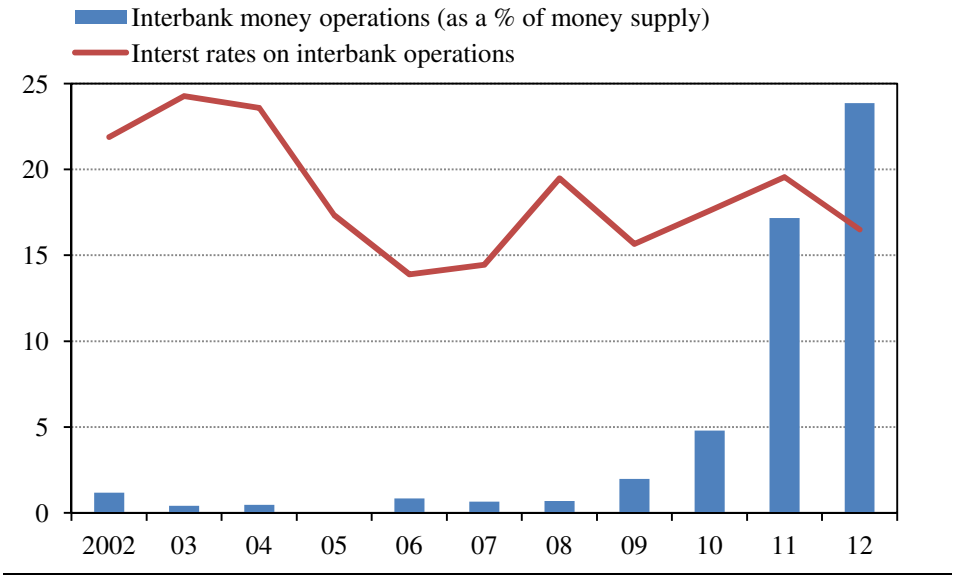
Among other factors the effectiveness of the interest rate channel highly depends on to what extent the money market and financial system is developed as a whole. Monetary authorities need to be able to effectively participate in such markets in order to bring the market interest rates up or down in accordance with the decisions regarding the monetary stance. However, similar to other low-income and developing countries the interbank money market in Tajikistan is undeveloped with low liquidity, as banks' operations are being made on an ad hoc basis (IMF, 2008).

As it shown in Figure 3.3.1 (according to the relevant statistics) until 2011 the market was almost non-existed with very low amounts of transactions between banks. Starting in 2011 banks has begun to diversify sources of funding but it still remains rudimentary.

Furthermore, the primary market for government securities in particular, and equity and stock markets as a whole, are not well capitalized and still underdeveloped. The amount of government issuance of securities is very low, and the NBT securities do not have a market-based interest rates or yield curve (IMF,

2008c). Thus, the limited loanable funds market ties the NBT's "hands" to use the interest rate toolkit in the effective transmission of monetary policy. Following Schaechter (2001), this fact mainly explains why the NBT uses a quantity variable (reserve money) as the operating target rather than a price variable (short-term interest rate).

Figure 3.3.1. Interbank money market in Tajikistan

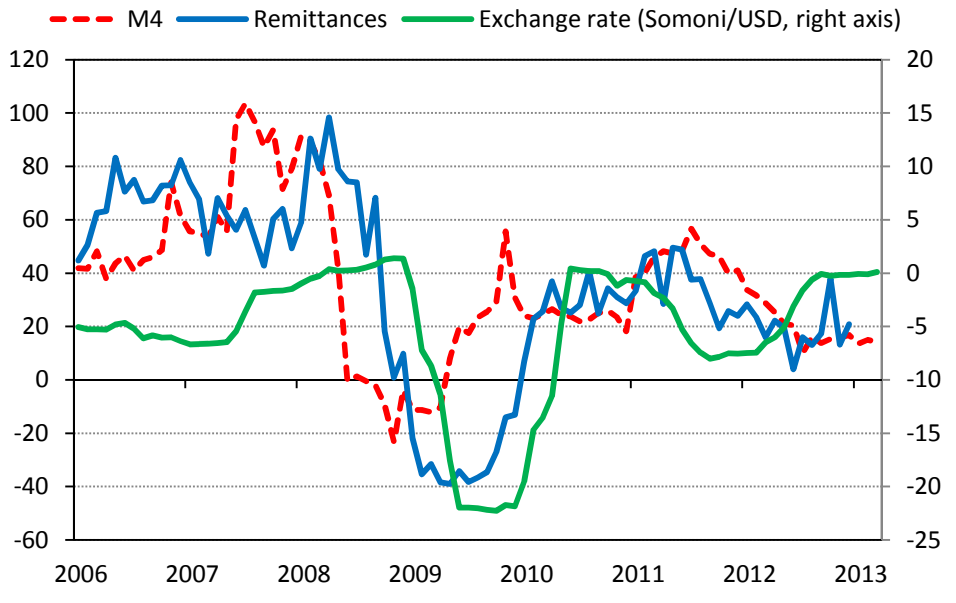


Source: NBT and author's calculation.

Another key factor impeding the effective monetary policy implementation is dollarization. Low confidence in the banking system is reflected in a high degree of dollarization of either deposits or loans. This creates significant uncertainty and asymmetric information in the transmission mechanism of monetary policy due to the effect of the exchange rate channel, as exchange rate fluctuations in many ways affect the financial position of economic agents. As previously noted, the banking system in Tajikistan is considered to be highly dollarized: the ratio of foreign currency deposits to total deposits exceeds 60 percent.

Leading to a growth in demand in Tajikistan migrant's remittances contributes to the dollarization process as well. Remittances are almost 50 percent of GDP. As it is shown in Figure 3.3.2, remittances have a leading relationship with other nominal variables such as exchange rate and broad money. Evidently remittances are important source of foreign exchange inflow and any considerable change in their inflow will immediately impact the exchange rate since they are mostly in US dollars. Also change in broad money has dependence on remittances through foreign exchange deposits and hence it appears that parts of them (remittances) are deposited in banks. Thus, it reasserts the earlier conclusion about the role of remittances in the economy of Tajikistan.

Figure 3.3.2 Broad money and remittances (change in %, annually)



Source: NBT.

This causes the factors of remittances, namely import dependency and export-orientation on one or two main commodities, to affect the exchange rate channel to

such an extent that it is *per se* the main transmitting channel that, in fact, could be controlled by the NBT. Exchange rate changes have direct impact on the prices of imported goods and therefore on consumer prices. This also leads to a change in the prices of domestic goods over foreign goods, affecting the volume of net exports. Exchange rate movements also affect the balance sheets of the economic agents/recipients who have assets or liabilities denominated in foreign currencies and are subject to currency risk.

CHAPTER 4

RESEARCH METHODOLOGY

4.1. Background and Literature Review

Among the conditions for the effectiveness of monetary policy regime targeting price stability, and therefore, stable output is the presence of an effective monetary transmission mechanism. While adopting a monetary regime based on price stability, previous research on the monetary transmission are of particular importance, since it is necessary for the authorities to have estimates of whether policy actions really affect the price dynamics and real growth and to choose further appropriate strategy. As an example developed countries have good systematic knowledge of the issues of monetary transmission related to their economies while most of them have now moved to a more modern - inflation targeting regime.

Most of the research related to the topic of empirical study of the transmission mechanism is fairly considered to the United States, because that is where the theoretical foundations were developed. Also important is that a sufficiently long series of statistical observation is available in the U.S. and other developed countries that reveal the patterns of development of economic processes over a fairly long period of time. Among the research in this field is Sims's study (1972; 1980), Christiano, Eichenbaum, and Evans' (1996; 1999), Leeper, Sims, and Zha's (1996), Bernanke and Blinder's (1992), Bernanke and Mihov's (1998), etc.

Among the approaches for measuring the effect of monetary policy (Mishkin, 2007b; Walsh, 2010) and methodological analysis of monetary policy transmission

are the reduced-form non-structuralistic studies on the basis of time-varying evidence[32], historical evidence[33] and case studies[34], or quantitative studies based on the use of the "vector autoregressive approach" which do not requires rigorous restrictions. Another approach based on structural macroeconometric models[35] where research is carried out both on the basis of macroeconomic data and information on the micro level (e.g., firms investment behavior, and expectation, or the banking sector credit activity). Structural models relying more on data investigate all main links in the economy, i.e. fully observing and explaining the channels of monetary policy. As Mishkin (2007b) points out, the reduced-form models, which have been utilized mainly by monetarists, do not imply full understanding of monetary policy effects [in the sense that if there is any doubt in all processes of the transmission mechanism] compare to the structuralistic Keynesians. The former models in that case will explain the effect and correlation between initial policy and final non-policy variables.

It should be noted that the degree of choosing between approaches highly depends on the availability of appropriate statistical data. Moreover, one of the reasons econometric research methods may not reveal the nature and direction of the effect of monetary shocks on real output is the short statistical time series data with high frequency (mostly monthly) of observations.

The other approach, called "narrative", was proposed by Romer and Romer (1990) and involves developing indicators that characterize the state of monetary

[32] M. Friedman and A. Schwartz's (1963a), "Money and Business Cycles".
[33] For instance, Friedman and Schwartz's (1963), Romer and Romer's (1990), Boschen and Mills' (1991).
[34] Sargent (1986).
[35] Like modern dynamic stochastic general equilibrium (DSGE) models

policy. Using information from the meetings of the Federal Open Market Committee (FOMC), they identified monetary policy variables - the dates when FOMC was inclined to change the policy stance as a tight. In such a manner it is possible to distinguish between money supply shocks and demand shocks. However, the subjectivity of this approach and the limited information content may be a disadvantage. After all, it has just been used to determine the episodes when policymakers believed that it should adopt more anti-inflationary steps without a dynamic effects investigation capturing both exogenous and endogenous factors (Leeper, 1997; Walsh, 2010).

This approach was extended by Boschen and Mills (1991). On the basis of the intentions of the FOMC members, they developed an index to characterize the state of monetary policy from the "very expansionary" to "very tight". They found that this index of expansionary policy was consistent with the movements of money indicators and interest rates upwards and downwards, respectively.

Due to uncertainty, the application of this approach to estimate the monetary policy in transition and developing countries is only viable after improvement of the monetary authorities' and policy transparency and communications.

Currently, economic theory and practice highlight the most commonly used indicator of the monetary policy stance: the key interest rate of the central bank. Under effective interest rate policy, a flexible exchange rate and an independent central bank this variable most accurately reflects the direction and the nature of monetary policy. Therefore, the key [or official] interest rate is considered by the central banks of many countries (in particular developed countries like the UK, the

Euro area, the United States, Canada, Australia, Japan etc.) as a starting point when analyzing the monetary transmission mechanism,.

Looking forward to note that this research will use a Vector Autoregressive (VAR) approach, being the most "widely used empirical methodology to analyze the transmission mechanism" (Mojon & Peersman, 2001). Economic literature suggests that a widely used approach to the analysis of the impact of monetary policy shocks on the real economy is on the basis of vector autoregression, proposed by Sims (1972; 1980).

VAR is a linear model containing *n*-equations in the vector of usually endogenous variables where the current value of a variable is explained (have feedback relationship) by its lagged values, as well as the current and past (lagged) values of the other variables (Gujarati & Porter, 2009; Stock & Watson, 2001). According to Sims, VAR models do not assume division between endogenous and exogenous variables since both leading variables are dependent on their own previous values as well as on the previous values of the other variables included in the model, where in such case all variables are considered as endogenous. Note that in this paper, VAR generally refers to the standard or reduced form of VARs. The use of vector autoregressive models with exogenous variables is associated with the work of Bernanke and Mihov (1998), and Christiano et al. (1999). Following Watson (1994), VAR in its reduced-form can be written in matrix form as:

$$Y_t = \alpha + \sum_{p=1}^{n} A_p Y_{t-p} + \mathrm{E}_{yt} \qquad (1)$$

$$Y_t = \begin{bmatrix} y_t \\ x_t \end{bmatrix}, \quad Y_{t-p} = \begin{bmatrix} y_{t-p} \\ x_{t-p} \end{bmatrix}, \quad \mathrm{E}_{yt} = \begin{bmatrix} \varepsilon_t^y \\ \varepsilon_t^x \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

where Y_t is a $n \times 1$ vector of endogenous variables, α is a $n \times 1$ vector of constants, A is $n \times n$ coefficient matrix to be estimated, and $\mathrm{E}(\varepsilon_t)$ is a vector of residuals or serially uncorrelated innovations with a zero or constant mean, variance and covariance matrix. Including exogenous variables the equation will be represented as

$$Y_t = \alpha + \sum_{p=1}^{n} A_p Y_{t-p} + BX_t + \mathrm{E}_{yt} \qquad (2)$$

where B is $n \times m$ matrix of coefficients and X_t is a $m \times 1$ vector of exogenous variables.

VARs do not necessarily need data-intensive time series and have a simplified scheme providing a systematic way of estimating different dynamics of multivariate time series (Stock & Watson, 2001). Theoretical knowledge about the nature of economic processes defines only the set of variables being included in the model while the final specification of the econometric model (the number of lags of the variables) is determined empirically. The main difference between this approach and the traditional econometric modeling of economic processes is that it is not directed to draw inferences about optimal policy but to seek empirical evidence about the response of macroeconomic variables to policy shocks or innovation and further to identify an adequate theoretical model of economy (Favero, 2001).

In general, VARs provide compatible results to study of aforementioned relationships (Walsh, 2010), especially in transition and low-income economies

while not requiring such a large set of variables. Ganev, Molnar, Rybinski and Wozniak (2002), in their study on transitioning Central and Eastern Europe countries, proceed from the use of relevant models like VAR instead of using structural models which rely on strong theoretical assumptions. Indeed, in developing countries the impact of monetary policy on the economy is characterized by a greater degree of uncertainty than in developed countries due to institutional and structural shortcomings, specifically without a developed financial sector and capacious banking system (Cecchetti, 1999; Elbourne et al., 2003; Dabla-Norris & Floerkemeier, 2006). The nature and effectiveness of the transmission mechanism and its stylized channels like interest rate, credit, and asset price vary subject to the size, structure and openness of the economy, i.e. by the degree of its development. Ganev et al. (2002) concluded that in transition economies these factors make the traditional instruments of monetary policy less effective than in the 'neoclassical' conditions that may even reflect in time inconsistencies.

The evidence from empirical studies (Coricelli, Egert, and MacDonald, 2005; Ganev et al., 2002) suggests that in transition economies, the exchange rate channel plays the main role in the transmission of monetary policy relative to the modernly monetary policy implementing countries with the developed financial and sizable banking sectors where the interest rate and its channel is the dominant choice of policy. Moreover, according to Ganev et al. (2002) responses of rise in prices and output to the exchange rate depreciation were positive, i.e. exchange rate pass-through was inflationary and output stimulating.

Although there is a lot of literature on different countries concerning the research of the monetary policy impact on the economy, it is rather scarce related to the topic in Tajikistan. A few sources considering Tajikistan were found where research was mainly conducted using quantitative methodology with empirical multiple regression equations (mainly VAR and VEC approaches) and analysis of different economic processes.

Tashrifov (2008) analyzed and empirically estimated a model of monetary policy regime of Tajikistan by investigating the effect of monetary policy innovation on inflation and output for the 10 year transition period employing the standard five-variable Structural Vector Autoregressive (SVAR) model. By generating the structural impulse response and forecast error variance decomposition functions the study revealed the significance of exchange rate impulses of monetary policy impact on inflation in the short- and long-run models, and in the long run found the policy innovations are contributing more to growth.

In other research Isakova (2008) examined the monetary transmission mechanism of three Central Asian countries (including Tajikistan). Using a VAR model obtaining an impulse response function showing how output or prices respond to a monetary policy shock, she concluded that there is a strong pass-through from exchange rate to the market. Along with this she considered there is a weak transmission between policy and market interest rates and in this direction, a more policy efficient financial market should be developed. This is common for highly dollarized and open economies, where the factor of dollarization decreases the effectiveness of the monetary policy.

Alturki and Vtyurina (2010) examined the monetary transmission mechanism of Tajikistan by estimating a Vector Error Correction Model (VECM). They found that the growth in broad money was contributing to inflation and also noted the inefficiency of the NBT's existing policy rates, the refinancing rate and reserve requirement ratio, in controlling inflation. They also found there is strong impact of exchange rate channel on the level of prices. The main recommendations drawn from the study are to strengthen the interest rate channel, to develop the securities market with both government bonds and the CB's bills, and to enhance the measures to develop the financial and banking sectors.

4.2. Data and variables description

The chosen endogenous macroeconomic variables for the analysis, to be explained in detail below, consist of real GDP (y), consumer price index (p), and reserve money (m), banks' lending interest rate (r), the level of credits to the economy ($cred$), and the nominal exchange rate of domestic currency (somoni) to US dollar (e).

Real GDP is the percentage real growth of GDP, published monthly but with a period-to-period cumulative value (e.g., Jan-Feb 2012/Jan-Feb 2011, Jan-Sep 2012/Jan-Sep/2011, etc.). Though the Agency on Statistics of Tajikistan publishes the monthly nominal GDP (GDP at current prices), data on real GDP (GDP at constant prices) are not available on a monthly basis, i.e. still have not been officially

published. As it is known real GDP (y_t) is equal to nominal GDP (Y_n) divided by GDP price deflator (Y_d):

$$y_t = \left(\frac{Y_{nt}}{Y_{dt}}\right) \times 100$$

As a monthly GDP deflator is not available it is worthwhile to estimate using some other indicator characterizing general level of price like consumer price index (CPI). So in this case the monthly series of real GDP data were derived using CPI as a proxy to GDP deflator.

Among the other existing indicators characterizing the overall price level such as producer price index (PPI) or GDP deflator, CPI is more acceptable since it covers a large items of tradable and non-tradable consumer goods and services (more that 300) and hence, compatible with the living cost compare to the PPI (Zavkiev, 2005). Moreover, it is available every month and is used by the NBT as a reference in policy conduct. So in this case the monthly series of CPI inflation is as the variable characterizing inflationary processes.

Money stock is one of the key variables reflecting the state of monetary policy and its effect on the macroeconomic variables. In general, the researchers are employing one of the variants of the monetary aggregates, such as monetary base (also known as reserve money or high-powered money), narrow money (M1), and broad money (M2). It should be said that money variables do not always adequately and fully reflect the direction of monetary policy because in addition to changes in the money supply it may also reflect changes in the demand for money. Hence, in such case it is difficult to distinguish weather the growing volume of money supply

caused GDP growth and the level of prices, or conversely the economic dynamics causes change in the money stock. This is known as the issue of reverse causation.

As it was considered in the previous chapter, the NBT adopts a monetary targeting regime with the reserve money being the program benchmark. The central bank has a direct link to the monetary base, which serves as the main channel through which the monetary authorities control the money supply. The monetary base mainly consists of issued currency outside banks (currency in circulation) and banks' reserves as in the "cash in vault" form and deposits within the central banks. Monetary policy instrumentation, such as open market operations (purchases or sales of securities, foreign exchange intervention, and sterilization) and transaction with commercial banks or government will be reflected first in the change of the amount of monetary base. Choosing monetary base as a variable most reasonably characterizing the key point of monetary policy seems appropriate. Thus, the reserve money (*m*) will be used as a money representative in the model.

As the study is concerned with investigaion of monetary policy effectiveness, the NBT's refinancing rate as the de jure policy rate is not included in the model since the analysis of the previous chapter (see chapter 3) reveal its symbolicness and inefficiency. One can hardly find any causation or even correlation between policy and market interest rates, as any change in policy rate is not reflected in the proportional change of the market interest rate. Instead, the representative average monthly lending interest rate (*r*) of the banking system adequately reflects the dynamics of the market interest rates and thus monthly series of the banking system's credits (*cred*) to the economy has been chosen, assuming that changes in the

monetary policy operations and thus money supply will be transmitted through the credit channel to the macroeconomic economic variables.

The nominal exchange rate is the official average monthly exchange rate of Somoni to US dollars with the December 2000 as a base period. Due to the fact that the bulk of foreign currency transactions either in the domestic market or foreign trade turnover are in US dollars, a decision has been made in favor of US dollar.

Taking into account that Tajikistan's economy is highly vulnerable to external economic influence and to eliminate the effect of "price puzzle" (Sims, 1992), the indices of the world commodity prices for wheat (p^c_w) and oil (p^c_oil) are chosen as exogenous factors to control for these shocks. Moreover, following Dabla-Norris and Floerkemeier (2006), oil prices conform to remittances' impact since they are connected with "the energy-related economic boom in Russia, which has led to significant income growth and prices in Russia's non-tradable sector".

Since the economy of Tajikistan is characterized as transitional, it should be taken into consideration that there isn't reliably good or sufficiently long time series data. For this purpose, to maximize the number of observations statistical data covers the monthly representation from the period of January 2001 to December 2012 totalling 145 observations. Data for GDP and consumer price index are taken from the "Socio-economic situation in Tajikistan" - the monthly report of the Agency on statistics under the President of the Republic of Tajikistan, data for monetary aggregates, credits, interest rate and exchange rate came from the National bank of Tajikistan both directly upon request and from the official web page. Data for the world commodity prices are from the World Bank.

Real GDP, CPI, exchange rate, credits, reserve money variables, and commodity prices (except interest rate) in the model are transformed into natural logarithms. Data on real GDP data, which had a seasonal pattern, was seasonally adjusted. A number of deterministic dummy variables (*d*) in order to control the effects of structural breaks have been included. Also time trends (*t*) have been included in all VAR equations. For data analysis the econometric software package E-views was used.

4.3. Model description and specification

In this paper, the relationship between the transmission channels operating in Tajikistan and output and price level over the last decade is analyzed. Investigating other possible channels, such as the balance sheet channel, asset prices and the expectations channels, is problematic as there is a lack of an appropriate environment or capacity, i.e. the absence of any financial indices' indicator as a result of underdevelopment markets, and statistical accounting and hence, data for estimation and analysis. Following this, the study focuses on the monetary policy transmitting variables in Tajikistan, such as reserve money as a proxy to monetary policy stance, exchange rate and their effect on inflation and output.

Indeed as Leeper, Sims, and Zha (1996) and Walsh (2010) argue that any change or correlation between monetary policy and non-monetary variables, e.g. money or interest rates and output may just be the reflection or response of the policy variable to the processes in the economy and not the exogenous policy outcome.

Even so, such a response must be in turn followed with the affected non-monetary macroeconomic indicators, that is, the effect of policy change should be reflected in the targets (e.g., inflation or unemployment). What can be here assumed is that there is no reverse causation from the policy interest rate serving as a transmission channel to the economic activity in the case of Tajikistan.

This research on the impact of NBT's monetary policy on real variables uses a multivariate time series regression analysis by employing the Vector Autoregressive method with a system of endogenous and exogenous variables. This model is used for analysis to obtain causality, impulse responses and variance decompositions showing how prices or output respond to a change in monetary policy stance (Stock & Watson, 2001). Using the lag operator notation the following standard VAR-model is to be estimated:

$$Y_t = A(L)Y_{t-1} + BX_t + u_t \quad (3)$$

where Y_t is a $n \times 1$ vector of endogenous variables, X_t is a $k \times 1$ vector of exogenous variables, A and B are $n \times n$ and $n \times k$ matrix polynomials respectively, L is the lag operator, and u_t is a vector of serially uncorrelated residuals with a constant and time invariant mean and variance matrix. X_t controls for the disturbances that are not directly managed by the monetary authority and may somewhat affect the dynamics of the model.

In general, in case of the current investigation the standard VAR implies the following equations:

$$y_t = \alpha_1 + \sum_{i=1}^{n} \beta_{11} y_{t-i} + \sum_{i=1}^{n} \beta_{12} p_{t-i} + \sum_{i=1}^{n} \beta_{13} cred_{t-i} + \sum_{i=1}^{n} \beta_{14} m_{t-i} + \sum_{i=1}^{n} \beta_{15} r_{t-i} + \sum_{i=1}^{n} \beta_{16} e_{t-i}$$
$$+\gamma_{11} p\_oil_t + \gamma_{12} p\_w_t + \gamma_{13} d + \mathrm{u}_{1t} \quad (4)$$

$$p_t = \alpha_2 + \sum_{i=1}^{n} \beta_{21} y_{t-i} + \sum_{i=1}^{n} \beta_{22} p_{t-i} + \sum_{i=1}^{n} \beta_{23} cred_{t-i} + \sum_{i=1}^{n} \beta_{24} m_{t-i} + \sum_{i=1}^{n} \beta_{25} r_{t-i} + \sum_{i=1}^{n} \beta_{26} e_{t-i}$$
$$+\gamma_{21} p\_oil_t + \gamma_{22} p\_w_t + \gamma_{23} d + \mathrm{u}_{2t} \quad (5)$$

$$cred_t = \alpha_3 + \sum_{i=1}^{n} \beta_{31} y_{t-i} + \sum_{i=1}^{n} \beta_{32} p_{t-i} + \sum_{i=1}^{n} \beta_{33} cred_{t-i} + \sum_{i=1}^{n} \beta_{34} m_{t-i} + \sum_{i=1}^{n} \beta_{35} r_{t-i} + \sum_{i=1}^{n} \beta_{36} e_{t-i}$$
$$+\gamma_{31} p\_oil_t + \gamma_{32} p\_w_t + \gamma_{33} d + \mathrm{u}_{3t} \quad (6)$$

$$m_t = \alpha_4 + \sum_{i=1}^{n} \beta_{41} y_{t-i} + \sum_{i=1}^{n} \beta_{42} p_{t-i} + \sum_{i=1}^{n} \beta_{43} cred_{t-i} + \sum_{i=1}^{n} \beta_{44} m_{t-i} + \sum_{i=1}^{n} \beta_{45} r_{t-i} + \sum_{i=1}^{n} \beta_{46} e_{t-i}$$
$$+\gamma_{41} p\_oil_t + \gamma_{42} p\_w_t + \gamma_{43} d + \mathrm{u}_{4t} \quad (7)$$

$$r_t = \alpha_5 + \sum_{i=1}^{n} \beta_{51} y_{t-i} + \sum_{i=1}^{n} \beta_{52} p_{t-i} + \sum_{i=1}^{n} \beta_{53} cred_{t-i} + \sum_{i=1}^{n} \beta_{54} m_{t-i} + \sum_{i=1}^{n} \beta_{55} r_{t-i} + \sum_{i=1}^{n} \beta_{56} e_{t-i}$$
$$+\gamma_{51} p\_oil_t + \gamma_{52} p\_w_t + \gamma_{53} d + \mathrm{u}_{5t} \quad (8)$$

$$e_t = \alpha_6 + \sum_{i=1}^{n} \beta_{61} y_{t-i} + \sum_{i=1}^{n} \beta_{62} p_{t-i} + \sum_{i=1}^{n} \beta_{63} cred_{t-i} + \sum_{i=1}^{n} \beta_{64} m_{t-i} + \sum_{i=1}^{n} \beta_{65} r_{t-i} + \sum_{i=1}^{n} \beta_{66} e_{t-i}$$
$$+\gamma_{61} p\_oil_t + \gamma_{62} p\_w_t + \gamma_{63} d + \mathrm{u}_{6t} \quad (9)$$

So in the benchmark model the vector of endogenous policy and non-policy variables with more probability of determining the level of prices with money supply (m_t) as a proxy for monetary policy stance in Tajikistan will be as follow:

$$Y_t = [\ y_t\ ,\ p_t\ ,\ m_t\ ,\ e_t\ ] \quad (10)$$

and the vector of exogenous factor-variables as:

$$X_t = [\ p^c\_oil_t\ ,\ p^c\_w_t\ ] \qquad (11)$$

In the second VAR equation the credits and lending interest rates are included in the vector of endogenous variables assuming that change in money supply (*m*) leads to a change in lending interest rate (*r*) and credits (*cred*):

$$Y_t = [\ y_t\ ,\ p_t\ ,\ cred_t\ ,\ r_t\ ,\ m_t\ ,\ e_t] \qquad (12)$$

Hence, in the first VAR ordering inflation is a linear function of lagged values of output, inflation, money supply, and exchange rate; and in the second ordering, output acts as a function of lagged values of itself, inflation, credits, interest rate, money supply and the exchange rate. Here accordingly noting Bernanke and GertIer (1995) VARs come as a system where "each of a set of variables is regressed on lagged values of both itself and the other variables in the set".

In the VAR analysis, applying the Granger causality test helps find the systematic relationship between monetary policy and macroeconomic variables. Introduced by Granger (1969), the main point is that in a bivariate system of variables Y_t Granger-cause X_t if X_t can be better predicted using the current and past values of both X_t and Y_t, and by definition "Y_t, is causing X_t, if we are better able to predict X_t, using all available information than if the information apart from Y_t had been used". The result of this test for Granger causality criteria shows whether the lagged value of one variable determines other variables. Therefore, the research is

supplemented by testing for the presence of Granger causality between the model variables.

For the obtaining results of the model, structural analysis with the examination of impulse response functions and variance decomposition is undertaken. The impulse response function outlines the over-time response of the present and future values of each VAR variable to a one standard deviation/or increase of a specified VAR variable's one-time innovations/or shocks (Stock & Watson, 2001). It traces out the reaction of i-th variable to a 1 percent change in the j-th innovation. It helps to show (as well as a graphic time transmission) how prices and output, as well as credits and market interest rates respond, to the monetary policy variables, i.e. money supply and exchange rate.

Furthermore, it is advisable to analyze the variance decomposition. Variance decompositions or forecast error variance decompositions (FEVD) is the other VAR model technique for investigating the effect of innovations. According to Stock and Watson (2001), it indicates the portion of the variance of the forecast error that arose in predicting a variable due to a concrete innovation at a given horizon. Hence, the variance decomposition reports on the comparative efficacy of each shock to the variables in the VAR system or "information about the relative importance of each random innovation in affecting the variables in the VAR"[36].

An important feature of the analysis of monetary policy on the basis of vector autoregressive approach is statistical diagnostics of the time series. In particular, to identify short-term relationships between money and real output it is worthwhile to

[36] EViews user guide manual, page 529.

adjust data series for seasonality. In addition, the standard testing procedures like unit root tests of time series on their stationarity and cointegration is an important constituent of every empirical investigation.

An important feature of the analysis of monetary policy on the basis of vector autoregressive approach is statistical diagnostics of the time series. In particular, to identify short-term relationships between money and real output it is worthwhile to adjust data series for seasonality. In addition, the standard testing procedures like unit root tests of time series on their stationarity and cointegration is an important constituent of every empirical investigation.

4.4. Appropriateness of the data

An important concept in the analysis of time series is stationarity (Greene, 2000) because each time series regression involves the data being stationary. In order to find linear interdependencies among multiple time series before estimating the vector autoregressive model it is useful to determine whether the data is stationary or not. Otherwise running a regression may result in a misleading relationship in the model e.g., just time trends correlation of data series showing a significant criterion ($R^2 > 0.9$). Such outcome is known as a phenomenon of spurious regression in the econometric literature (Gujarati & Porter, 2009). According to Gujarati and Porter (2009) a time series is stationary when it has a constant mean with a variance or stable fluctuation around this mean; that is, the time series probability distribution is time-invariant and it is necessary to note that in general time series are non-stationary

and integrated of order *I*(1), i.e. have a differenced meaning. These kinds of tests usually are carried out by utilizing the unit root test and the conventional Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) approaches.

However, there is much empirical evidence where instead, non-stationary data is utilized. For instance, Sims, Stock and Watson (1990) in particular, suggested using differenced data is "in many ways unnecessary" since the VAR analysis is mainly used to find dynamic interactions between for example, policy and non-policy variables, but doesn't focus on the regression coefficients estimates. Thus, transforming data may not capture information about such relationship in the data.

Accordingly, for testing each series on stationarity, the unit root test is used. With the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests for the presence of a unit root the level of integration of the time series, including the constant, has been estimated (Table 1).

Table 4.1. Results of the unit root test

	Levels			First Differences		
	ADF	PP	KPSS	ADF	PP	KPSS
loge	-1.2763 *I*(1)	-1.4925 *I*(1)	1.3509	-4.2286	-6.7846	-
logm	-0.5605 *I*(1)	-0.5250 *I*(1)	1.3948	-12.8885	-12.9439	-
logcpi	-0.9890 *I*(1)	-1.2807 *I*(1)	1.4172	-8.2713	-8.3207	-
logy	-0.9890 *I*(1)	-1.2807 *I*(1)	1.4172	-8.2713	-8.3207	-
logcredit	-1.6786 *I*(1)	-1.6555 *I*(1)	1.3502	-11.0181	-11.0040	-
lendrate	-3.6466	-5.2326	0.9054	-	-	-
logp_oil	-1.7715 *I*(1)	-1.5343 *I*(1)	1.3236	-7.4128	-7.4786	-
logp_w	-1.7455 *I*(1)	-1.2145 *I*(1)	1.1324	-9.2783	-9.1520	-

As it is seen from the table, the non-stationary variables tested by the ADF and PP tests are at levels and indicated by the same orders of integration $I(1)$, that is they are non-stationary. Contrary, the KPSS test showed that all variables are stationary. Not surprisingly the market lending interest rate (r) variable is integrated by order of zero $I(0)$, i.e. stationary at its level.

After taking first differences of the ADF and PP for those indicated as non-stationary, the null hypothesis of a unit root was rejected and all variables became stationary. Therefore, overall to find out consensus between each test the conclusion is that the maximum order of integration for data transformation is one.

As a first step it is critical to determine the optimal lag length of the VAR model since it is "the biggest practical challenge" (Gujarati & Porter, 2009). As it was tested the variables have at maximum the first order ($I(1)$) of integration.

Instead of taking the variables at their first order the current study employs the lag-augmented VAR method proposed by Toda and Yamamoto (1995). This procedure consists in estimating VAR variables in levels irrespective of whether there are integration or cointegration equations in the model. Further, to obtain an optimal lag length it suggests using a common lag order selection procedure to find a lag length (k) plus maximum order of integration (d_{max}) of possible non-stationary variables ($k + d_{max}$). It should be noted that depending on the standard asymptotic theory, the order of integration should not be a greater than the true lag length of the VAR (Toda & Yamamoto, 1995). There is evidence that Toda and Yamamoto's inference performs better outcomes concerning to the Granger causality and impulse response function tests.

CHAPTER 5

EMPIRICAL RESULTS AND DISCUSSION

As a consequence of employing a monetary targeting regime, the NBT determines money supply - reserve money as an indicator reflecting the stance of the monetary policy. And at the same time, as NBT is constrained from using or targeting qualitative variables (such as policy interest rate), to achieve its quantitative target it mainly uses the reserve requirements ratio, operations in the open market (issuing securities), and foreign exchange intervention. Thus, it follows that choosing reserve money as a main policy variable in our VAR model; we can examine the effects or impulses of any change in this variable on the real sector dynamics. Other things being equal, an increase in reserve money indicates an expansionary stance of the NBT and vice versa, a decrease - as contractionary. Also, and not less important, it is assumed that these fluctuations are a result of the change in monetary policy stance.

5.1. The VAR 1 model

The VAR (1) model includes four variables: log of reserve money (LOGM), log of exchange rate (LOGE), log of price level (LOGCPI), and log of real GDP (LOGY). The estimated VAR-used lag order selection criteria showed the lag length equal to one (Table 4.1) and the VAR lag exclusion Wald tests confirmed to use one lag since their coefficients within one lag jointly were significant, and taking into

account that the maximum order of our non-stationary variables is 1, i.e. $I(1)$ the choice has been made to use 2 lags following Toda and Yamamoto's $k+d_{max}$.

Table 5.1.1.
VAR Lag Order Selection Criteria
Endogenous variables: LOGM LOGE LOGCPI LOGY
Exogenous variables: C D01 D02 D03 LOG(P_OIL) LOG(P_W) T
Sample: 2000:12 2012:12
Included observations: 133

Lag	LogL	LR	FPE	AIC	SC	HQ
0	701.8786	NA	4.67E-10	-10.13351	-9.525018	-9.886244
1	1216.267	943.6894	2.60E-13*	-17.62807*	-16.67186*	-17.23950*
2	1232.162	28.20522	2.61E-13	-17.62650	-16.32258	-17.09663
3	1239.481	12.54719	2.99E-13	-17.49596	-15.84433	-16.82480
4	1256.327	27.86466*	2.97E-13	-17.50867	-15.50933	-16.69622
5	1265.598	14.77907	3.31E-13	-17.40749	-15.06044	-16.45374
6	1274.444	13.56770	3.73E-13	-17.29991	-14.60515	-16.20486
7	1284.982	15.52921	4.12E-13	-17.21777	-14.17530	-15.98142
8	1290.001	7.095381	4.95E-13	-17.05265	-13.66247	-15.67501
9	1300.528	14.24695	5.52E-13	-16.97035	-13.23245	-15.45141
10	1316.998	21.29956	5.65E-13	-16.97742	-12.89181	-15.31718
11	1337.087	24.77109	5.52E-13	-17.03890	-12.60558	-15.23737
12	1346.368	10.88575	6.39E-13	-16.93786	-12.15683	-14.99503

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: E-Views, author's calculation.

The second step was to determine stability conditions and testing residuals for autocorrelation and serial correlation of whether the estimated VAR is stable and stationary. The results showed that all the AR roots modulus are less than one and lie inside the unit circle suggesting that the model is stable (Tables 5.1.2). Results for serial correlations based on LM tests and for autocorrelation based on portmanteau tests showed below (Tables 5.1.3 and 5.1.4) are acceptable with no rejection of null

hypothesis for residuals serial correlation and autocorrelations at any tested lags suggesting the model is not misspecified.

Table 5.1.2. VAR Stability Condition

Roots of Characteristic Polynomial
Endogenous variables: LOGM LOGE LOGCPI LOGY
Exogenous variables: C D01 D02 D03 LOG(P_OIL) LOG(P_W) T
Lag specification: 1 2

Root	Modulus
0.959436 - 0.026161i	0.959793
0.959436 + 0.026161i	0.959793
0.882999 - 0.043704i	0.884080
0.882999 + 0.043704i	0.884080
0.282241	0.282241
-0.242902	0.242902
0.228489	0.228489
-0.019034	0.019034

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: E-Views, author's calculation.

Table 5.1.3. VAR Residual Serial Correlation LM Tests

H0: no serial correlation at lag order h
Sample: 2000:12 2012:12
Included observations: 143

Lags	LM-Stat	Prob
1	18.05472	0.3207
2	19.91635	0.2240
3	16.79172	0.3992
4	9.500478	0.8914
5	7.641222	0.9588
6	10.65721	0.8301
7	8.532637	0.9314
8	10.84062	0.8192
9	14.94312	0.5288
10	16.08705	0.4469
11	11.15319	0.7999
12	13.86492	0.6088

Probs from chi-square with 16 df.

Source: E-Views, author's calculation.

Table 5.1.4. VAR Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: no residual autocorrelations up to lag h
Sample: 2000M12 2012M12
Included observations: 143

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	4.445886	NA*	4.477195	NA*	NA*
2	16.63283	NA*	16.83700	NA*	NA*
3	30.61359	0.3839	31.11736	0.3599	29
4	42.36251	0.5843	43.20437	0.5483	45
5	51.00838	0.8154	52.16349	0.7826	61
6	61.94031	0.8941	63.57420	0.8638	77
7	69.42215	0.9679	71.44113	0.9528	93
8	79.55794	0.9847	82.17756	0.9741	109
9	95.49566	0.9769	99.18572	0.9571	125
10	112.7454	0.9616	117.7324	0.9236	141
11	125.3113	0.9704	131.3455	0.9328	157
12	141.9043	0.9597	149.4584	0.9018	173

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution

Source: E-Views, author's calculation.

Following Lutkepohl (2011), after the specification and estimation of standard VAR model its diagnostics of stationarity, the focus of the VARs analysis in general, and current investigation in particular, is on undertaking the Granger-causality, impulse response and variance decomposition analyses. Since it is commonly accepted among VAR practitioners that individual estimated VAR coefficients are not convenient to interpret (Sims, 1980; Gujarati & Porter, 2009) and quoting Bernanke and Blinder (1992) they are "themselves are not very interesting", we are interested in capturing and explaining the causality and dynamic relationship between macroeconomic and monetary policy variables. Moreover, Stock and Watson (2001) support this argument that the VARs complicated dynamics make Granger-causality, impulse response and variance decomposition analyses "more

informative than are the estimated VAR regression coefficients or R^2 statistics, which typically go unreported".

5.1.1. Granger causality test

Based on Toda and Yamamoto's lag-augmented VAR Wald tests the estimated Granger causality results are shown in Table 5.1.5. In the first block of monetary base (LOGM) there is not any causality from the explanatory variables either individually or jointly and hence, we cannot reject the null of no Granger-causation. An interesting result is that inflation does not cause reserve money, impelling us to argue that monetary authorities are adopting the policy exogenously. In the second block of exchange rate (LOGE) there is a weak (at the 10 percent significance level) indication of CPI causality to exchange rate. However, surprisingly there is much stronger evidence that real output (LOGY) Granger-causes exchange rate at the one percent level of significance.

In the third block there is unidirectional causality running from reserve money (LOGM) to inflation (LOGCPI) which is statistically significant at the 5 percent level, i.e. within 95 percent confidence the lags of reserve money taking together determine or predict the level of prices which suggests that, in fact, monetary authorities can impact future inflation. So, here the assumption of money correlation and transmission to prices, which have been noted throughout the second chapter, theoretically, and in the third chapter, particularly, is positively shown.

Table 5.1.5.
VAR Granger Causality/Block Exogeneity Wald Tests
Sample: 2000M12 2012M12
Included observations: 143

Explanatory Variable	Dependent Variable			
	LOGM (1)	LOGE (2)	LOGCPI (3)	LOGY (4)
LOGM	-	0.5011	0.0352**	0.6767
LOGE	0.8837	-	0.0603***	0.6383
LOGCPI	0.9747	0.0793***	-	0.1291
LOGY	0.8217	0.0081*	0.8387	-
All	0.9964	0.0143**	0.0751***	0.5924

*** (** and *) denotes rejection of the hypothesis at the 10% (5% and 1%) level
Source: E-Views, author's calculation.

Moreover, there is also a weaker, but with still valid evidence of Granger-causality, relationship from exchange rate (LOGE) to inflation at the 10 percent significance level (6.03 %), which is, in fact, bidirectional. Here, the causality between exchange rate-inflation variables is mostly the cause of other, either domestic or external factors. For instance, in the CPI basket there is a large quantity of imported items, so any increase of these goods or exchange rate depreciation will result in inflation. Likewise, exchange rate depreciation can be inflationary since the increased demand for foreign currency will tend the exchange rate to depreciate. Thus, one important implication is that exchange rate depreciation will increase inflationary pressures. But given the low domestic productivity base, without benefits from depreciation (increased competitiveness), and without appropriate policy management there will be a vicious cycle of causations: depreciation -> inflation -> depreciation -> inflation.

Coming back to the Granger-cause table as was mentioned there is strong evidence that real output Granger-causes exchange rate at the 1 percent significance level. The possible explanation of such outcome may be that the exchange rate in Tajikistan is a function of trade turnover and increased output generating more consumption and hence, foreign demand affects the exchange rate. However, it may be complemented with the reflection of the remittances' factor causality through the output. And taking together LOGM, LOGE, and LOGY can actually well predict the prices behavior in the future at the 10 percent (7.51 %) level of significance.

As it can be observed in the last block of real output (LOGY) as a dependent variable, there is no causation or feedback from independent nominal prices (LOGCPI, LOGM, and LOGE). However, this is generally contrary to the new Keynesian proposition about money non-neutrality in the short run. But in the long run it actually cannot affect the real GDP dynamics, since it is basically caused by other real-side factors.

In parallel for approving the graphical analysis and conclusion made in chapter 3 of the current research, a Wald test is obtained on causation of the world wheat prices' (P_W) coefficient to domestic prices (LOGCPI) with the null hypothesis of no P_W causation. The result reported below (Table 5.1.6) shows zero *p-value* of the null and we can with 100% confidence reject the null hypothesis, meaning that there is a very strong causation from world wheat prices to domestic inflation and that one must take the P_W variable into consideration while predicting the future level of prices in Tajikistan.

Table 5.1.6
Wald Test:
Equation: P_W to CPI

Test Statistic	Value	df	Probability
F-statistic	19.75063	(1, 128)	0.0000
Chi-square	19.75063	1	0.0000

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(44)	0.019632	0.004417

Restrictions are linear in coefficients.

Source: E-Views, author's calculation.

5.1.2. Impulse response function

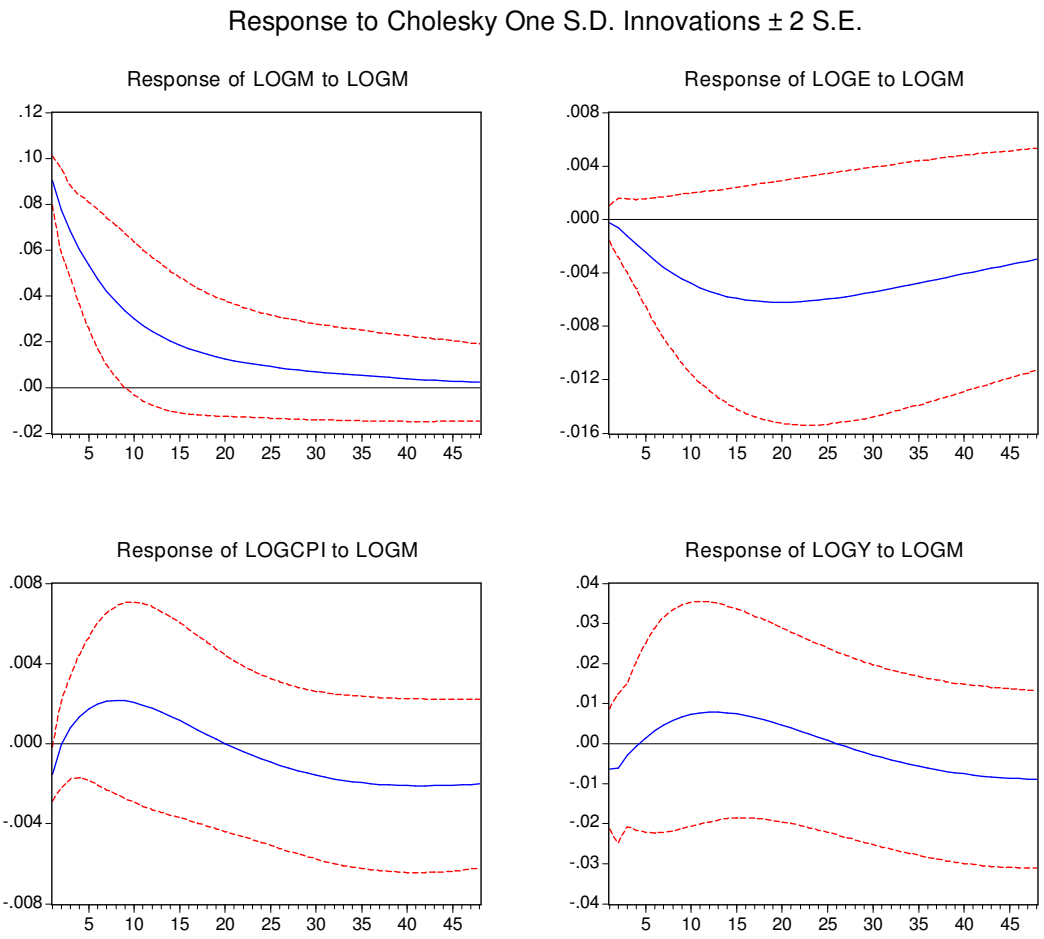
Following Sims (1992), the orthogonalized impulses (Cholesky) were used within VAR variables ordering assuming that money supply impacts all other variables (LOGM -> LOGE -> LOGCPI -> LOGY).[37] Impulse responses were also traced out by Pesaran and Shin (1998), which are generalized impulses that do not count the VAR ordering, but the results were almost the same as the Cholesky orthogonalization.

Figure 5.1.1 shows the result of VAR impulse responses of the effect of the monetary policy (reserve money) shock on the VAR equation over 48 months. The lower-right graph suggests that initial money shock starting from the second month leads to a positive, statistically significant response of real output (LOGY) up to two years reaching its maximum in 10-13th period. As the shock dies out, the output

[37] Sims (1992) actually used identified VAR with assumption that short-term interest rate as a policy variable has contemporaneous impact on other variables, while there was no such feedback impact from the output.

impulses decline as well. This, in general, is in line with the monetarists' proposition that "money matters". However, it less consistent with the Granger-causation results, as below we can see in general, the positive responses of output to money shock.

Figure 5.1.1. Impulse responses to a money supply shock



In the lower-left graph there are also positive responses of prices (LOGCPI) to money. Increase in money supply results in increase of inflation reaching its maximum level after the seventh month, i.e. one standard deviation shock to inflation increases inflation up to 0.22 percent at the maximum. Further it can be seen that

money contraction will lead to deflation after the 20 months, which is in line with the responses' trend of money to its own shock shown in the upper left graph.

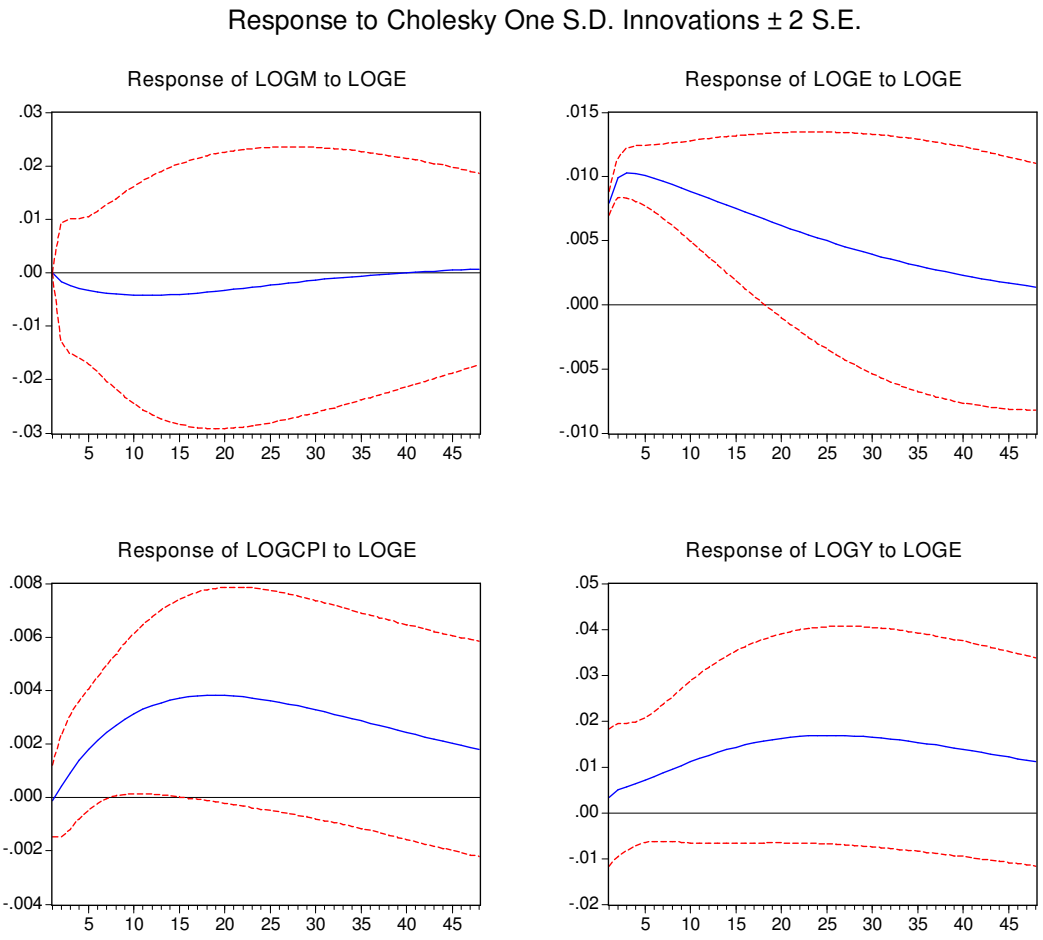
Finally, there is a negative response of exchange rate (LOGE) to money shock (upper-right graph), which contradicts the standard explanation.

According to economic theory, money expansion (contraction) should cause the domestic currency to depreciate (appreciate). However, empirical evidence suggests that macroeconomic fundamentals have little explanatory power for nominal exchange rates leading to a sort of "exchange rate determination puzzle" (Bacchetta & Wincoop, 2005), especially in developing countries. In case of Tajikistan this implies 1) that exchange rate is mostly a function of the external factors i.e. current account, and less variant to domestic factors; and 2) that NBT adopts floating exchange rate management and tries to keep the Tajik somoni exchange rate stable [taking into account the peoples' sensitivity to its depreciation] intervening in the foreign exchange market. However, inclusion of an identified structuralistic approach, based on theoretical assumption may be better to solve this puzzle.[38]

Figure 5.1.2 indicates the effect of exchange rate innovations. In contrast, here the response of money target (LOGM) [in line with theory and practice] is negative, meaning that to the one-unit exchange rate shock (devaluation) monetary authorities are tightening the policy stance reflected in the money policy target decrease.

[38] For example, see Sims (1992), Kim and Roubini (2000).

Figure 5.1.2. Impulse responses to a exchange rate shock

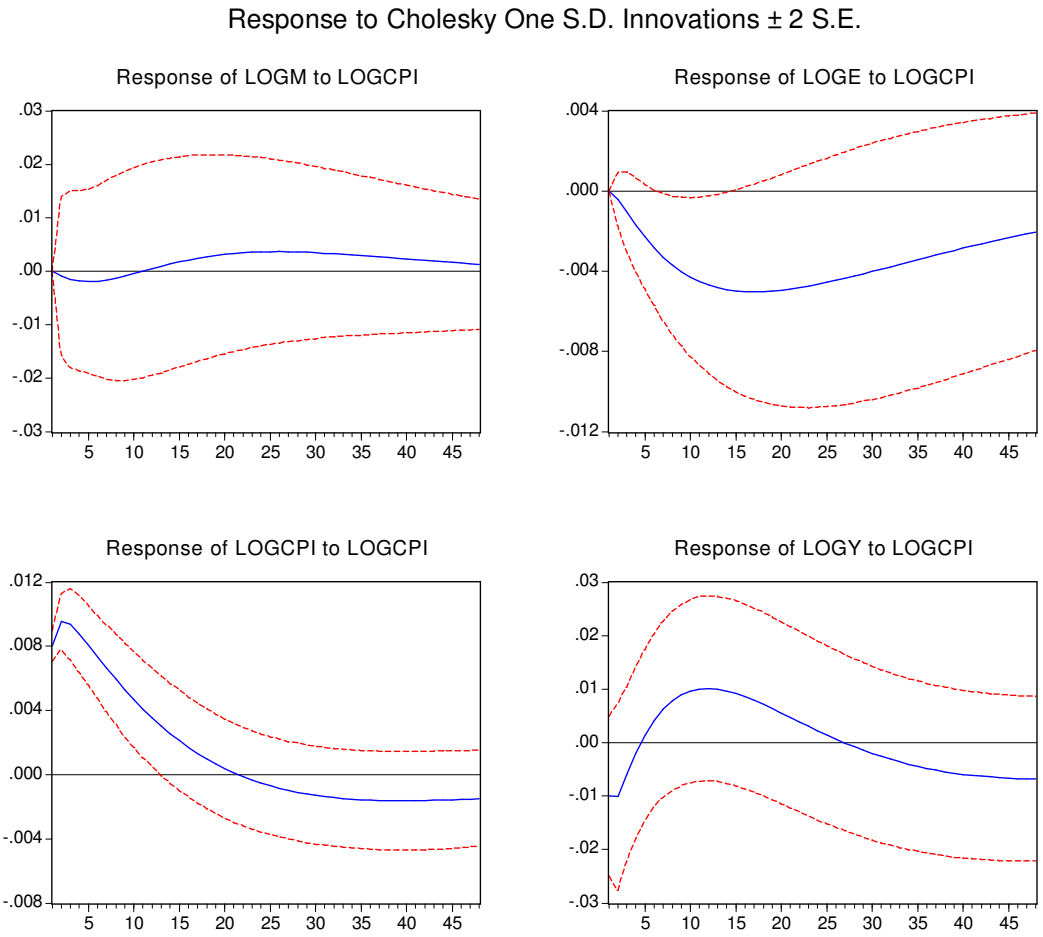


Prices (LOGCPI) are also responding positively to exchange rate shocks after the third month reaching maximum at 19-20 months. So there is an evidence of exchange rate pass-through to home prices, however, statistically not as significant as in case of money or output responses. And finally, there is a positive response of output (LOGY) to the exchange rate shock, meaning that exchange rate depreciation causes real output to grow, with maximum impact roughly after 24 months. The possible theoretical explanation is that the exchange rate affects real output through the improvement of the trade balance, since imports become costly and exports

beneficial. Taking parallels, Sims (1992) findings regarding the output responses to the exchange rate in U.S. and Japan were similar; however France, Germany, and the U.K. had negative responses.

For complementarity and consistency, the effect of inflation (LOGCPI) is shown in the figure 5.1.3.

Figure 5.1.3. Impulse responses to exchange rate shock



As it can be seen, the money target (LOGM) responds to an increase in prices until 11 months negatively, suggesting that actually monetary authorities' feedback is appropriately right. And after a year the money adjusts, responds positively, i.e.

endogenously to the rise in prices. However, the responses of exchange rate (LOGE) to the inflationary shock are not appropriate, associated negatively with appreciation rather than depreciation. This also could be explained along the lines of the above-discussed exchange rate puzzle.

Lastly, the output responses (LOGY) have a different pattern. Initially, up to the fifth month real output declines, and after that, until 28 months it rises and again dies out into negative. The only question is on the positive output response length (which is statistically significant). Possibly, the theoretical interpretation is that it is the case of economy's equilibrium adjustment following the negative response.

5.1.3. Forecast error variance decompositions (FEVD)

The FEVDs for the estimated VAR are ordered as follows: money, exchange rate, inflation, and output. These are presented graphically and numerically in Figure 5.1.4 and Table 5.1.7, respectively. The exchange rate and CPI variance decompositions show more variation among the variables. For instance, in the variation of the exchange rate (*b.*) at the 16-month horizon, 28 percent of the error is explained by CPI and money supply shocks, while at the 24 month - 39 percent. The variance decomposition of inflation (*c.*) shows that 21 percent at the 16-month horizon is attributable to reserve money and exchange rate, while at the 24-month horizon – 31 percent (26 percent for exchange rate and 5 percent for other shocks). Furthermore, in the variance decomposition of money (*a.*), almost 100 percent of the error variance in predicting money supply (at all given horizons) is explained by

own-shocks, indicating its exogeneity. The decomposition of real output (*d.*) shows a relatively tangible variance of exchange rate shock (12 percent) at the 24-month horizon, while a significant portion is due to its own shock.

Table 5.1.7. VAR Variance Decompositions 1/

a. Variance Decomposition of LOGM

Forecast Horizon	*Forecast Standard Error*	*Variance Decompositions (percentage points)*			
		LOGM	*LOGE*	*LOGCPI*	*LOGY*
1	0.09	100	0	0	0
8	0.18	99	0	0	1
16	0.19	98	1	0	1
24	0.19	97	1	0	2

b. Variance Decomposition of LOGE

Forecast Horizon	*Forecast Standard Error*	*Variance Decompositions (percentage points)*			
		LOGM	*LOGE*	*LOGCPI*	*LOGY*
1	0.01	0	100	0	0
8	0.03	6	89	5	0
16	0.04	16	72	12	0
24	0.05	23	61	16	0

c. Variance Decomposition of LOGCPI

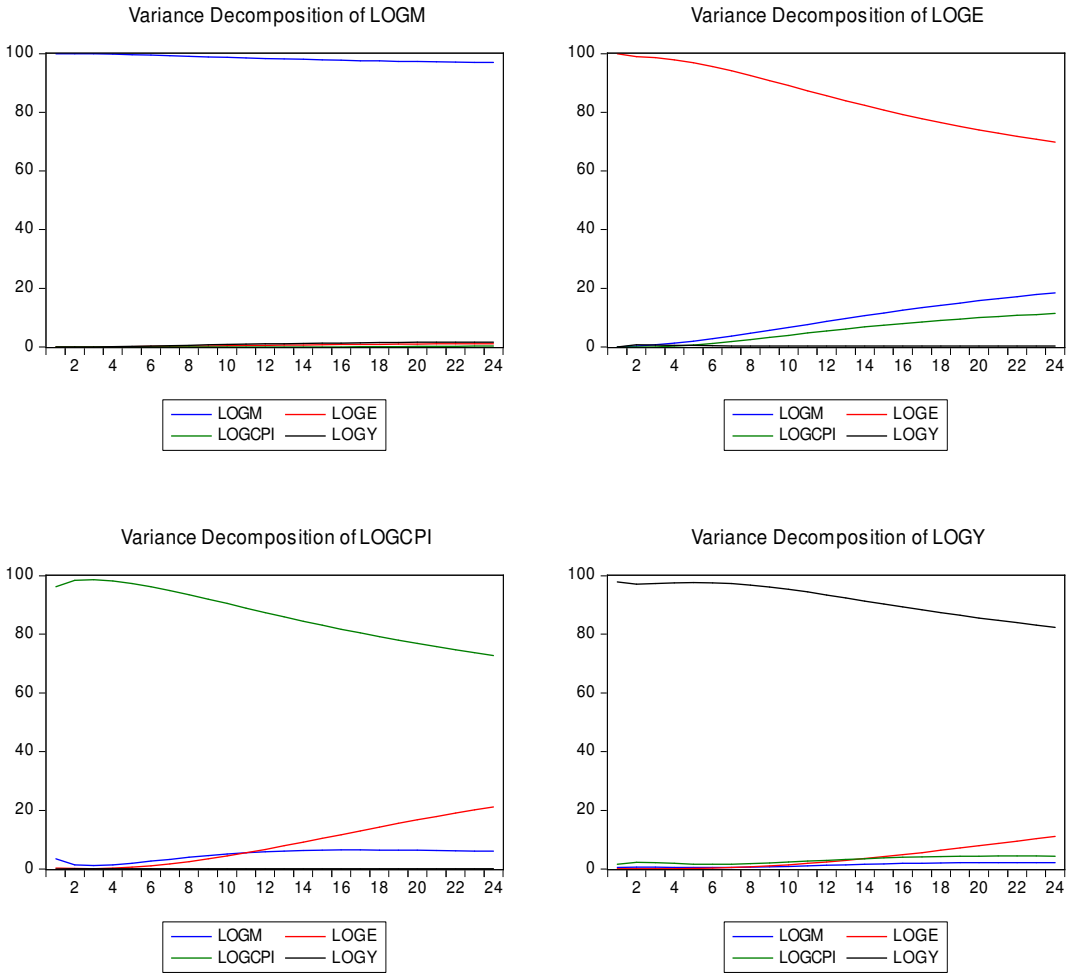
Forecast Horizon	*Forecast Standard Error*	*Variance Decompositions (percentage points)*			
		LOGM	*LOGE*	*LOGCPI*	*LOGY*
1	0.01	4	0	96	0
8	0.02	4	4	92	0
16	0.03	6	15	79	0
24	0.03	5	26	69	0

d. Variance Decomposition of LOGY

Forecast Horizon	*Forecast Standard Error*	*Variance Decompositions (percentage points)*			
		LOGM	*LOGE*	*LOGCPI*	*LOGY*
1	0.09	1	0	1	98
8	0.15	1	2	1	96
16	0.17	2	6	4	88
24	0.18	3	12	4	81

Source: E-Views, author's calculation;
1/ The structure of the table was adopted from Stock and Watson (2001).

Figure 5.1.4. Forecast Error Variance Decompositions of ordered VAR



5.2. The VAR 2 model

The VAR (2) model includes six variables ordered as follows: log of reserve money (LOGM), log of exchange rate (LOGE), bank's nominal lending interest rate (LENDRATE), log of banking system's credits to economy (LOGCREDITS), log of price level (LOGCPI), and log of real GDP (LOGY), assuming that while nominal variables interact with each other, they have effect on real output. We will be successive and follow all statistical procedures undertaken in VAR (1) model. First, the lag order criterion showed the first order of lag as an optimum (Table 5.2.1). From chapter 4 of this paper, the maximum order of integration for each selected variables was one, *I*(1). Following Toda and Yamamoto's approach, here (k=1) + (d=1) = 2, thus the length of lag in the model will be equal to two. Diagnostic checking showed that the model satisfies stability conditions and residuals are not autocorrelated or serially correlated.

Table 5.2.1.
VAR Lag Order Selection Criteria
Endogenous variables: LOGM LOGE LENDRATE LOGCREDIT LOGCPI LOGY
Exogenous variables: C LOG(P_OIL) LOG(P_W) D01 D02 D03 D04 T
Sample: 2000:12 2012:12
Included observations: 133

Lag	LogL	LR	FPE	AIC	SC	HQ
0	436.6044	NA	1.17E-10	-5.843676	-4.800542	-5.419786
1	1123.466	1229.121	6.59E-15*	-15.63107*	-13.80559*	-14.88927*
2	1147.681	41.14642	7.94E-15	-15.45385	-12.84601	-14.39412
3	1163.483	25.42592	1.09E-14	-15.15012	-11.75994	-13.77248
4	1187.602	36.63145	1.34E-14	-14.97145	-10.79892	-13.27590
5	1215.234	39.47522	1.59E-14	-14.84563	-9.890745	-12.83215
6	1234.086	25.23053	2.17E-14	-14.58776	-8.850530	-12.25637
7	1260.875	33.43580	2.70E-14	-14.44925	-7.929668	-11.79994
8	1288.360	31.82435	3.40E-14	-14.32120	-7.019268	-11.35398
9	1318.827	32.52837	4.22E-14	-14.23799	-6.153710	-10.95285
10	1373.099	53.04861	3.80E-14	-14.51277	-5.646139	-10.90971
11	1424.736	45.81311	3.73E-14	-14.74791	-5.098929	-10.82694
12	1498.217	58.56328*	2.79E-14	-15.31153	-4.880193	-11.07263

* indicates lag order selected by the criterion

Table 5.2.2. Stability test

Roots of Characteristic Polynomial
Endogenous variables: LOGM LOGE LENDRATE LOGCREDIT LOGCPI LOGY
Exogenous variables: C LOG(P_OIL) LOG(P_W) D01 D02 D03 D04 T
Lag specification: 1 2

Root	Modulus
0.985488	0.985488
0.911633 + 0.018429i	0.911819
0.911633 - 0.018429i	0.911819
0.873317 - 0.035433i	0.874036
0.873317 + 0.035433i	0.874036
0.522061	0.522061
-0.109212 + 0.250037i	0.272847
-0.109212 - 0.250037i	0.272847
-0.240021	0.240021
0.211953 - 0.014925i	0.212478
0.211953 + 0.014925i	0.212478
-0.100689	0.100689

No root lies outside the unit circle.
VAR satisfies the stability condition.

Table 5.2.3.

VAR Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Sample: 2000M12 2012M12
Included observations: 143

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	9.734709	NA*	9.803263	NA*	NA*
2	30.45215	NA*	30.81457	NA*	NA*
3	56.21036	0.8235	57.12474	0.7997	67
4	83.36122	0.9221	85.05692	0.9004	103
5	106.5609	0.9813	109.0972	0.9713	139
6	135.4083	0.9882	139.2080	0.9786	175
7	160.6677	0.9959	165.7674	0.9906	211
8	182.8058	0.9992	189.2175	0.9975	247
9	221.0014	0.9974	229.9785	0.9908	283
10	254.2203	0.9969	265.6950	0.9866	319
11	284.6488	0.9975	298.6592	0.9865	355
12	313.8122	0.9984	330.4940	0.9882	391

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution

Table 5.2.4
VAR Residual Serial Correlation LM Tests
H0: no serial correlation at lag order h
Sample: 2000:12 2012:12
Included observations: 143

Lags	LM-Stat	Prob
1	28.27558	0.8172
2	33.81491	0.5729
3	27.59688	0.8413
4	22.74549	0.9580
5	22.59241	0.9602
6	25.98831	0.8908
7	27.80476	0.8341
8	26.42310	0.8785
9	37.16918	0.4150
10	33.48853	0.5886
11	30.92201	0.7087
12	24.49366	0.9271

Probs from chi-square with 36 df.

5.2.1. Granger causality test

The summary of the Granger-causality tests are reported in Table 5.2.6. The result reveals that the monetary policy variable (LOGM) is treated, in fact, as exogenous since there is no causation running from other model variables to money supply, which is consistent with the VAR (1) model's Granger-causality similar results. Similarly, given this information, the level of credits also acts exogenously. Thus, it is unlikely to be able to predict the behavior of these variables using other information in the model. However, there might be other factors outside the model influencing their exogeneity.

Further, the p-value of the lending interest rate is 0.5 percent, meaning that lending rates strongly Granger-causes exchange rates (LOGE) at the 1% level of significance. Similarly real output causes exchange rate at the 1% significance level,

while CPI at the 10% level. Here, other finding is that all other variables, in fact, can cause or predict exchange rate in the future, since jointly such probability is statistically significant at the 1% level. There is also significant bidirectional causality from exchange rate to market interest rates with close to 5% predictive accuracy. Next there is causal relationship at the 5% level of significance running from the credit activity variable to real output, meaning that the state of credits can actually determine real output.

Table 5.2.5.
VAR Granger Causality/Block Exogeneity Wald Tests
Sample: 2000M12 2012M12
Included observations: 143

Independent Variables	Dependent Variables					
	LOGM	LOGE	LENDRATE	LOGCREDIT	LOGCPI	LOGY
LOGM	-	0.6035	0.2221	0.3398	0.1006	0.8512
LOGE	0.8576	-	0.0176**	0.8528	0.2286	0.5277
LENDRATE	0.9613	0.0047*	-	0.2399	0.6943	0.6346
LOGCREDIT	0.6462	0.5796	0.2131	-	0.6107	0.0354**
LOGCPI	0.8025	0.0807**	0.7761	0.7613	-	0.6442
LOGY	0.8025	0.0058*	0.4364	0.7984	0.8593	-
All	0.9977	0.0015*	0.0577**	0.5021	0.2419	0.3033

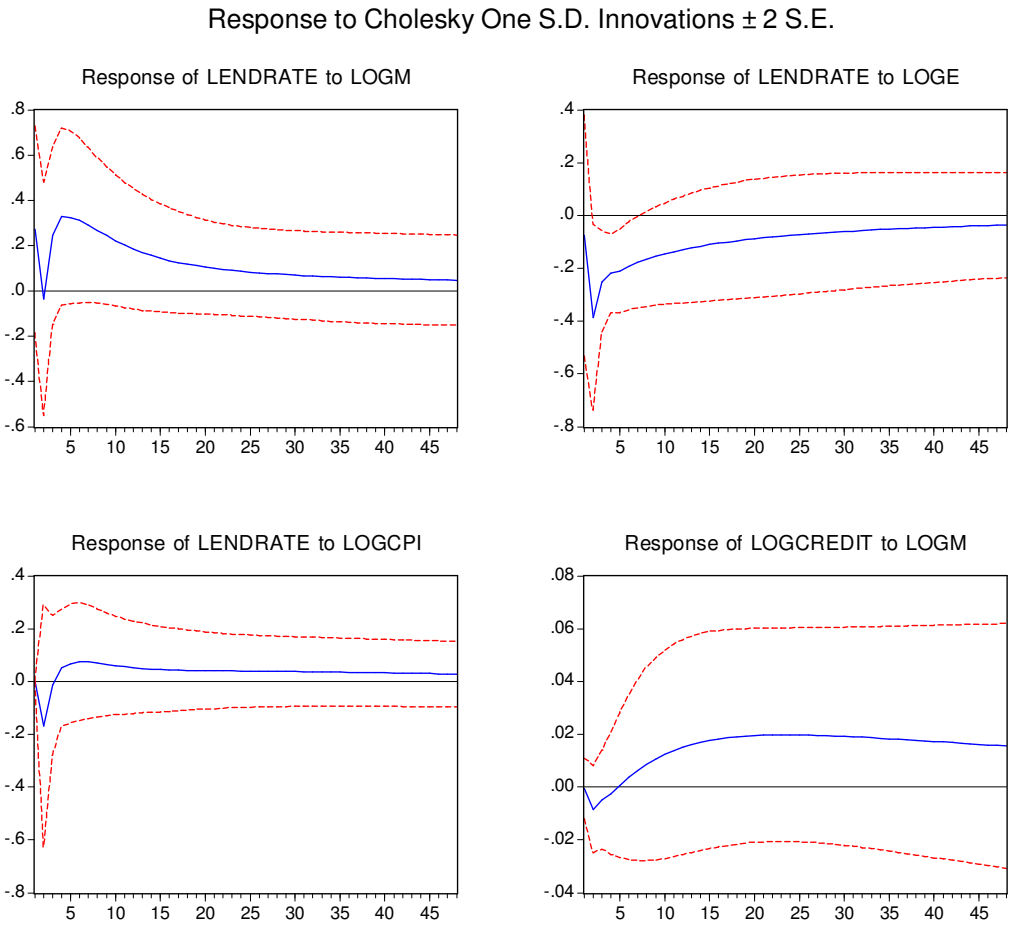
** (*) denotes rejection of the hypothesis at the 5% (1%) level
Source: E-Views, author's calculation.

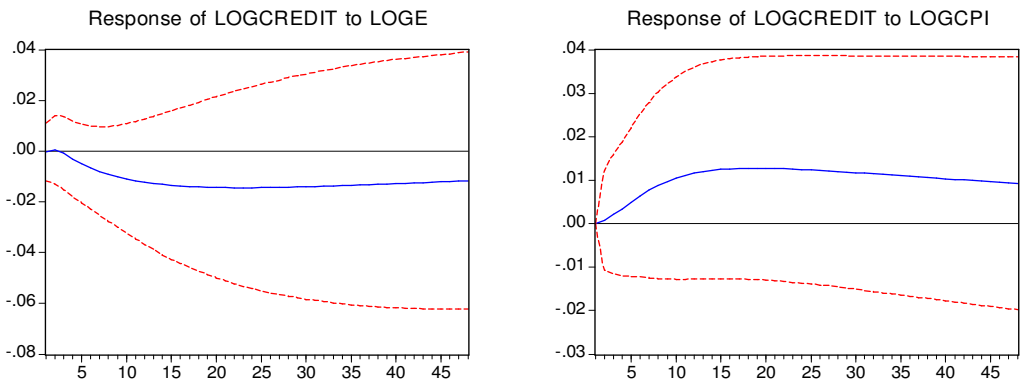
5.2.2. Impulse response function

Figure 5.2.1. shows the responses of lending interest rates (LENDRATE) and credits (LOGCREDIT) of the banking system to money supply, exchange rate, and CPI. Positive responses to money supply innovations of credits can be obsereved;

initially negatively, but after five months it reaches a maximum positive response. However, if increase in credits is consistent with theory, the behaviour of the lending rate is not; after a slight decline in the second month following a policy shock, interest rates tend to increase statistically significantly after four months. Possibly, a policy shock is anticipated and activates economy's dynamics and demand for money which in turn leads to such feedback to the banking system.

Figure 5.2.1. Impulse responses of the market lending interest rate (LENDRATE) and credits (LOGCREDIT)





Exchange rate shocks have a similar negative impact on interest rates and credits; the exchange rate depreciation (shock) abates the lending interest rates and level of credits, since such uncertanty forces economic agents to borrow and deposit less, which in turn shrinks demand and the bank's liquidity level. So, this is an important evidence of the severeness of exchange rate shock to the economy. And finally interest rate and credit show positive responces to a rise in CPI over the time horizon. Banks are increasing the cost of borrowing in response to inflation shocks insuring and adjusting their balance sheets in real terms profits. At the same time credits' supply increases meaning that economic agents demand more funds to investment expenditures than before.

Figure 5.2.2 expreses behaviour of other VAR (2) system variables in respond to the lending interest rate shocks. As it can be observed, money supply and credits respond positively to an increase in lending interest rates. We assume that money supply is exogenous taking into account that the monetary policy variable has a positive relation in respect to the market interest rate shock, possibly meaning that

monetary authorities want to cut down market interest rates, as they are high enough, by indicating an expansionary policy stance.

The high cost of borrowings, which is on average more than 20 percent, and has a persistant tendency to short time spans of repayment, makes firms and individual economic agents not so sensitive to changes in interest rates. One can hardly observe a stable declining tendency of bank's lending rates, which could gain some confidence or anticipation for the borrowing trade-off. That is why borrowers' non-anticipation and lack of confidence is probably an indicator of such positive response of credits to lending rate shock. It is hard to find more meaningful interpretation to this since the link between interest rate and policy variable is very weak. Nevertheless, as it is still puzzling and atheoretical, interpretation should be cautious. A better specification and identification of the model could have derived a more favourable outcome. However, other factors coming from for example, a relatively short span of data and data mis-specification, or the country's institutional and structural disorganizations may affect the standard theory explanation of these processes.

Coming back to Figure 5.2.2. the response of exchange rate and CPI have a negative relationship with interest rate shocks, which is fully meaningful (however not so much statistically significant) suggesting that interest rate innovations will lead to exchange rate appriciation and prices falling.

Figure 5.2.2. Impulse responses to lending interest rate (LENDRATE) innovations

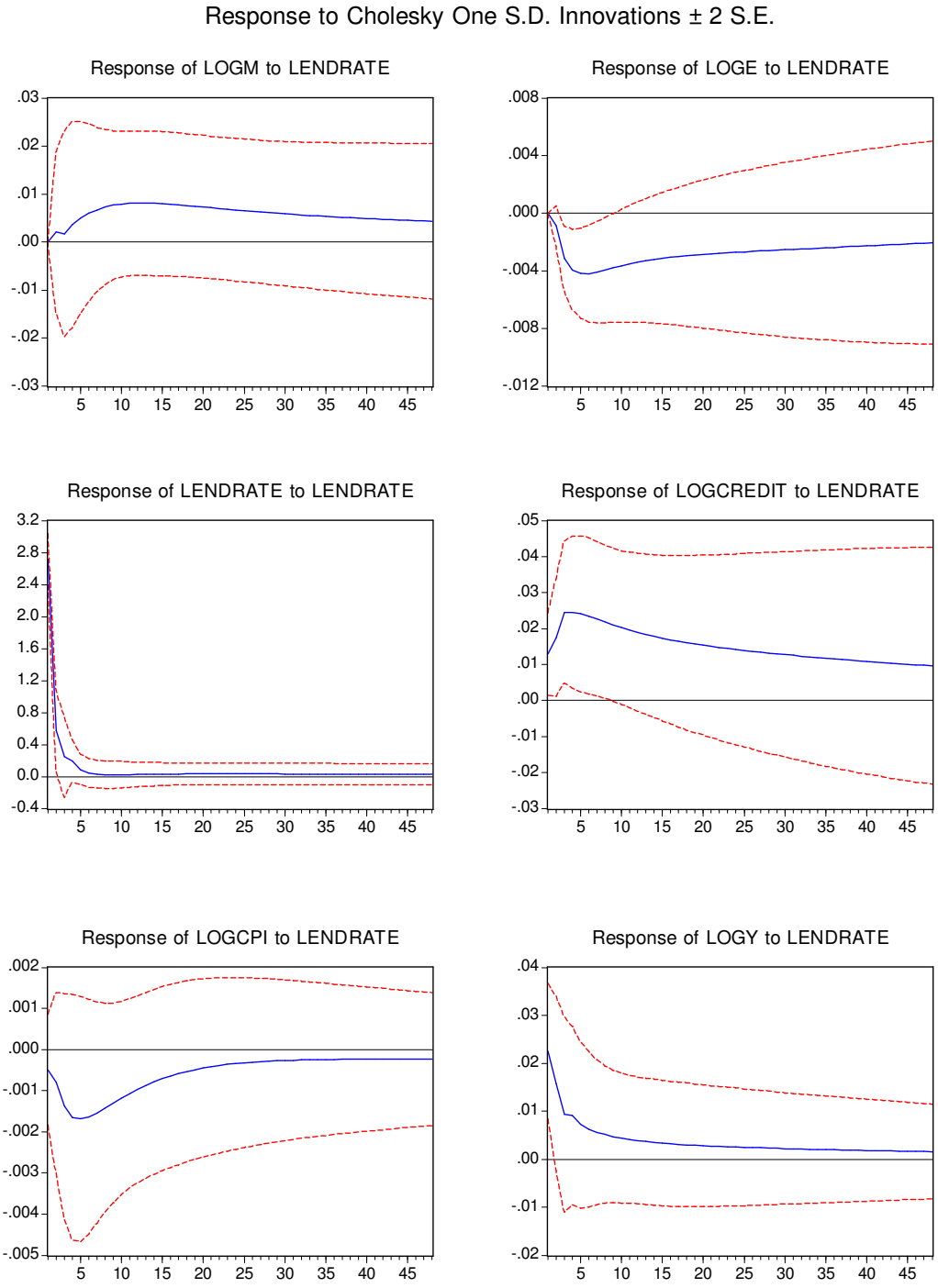
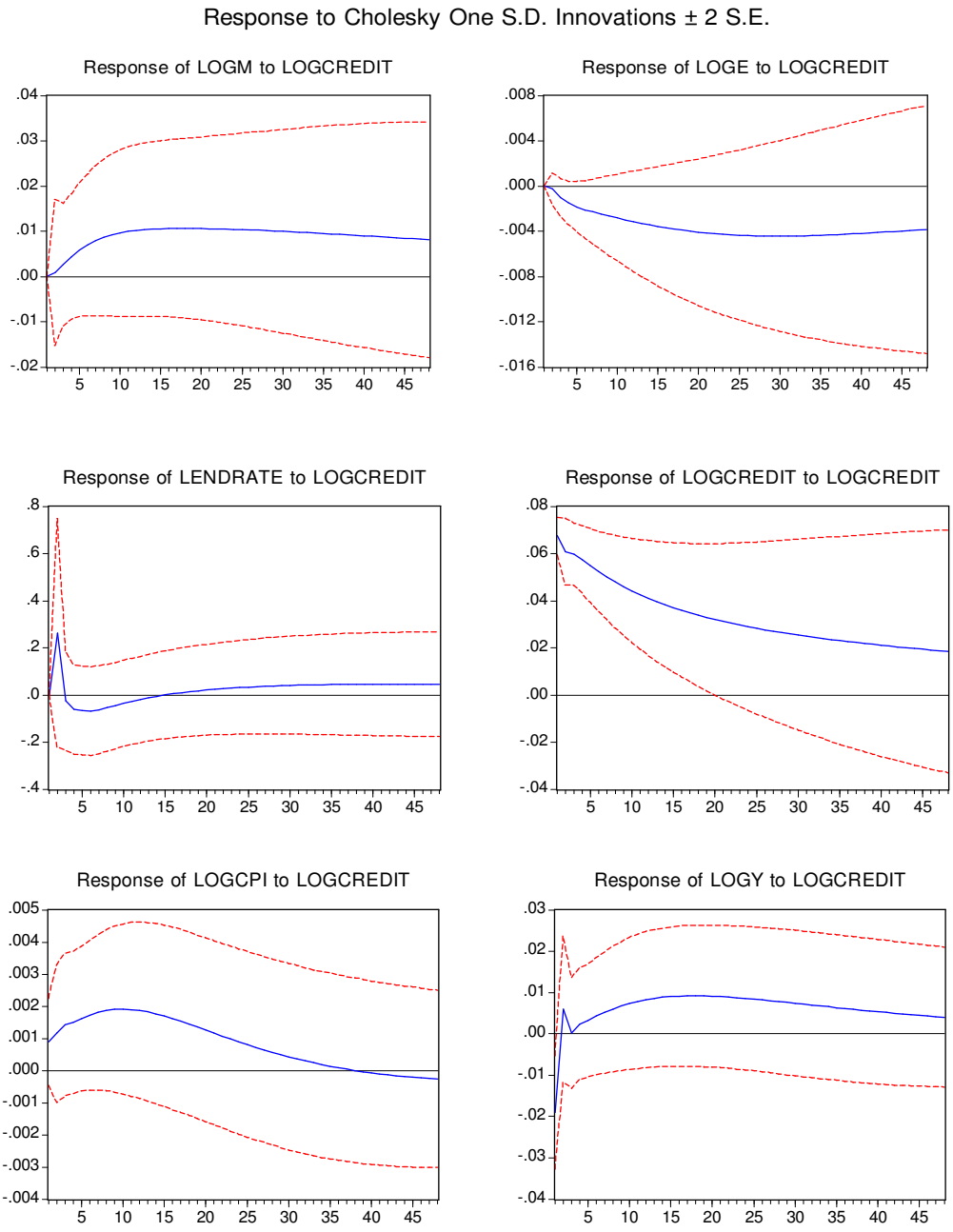


Figure 5.2.3 plots the responces of model variables to a credits shock. Money supply, CPI, and real output responds positively to a one percentage point positive shock in credits. In contrast, the exchange rate's response indicates its appreciation to

credit innovations which is also atheoretical. Possibly the interpretation is the same as the money supply -> exchange rate effect of the first VAR model.

Figure 5.2.3. Impulse responses to credits (LOGCREDIT) innovations



5.2.3. Forecast Error Variance Decompositions

The results show that exchange rate, credits and CPI variance decompositions have the largest variations among the variables. Money supply and CPI innovations are the most important and explain 26 percent of the forecast error in the variation of the exchange rate (*b.*) at the 16-month horizon, while credits and interest rates – 16 percent. At the 24-month forecast horizon their portion increases to 32 percent and 18 percent, respectively. Not surprisingly interest rates and money supply contribute 21 percent to the variation of credits (*d.*) innovation at the 24-month forecast horizon.

Table 5.2.6. VAR Forecast error variance decompositions

a. Variance Decomposition of LOGM

Forecast Horizon	*Forecast Standard Error*	*Variance Decompositions (percentage points)*					
		LOGM	*LOGE*	*LENDRATE*	*LOGCREDIT*	*LOGCPI*	*LOGY*
1	0.09	**100**	0	0	0	0	0
8	0.17	**97**	0	1	1	1	0
16	0.18	**92**	1	2	3	1	1
24	0.19	**88**	2	3	5	1	1
b. Variance Decomposition of LOGE							
1	0.01	0	**100**	0	0	0	0
8	0.03	6	**74**	11	3	5	1
16	0.04	16	**58**	10	6	10	1
24	0.05	20	**49**	9	9	12	1
c. Variance Decomposition of LENDRATE							
1	2.73	1	0	**99**	0	0	0
8	3.00	7	4	**87**	1	1	0
16	3.08	9	6	**83**	1	1	0
24	3.10	10	6	**81**	1	1	1

d. Variance Decomposition of LOGCREDIT

1	0.07	0	0	4	**96**	0	0
8	0.17	1	1	12	**85**	1	0
16	0.22	4	3	13	**77**	2	1
24	0.26	8	4	13	**70**	4	1

e. Variance Decomposition of LOGCPI

1	0.01	4	0	1	1	**94**	0
8	0.02	1	3	3	4	**90**	0
16	0.02	1	9	4	7	**79**	0
24	0.03	2	13	4	8	**73**	0

f. Variance Decomposition of LOGY

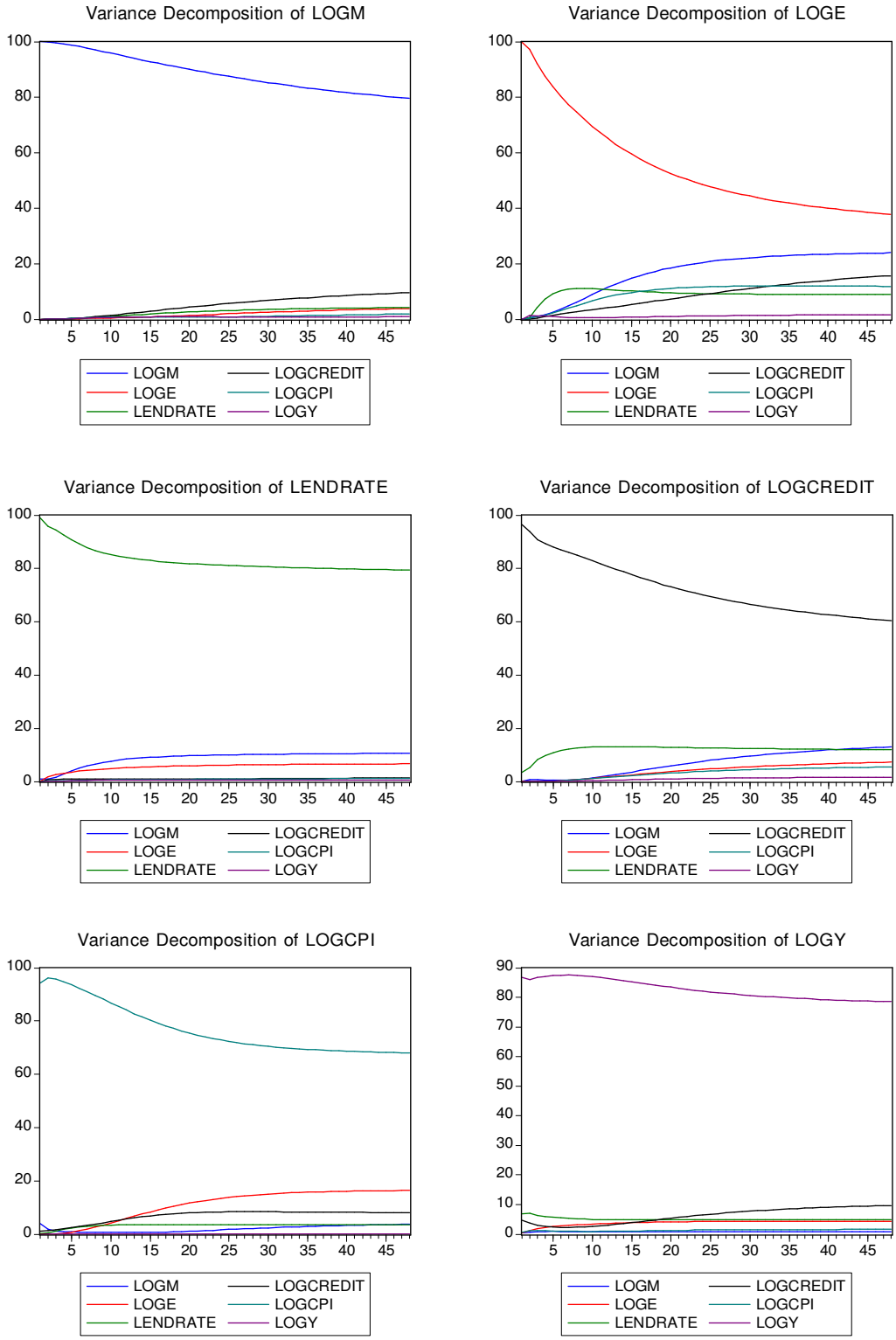
1	0.09	0	0	7	5	1	**87**
8	0.14	1	3	5	2	1	**88**
16	0.16	1	4	5	4	1	**85**
24	0.16	1	4	5	7	1	**82**

Source: E-Views, author's calculation;
1/ The structure of the table was adopted from Stock and Watson (2001).

The variance decomposition of CPI (*e.*) shows that 21 percent for the 24 months ahead is attributes to exchange rate and credits, and only 2 percent to the money supply.

As in the VAR (1) model the variance decomposition of money (*a.*) is mostly explained by its own innovations. In turn, money supply and exchange rate's contribution to the variation of lending interest rates (*c.*) is somewhat visible making 15-16 percent at 16-26-month forecast horizon. And the decomposition of real output (*f.*) shows a relatively small variance of exchange rate, credits, and interest rate shocks (16 percent) at the 24-month horizon, while again a significant portion is due to its own innovation.

Figure 5.2.4. Forecast Error Variance Decompositions of VAR (2)



5.3. Concluding remarks

It is worthwhile to outline and sum up in brief the main points from the above-stated results. First, the results of Granger-causality tests revealed that both money and exchange rate channels have meaningful causation in predicting the level of prices in the benchmark VAR (1) model. However, such predictive power has not been found in the second model. Also, the Wald test approved that world commodity wheat prices have a considerable impact on CPI. On the other hand, the exchange rate is found to be better predicted by real output dynamics and market interest rates, and less so by CPI. The study did not reveal any real output Granger causation from the monetary policy variable and the exchange rate. The exception here is the credit channel where the level of credits to the economy has been found to have predictive power and hence, causation to real output in the VAR (2) model. Moreover, the policy variable, which is targeting reserve money, was found to not be caused by any other system variables, suggesting that it actually acts exogenously. The caution here may be that causality running from commodity markets can transmit and affect the money supply's reaction, but it is assumed that their (world commodity prices) impact have short-term nature, whereas the policy variable has impact over the longer-term.

Second, the models' generated impulse response results have largely meaningful theoretical curves and interpretation. The effect of the monetary policy innovations on prices and output is positive; they affect prices in at maximum the seventh month and the output, after the ten months. Here, most likely the test

revealed the correlation between money and real output in the short run. In contrast, the effects of money on prices have a causal relationship. Similarly, there are such positive effect-impulses from exchange rate to CPI and real output, implying that weakened domestic currency shocks increase home prices through import prices and affect output through a decreasing trade deficit. The level of credits' response to the policy variable shock is positive, but market interest rates, instead of going down, react positively to a policy shock deriving that they do not actually depend on the monetary policy stance. And lastly, CPI and inflation have been affected by the credits and since the monetary policy variable in turn affects the credits it opens discussions for the effectiveness of the credit channel. But again we should take into consideration that the high level of dollarization limits here the role of monetary policy, since the significant portion of credits are foreign currency denominated. The impulse responses of credits to exchange rate supports this argument as the exchange rate depreciation reduces the level of credits supplied to the economy.

Third, the forecast error variance decompositions results showed that monetary and exchange rate innovations have contributed almost one third of the CPI forecast error variation, while in the variance decomposition of real output the exchange rate has a tangible but lesser variation.

CHAPTER 6

CONCLUSION

6.1. Summary

This research attempts to examine the effectiveness of monetary policy in Tajikistan by developing a standard vector autoregressive (VAR) model. It assumes at first, to define the current monetary policy framework, second, to detect the potential monetary transmission channels on a theoretical and practical ground, and finally, to test the impact and relationship of those identified channels on the economy. The methodology employed explains the effects and correlation between monetary policy and non-policy variables. However, the study does not draw inferences about optimal monetary policy for NBT, but rather finds evidence about the response of macroeconomic variables to monetary policy innovation. Hence, everything apart of this is descriptive assumptions and theoretical justification.

The study revealed that under the current monetary policy regime, the operating target of policy, i.e. reserve money, is effective in determining inflation in a sense that it impacts the movement of prices in the country. This means that for the NBT, in order to keep a stable level of prices *ceteris paribus* it is necessary to keep the growth of the reserve money more moderate than the current regime.

At the same time the prices are highly sensitive to world commodity (wheat) prices and exchange rate movements; a triangular interrelated effect of these variables that is inflation is a function of money, world commodity prices, and exchange rate can be drawn. However, taking into account that the impacts of the

latter two have, in general, a sporadic character, the policy stance and its targeting variable plays a more fundamental role in determining the level of prices in Tajikistan. Furthermore, not surprisingly, the study did not reveal a steady direct (causal) effect from the monetary and exchange rate variables to real output, except through the credit channel, where the level of banking system's credits to the economy is found to have such effect.

Nevertheless, the analysis of impulse responses – a centerpiece of the VAR models, reveals reasonable correlations and effects between monetary policy and non-policy variables. It indicates that positive money innovations temporary increases prices and real output which smoothly dies out after its maximum effect after 7 and 10 months, respectively, which is somewhat in line with the monetarists school emphasizing the role of money as a leading source of economic fluctuations. Similarly, there is evidence of positive impulses-responses of prices and output to exchange rate, indicating the existence of exchange rate pass-through. One of the implications is that the monetary targeting variable acts largely exogenously meaning that its own innovations accounts for almost all of its own variance of decomposition.

Inclusion of the market interest rate and credit variables to the benchmark model has revealed that lending interest rates do not effectively positively react to the monetary innovations in a sense that expansionary monetary policy does not cause interest rates to go down as the theory suggests. This in turn opens the problems of banking system fragility. Highly dollarized banks' liabilities and assets, which are pegged to a foreign currency, lack credibility and thus confidence in domestic

currency makes interest rates less sensitive to the change in money supply. However, the banks' credits showed positive response to the money innovations.

The short time span of the data allows analysis only on the short-term effects of monetary policy. Otherwise, the robustness of the aforementioned conclusion may be questioned due to the relatively short number of time-series observations. Obviously, for a more reasonable investigation the study suggests first, to have longer statistical series and hence second, to impose restrictions in the model in order to separate the short- and long-term effects of the monetary policy.

6.2. Policy implications

As the primary objective of the NBT is to maintain a stable level of prices, it should pursue *ceteris paribus* a prudent monetary policy (along of course with prudent fiscal policy). Any dilemma such: should monetary policy deal with low domestic production capacity and unemployment, i.e. run expansionary policy to mitigate it to the prejudice of low inflation is not acceptable. But its responsibility for inflation is complicated given the existence of non-monetary, external factors affecting inflation. Among them are a significant share of imported goods in the consumption basket and regulated prices and tariffs. Probably the best policy here would be containing money supply and demand pressures instead of adjusting to the increased prices and money demand. Moreover, the policy needs to be forward-looking; improvement and developing of analytical and forecasting toolkit is critical,

since it will allow respond to the inflationary pressures timely and not to allow their acceleration.

Of course, NBT can focus on some permanent mean trend of price level like core inflation, but it will make the goal of monetary policy less clear to the public. The empirical evidence suggests that prudent monetary policy will necessarily bring stability of prices over the longer horizon which will be a factor of stable economic growth, and in turn will also smooth the extreme sensitivity to non-monetary shocks. However, the monetary policy art is also to act counter cyclically; support aggregate demand when there are slow inflationary pressures and economic dynamics, and contain aggregate demand when there is a boom and hence, high inflationary pressures.

The study implies that the current monetary targeting regime is expedient for the NBT since the interest rate channel is ineffective at the current stage of development; implying targeting a quantitative variable is more convenient than some qualitative one. The adoption of another monetary regime such as inflation targeting depends primarily on the valid interest rate channel and technical forecasting capabilities that will be available only in the future. Adopting exchange rate targeting may in some way be effective in keeping domestic prices stable, but first it demands a considerable amount of foreign exchange reserves and second limits the role of monetary policy. Under the current circumstances there is no alternative to the sequential discreet monetary target. This implies that to continue improving the policy tools, in particular, the open market operations, whereas

strengthening the existing instruments and stimulating the issuance and circulation of the government bonds is of special importance.

Moreover, stimulating the interbank money market development with a further representation of an explicitly determined index (like LIBOR) will make additional funds available to banks and can serve as a possible optimal market interest rate which NBT could be able to attempt to influence. Also, the NBT need to be transparent and better communicate with the public regarding its policy implementation, decisions of particular issues such as the target of money supply (reserve money) growth for the year ahead. Of course, development of the financial-banking system plays a crucial role in this process and other institutional and structural issues affect the degree of monetary policy efficiency. So, the tasks are very broad and their decision is very important. Encouraging competitiveness in the banking system, further development of the banking services and cashless payment facilities, and not less importantly strengthening confidence among the banks will improve the monetary policy realization.

But more importantly, the NBT must take measures to eliminate or at least decrease the level of dollarization by market forces. The practice shows that stable macroeconomic condition, prudent monetary policy and private sector confidence in the central bank results in a stable rate of inflation, which contributes to the de-dollarization process.

At the same time, obviously any export promotion under the exchange rate management is ineffective. First of all the government's structural reforms directed to increase domestic productivity (supply-side policies) should be undertaken. It can

considerably decrease the existing vulnerability and dependence from the external factors and moreover, the exchange rate channel in the economy will be less significant. Meanwhile, the NBT should continue to adopt the current exchange rate policy, while keeping the exchange rate on a more stable base, especially during import price spikes, since the exchange rate disturbances may make inflationary processes more volatile.

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