Estimation of the Monetary Policy Reaction Function of the National Bank of Kazakhstan

By

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Abstract

This paper analyzes the monetary policy of the National Bank of Kazakhstan from the outset of transition period, with focus on determining whether it was conducted in a rule-like fashion with respect to key macroeconomic indicators. For this, reaction functions of the form introduced by Taylor (1993), modified by Clarida et al. (1998) are estimated for the period of 1994-2006. The results provide evidence of strict monetary policy stance with respect to inflation, level of economic activity and the real effective exchange rate of the domestic currency. In addition, to account for the important role played by sterilization policy, alternative reaction function of the type described by Obstfeld M. (1983) is estimated. The obtained sterilization coefficient can be interpreted in terms of both the extent of sterilization policy and the degree of independence of the National Bank.

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1. Introduction

Following John Taylor's seminal paper describing the interest rate setting of the Federal Reserve in terms of the rule, linking the behavior of the short-term nominal interest rates to inflation and economic activity (Taylor J., 1993), such rules have become increasingly popular tool to explain central banks' interest rate setting behavior. Considerable amount of academic literature has produced multiple variations of the original Taylor rule, applying them to analyze monetary policies of developed economies. Despite the fact that relatively little has been written on developing economies, there is virtually no study attempting to quantitatively describe monetary policies of transitional economies in terms of the Taylor rule. While this may be due to inability of transitional economies' central banks to explicitly follow any rule for institutional reasons and radically transforming economic environment, it nevertheless seems reasonable to expect these central banks to have defined preferences with respect to certain policy variables, and therefore to follow some form of rule implicitly.

The aim of this study is to investigate whether the National Bank of Kazakhstan's monetary policy could be characterized as conducted in a rule-like fashion and if so, to determine major guidelines of the monetary policy decisions. Despite the National Bank of Kazakhstan officially started to operate under inflation targeting framework only from the beginning of 2007, its successful record of curbing inflation over the period of transition makes estimating its reaction function an instructive exercise. Given that restraining ramping inflation was the primary goal of the monetary policies across the former Soviet republics, Taylor type reaction function defined in terms of inflation and output targets, seems to fit the best the monetary policy objectives of the National Bank of Kazakhstan.

Siklos P. (1996) notes that given the large capital inflows to the transitional economies of the Central and Eastern Europe, these countries experienced real appreciations of their currencies. For this reason, sterilization policy gained particular importance because of its effect on the monetary base and the money supply, and hence, the countries' ability to control inflation. Given significant amount of foreign exchange inflows into Kazakhstan, following the most painful stages of economic reforms, and the National Bank's legal objective of maintaining domestic currency's stability, sterilization proved to be essential component of its monetary policy. Therefore, following empirical estimation of the Taylor rule, we also estimate sterilization policy reaction function for the National Bank of Kazakhstan based on the theoretical framework developed by Cumby and Obstfeld M.(1983).

The rest of the paper is organized as follows. Section 2 provides overview of macroeconomic developments and monetary policy in Kazakhstan. Section 3 discusses the aspects of different monetary policy frameworks in general, and those in place in Kazakhstan in particular. Section 4 presents theoretical grounds, methodology and empirical estimations of the National Bank's reaction function. Section 5 discusses the results. Section 6 concludes.

2. Monetary Policy in Kazakhstan: Overview

2.1 The Launch of the Banking System in Kazakhstan

The modern banking system of Kazakhstan developed in the course of the transformations that took place since 1987 in the framework of the banking reform. The transition period characterized by the symbiosis of the old and the new banking structures was fairly short-lasting. The process of the transformation of the banking system was accomplished in three stages.

Until the early 1990s Kazakhstan, or Kazakh SSR, used to be part of the USSR, political, economic and monetary union of the Soviet Republics. During the Soviet Era the role of the monetary policy was to ensure the fulfillment of economic plan and to control the households' purchasing power (Balino, T., 1998). Gosbank, responsible for execution of the monetary policy, was a 'hybrid institution', combining the functions that are traditionally divided between the central bank and the commercial banks in market economies. Reforms that took place in 1990 and 1991 created the central banks of the union member republics, which were made subordinate to the Gosbank. Following the collapse of the Soviet Union, monetary policy functions were delegated to the central banks of the republics operating in the ruble area. New realities of political independence as well as the task of transforming the economy from centrally planned into the market economy brought about the need for new institutions, monetary policy capable of achieving price stability in particular.

During the first stage (1988-1991), the USSR specialized state banks were restructured with part of their functions delegated to the republican level. At the same time enterprises were

allowed to establish their own commercial banks to mobilize resources in addition to the amounts ensured by the state banks and necessary to meet the central production plans. This led to the sharp growth in the number of newly created commercial banks[1]. In Kazakhstan 72 new commercial banks were established by enterprises in addition to five existing state specialized banks.

At the second stage (1992-1993) the National Bank of the Republic of Kazakhstan, while still in the ruble zone, took over a number of functions of the central bank. Four out of five specialized state banks were converted into the joint-stock companies and further 112 commercial banks were licensed, expanding the number of financial institutions to 184 by the end of 1993. However, the rapid increase in the number of banks went in parallel with accelerating inflation and deterioration of production, which prompted the private sector to shift their savings into holdings of foreign currency outside the banking system. This posed a real threat of the imminent collapse of the banking system, with the bulk of deposits being withdrawn from the state banks. To save the banking system and to improve its credibility, the National Bank embarked on tightening of prudential regulatory requirements, in particular those, regarding capital adequacy for establishment of new banks.

The immediate period before the introduction of the new currency was characterized by hyper-inflation with monthly rates reaching up to 30-50% and over 2000% for 1993 as a whole[2]. This came as a result of the monetary union to which all the Soviet republics were participants with the right to issue non-cash ruble credits to cover their fiscal deficits. This situation could be described in terms of the common-pool problem, because the inflationary consequences of each

[1] Newly established commercial banks were entitled to obtain subsidized credit from the National Bank, which made this activity very attractive for enterprise managers to channel credit to corporate insiders.
[2] Inflation soared to triple-digit levels in most of the CIS countries over 1991-1993

of the governments' actions were to be born by the entire group of countries, thus providing perverse incentives for single governments to keep their finances in order. Disintegration of the USSR rendered impossible collective action among the authorities of the former member states and suggested the only feasible solution to curb ramping inflation, i.e. establishing monetary independence by issuing own currencies for each member country. In Central Asia the Kyrgyz som was created in May 1993, the Turkmen manat in October 1993, the Kazakh tenge in November 1993, the Uzbek sum in July 1994, the Tajik ruble in May 1995.

The third stage of the banking system transformation (from November 1993) started with **an introduction of the national currency, the tenge. The National Bank was endowed with a full responsibility over the operation of the monetary system, thus declaring its formal independence.** This enabled the National Bank to initiate the process of financial system restructuring, which consisted of the following major steps:

- Financial restructuring and bank licensing;
- Modernization of banking operations and creation of the legal and regulatory environment.

In 1994, the National Bank tightened regulatory conditions for commercial banks, including sharp fall in the number of authorized new banks (only 7 in 1994) and initiation of the systemic evaluation of the banking system. In 1995, some 60 banks which did not meet capital adequacy requirements were liquidated, despite the difficulties associated with vague legal framework. The size of the banking system contracted considerably, with broad money dropping from 21% of GDP at the end of 1993 to 11% at the end of 1995 due to the reduction in banking system deposits. Nonetheless, the collapse of the banking system was prevented.

In 1995 the National Bank turned its focus on putting in place appropriate legal and accounting reforms, strengthening prudential regulation. New laws along with amendments to the existing laws were issued, including Presidential decrees on the operations of the National Bank and on the operations of commercial banks. As a result, the number of small and nonviable banks was reduced further, while there was an improvement in the number of profitable banks (Table 1).

Table 1. Kazakhstan: Number of Commercial Banks and Branches

	State	Joint-venture*	Other	Total	Branches
1991	…	…	…	72	…
1992	…	…	…	158	890
1993	…	…	…	184	952
1994	3	10	178	191	1022
1995	3	7	120	130	1036
1996	4	8	89	101	949
1997	4	8	71	83	…

Source: Hoelscher D. "Banking System Restructuring in Kazakhstan", IMF Working Paper WP/98/96, June 1998

* Foreign participation greater than 50 percent

2.2 Macroeconomic Developments at the Early Stages of Transition

Following the introduction of the tenge, the currency was not allowed to float freely and was artificially maintained at the levels of 4.7 KZT in November and 5.7 KZT in December for 1 USD.

A serious problem for the economic policy was posed by the enterprise indebtedness and arrears, resulting in a sharp decline of real output, which equaled 11.4% in 1993. In an attempt to promote output recovery fiscal and monetary policy measures included issuing direct loans to the enterprises. At the same time, the government and the National Bank adopted fiscal and monetary stabilization measures, including targeting the monetary aggregates. However, in the environment of acute shortage of working capital, such loans did not reverse the decline of economic activity, but pushed inflation and contributed to the tenge depreciation. Urged by the IMF and the U.S. officials, **Kazakhstan's authorities let the tenge to float, which led to its continuous depreciation to 52.1 KZT in one year and 67.7 KZT per 1 USD by the middle of 1995.**

A soar in inflation in the first months of 1994 prompted the government to take an active anti-inflationary stance with tightening monetary and fiscal policies. The monthly inflation thus was reduced from 42.6% in January to 10.2% in December 1994, with the annualized rate reaching 1,160% (Figure 1). The reduction in inflation was reached primarily by an attempt by the National Bank to regulate the distribution of direct government credits and setting of refinancing rate at 400%. At the same time, the budget deficit totaled about 4.6% of GDP and was funded mainly by foreign loans and the loans of the National Bank. However, the policy tightening led to further output contraction by a record 17.8% in 1994, while the tenge depreciated 8.6 times against the dollar (Figures 2 and 3).

Figure 1

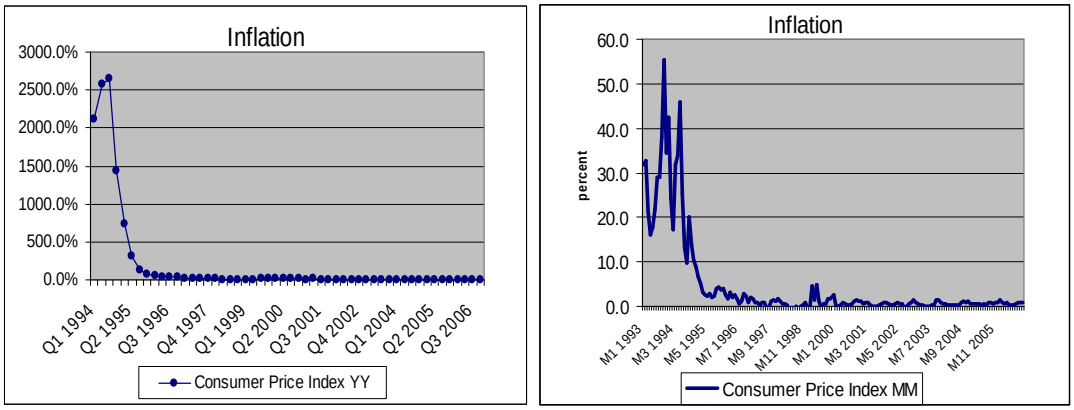


Figure 2

GDP Dynamics %

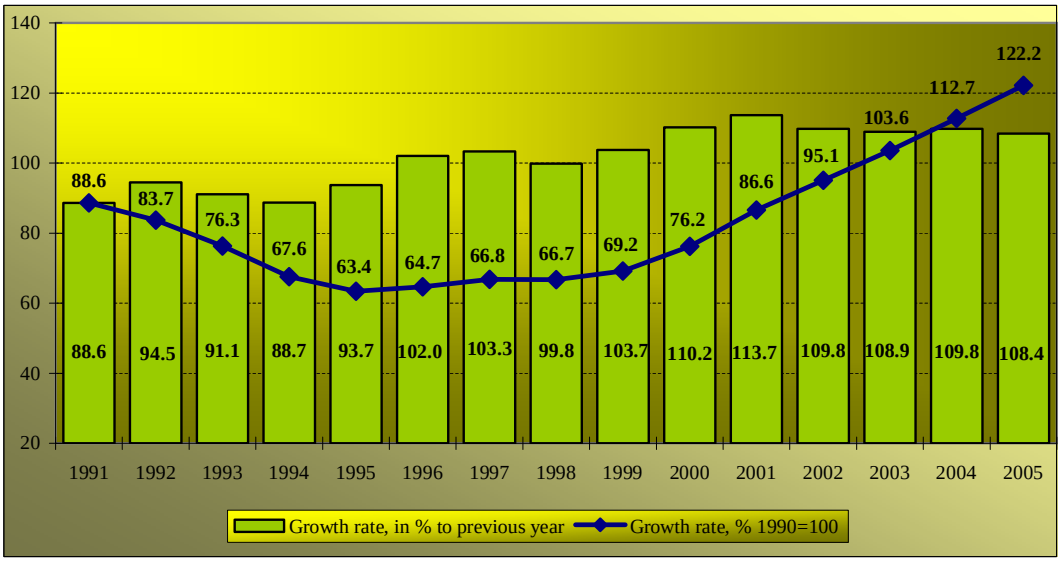
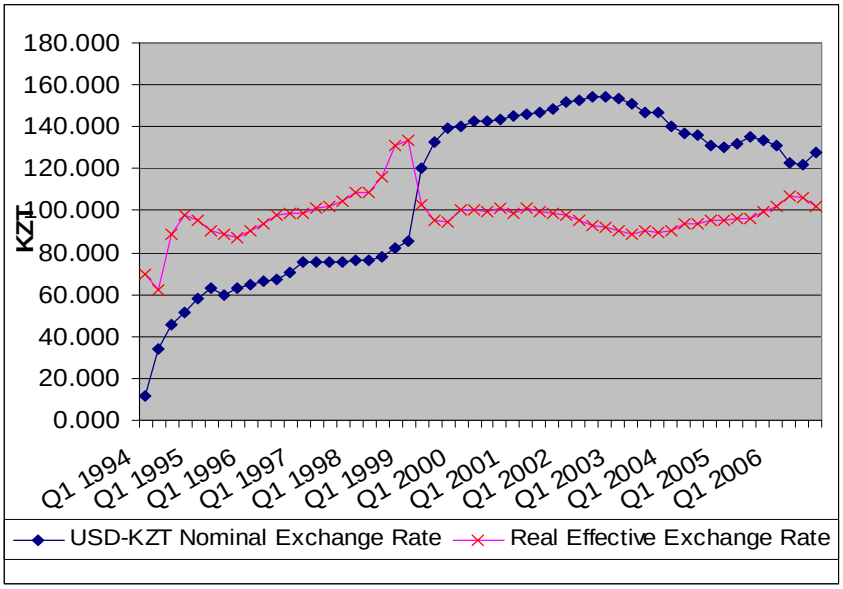


Figure 3



The exchange rate data are defined in a way that a fall/rise in the exchange rate corresponds to depreciation/appreciation of the tenge.

One of the main achievements of monetary policy in 1994 was the **adoption of the classical instruments of monetary regulation such as official refinancing rate, required reserves rate, operations on currency market.** The National Bank also started selling the newly issued three- and six-month government bonds through auctions.

In light of deteriorating economic situation the policy focus was set at the achievement of macroeconomic and financial stabilization through establishing and developing the institutes of a free market economy and acceleration of reforms through 'shock therapy'. To promote reforms in the banking sector the program of development of the banking sector for 1995 was elaborated by the National Bank. The program was in coordination with the general government anti-crises package of reforms, while at the same time taking into account recommendations by the international financial organizations.

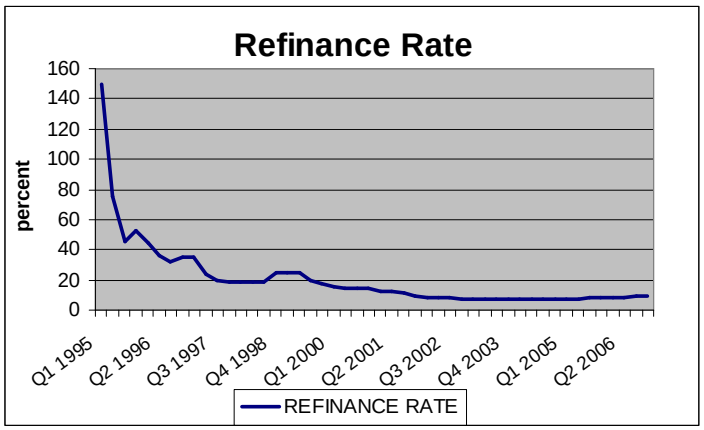
One of the main achievements of the program was the **adoption in March 1995 of the Law on the National Bank of Kazakhstan**. Particularly, the Law put in place coordination between the National Bank and the Ministry of Finances in the area of financial policy, stipulated full range of monetary and currency regulatory instruments used by the National Bank and creation of supervisory and regulatory framework regarding operation of commercial banks. According to the Law **the main goal of the National Bank was determined as maintenance of internal and external stability of the national currency, which implied curbing inflation and stabilizing the tenge exchange rate**. The other goals include contribution to the stability of monetary, credit and banking systems and protection of interests of banks' creditors, their investors and clients. To ensure efficiency of the monetary policy the National Bank was given operational independence and made accountable to the President of the Republic of Kazakhstan. Moreover, to promote confidence in its policies the National Bank started to announce annual indicative targets for the inflation rate and the exchange rate, effectively fixing the tenge.

Inflation and exchange rate stabilization were achieved through monetary base regulation by changes in the refinancing rate, required reserves norm, foreign exchange market interventions and open market operations. **The main instrument of the monetary policy, official refinancing rate, was set according to the actual rates of inflation**. Thus, the National Bank concentrated on its main function of monetary regulation, while issuing credits to the economy became the prerogative of commercial banks. Starting from 1995 the National Bank abandoned the practice of issuing direct credits to enterprises.

The stabilization policy helped to bring inflation down to 160.3% in 1995 with the tenge depreciating by just 18%, which allowed to decrease the refinancing rate from 300% in 1994 to

45% in September 1995, though by the year end it was raised to 59% due to the influence of non-monetary factors (Figure 4).

Figure 4



In 1996, for the first time in the history of Kazakhstan, the GDP grew by 1.1% and inflation dropped to 28.7%. The GDP grew by 2% in 1997, year-end inflation equaled 11.2% against the indicative target of the government of 17.5%. 80.3% of the 3.4% of GDP budget deficit was financed through external borrowing, while the direct credits from the National Bank fell from 12.5% in 1996 to 4.3% of the budget deficit in 1997. Starting from 1998 the National Bank no longer issues credits to finance budget deficits. The refinancing rate fell from 35% at the end of 1996 to 18.5% in 1997.

Under the conditions of economic recovery, declining inflation, increased stability of the national currency and constrained inflationary expectations leading to the decrease in money velocity and growing demand for money, the National Bank was faced with the need to meet the demand for money on the one hand, and keep rather tight monetary policy, on the other. Therefore, the main channel of monetary expansion became the multiplicative impact of the second tier banks. At the same time, **under increasing inflows of foreign capital into the**

country, the monetary policy had to focus on the stability of the exchange rate through sterilized interventions using the notes of the National Bank. Abandonment of the budget deficit financing by the National Bank was rendered possible by the growing government securities market, their larger volumes and longer maturities. However, **to make government securities more attractive for commercial banks and prompt them to diversify away from foreign exchange denominated holdings, the National Bank embarked on the policy of reducing the pace of tenge's depreciation** practically holding it at the level of 75.55 KZT= 1USD. The combination of foreign exchange inflows, tight monetary policy and stability of the currency resulted in significant real appreciation of the tenge, though in nominal terms the currency depreciated against the dollar by 3.1% in 1997 and by annualized 4% from December 1997 to July 1998.

2.3 Russian Crisis of 1998

By mid-1998 Kazakhstan was hit by a number of external shocks, such as decline of commodity prices, financial crisis in Russia and other emerging market economies. The floating of the Russian ruble and its depreciation by almost 70% resulted in deterioration of the price competitiveness of Kazakhstan's tradable sector and the balance of payments, exerting downward pressure on the tenge. **To avoid sharp depreciation of the currency and loss of control over economic developments and inflation, the National Bank continued to intervene into the foreign exchange market as well as raised the refinance rate twice during the year to 25% only to decelerate the speed of the tenge depreciation**, which equaled annualized 20.2% from August 1998 to March 1999. Other restrictive anti-crises measures were initiated in fiscal as well as external trade areas. Fiscal discipline is believed to be the main

difference in the policy response to the crisis between Kazakhstan and Russia, which kept lax fiscal stance even after the crisis. Nonetheless, positive output growth in the first half of 1998 was reversed during the second half of the year, with GDP contracting by 2.5% in 1998. **Tight monetary and fiscal policies resulted in disinflation and crisis of small and medium enterprises, especially in the sectors competing with Russian imports.**

In the face of substantial depletion of its international reserves the National Bank was forced to abandon the managed float and shift to free float on April 4th 1999. Often cited official statement states:

"During the last months the Government and the National Bank carried out detailed analysis of all proposals on the tenge exchange rate policy for 1999 (continuing the policy of a managed float with a smooth and even depreciation, implementing one-step devaluation, linking tenge to a hard currency basket, introduction of a fixed exchange rate, freely floating exchange rate). Advantages and disadvantages of each possible exchange regime were evaluated, taking into account the situation in the country and abroad. Based on the results of this analysis the Government and the National Bank made a decision to move to the regime of a free floating exchange rate of tenge as the most appropriate regime under the current conditions of Kazakhstan's open economy and unstable conditions in international financial and commodity markets" (Kasera, 2007).

Despite the shift was widely praised by the international community and IMF in particular, some regarded this move as long planned and deliberate from the part of the authorities. The report by Washington Times put it: "In fact, the move was less a decision to let the market dictate the strength of the currency and more of a move toward weakening the tenge to make domestic goods more competitive. The reality was that the National Bank started from

the first day of the "float" to purchase dollars, effectively pushing the tenge down from 88.3 KZT/US$ towards what insiders said was a target of 130 – 150 KZT/US$". At the same time the above mentioned statement by Kazakhstan's authorities it is said that **"the National Bank will not let exchange rate fluctuations to exceed rational expectations"**, which points at the authorities' intention to keep control over the tenge exchange rate developments despite the announced change in policy regime. As a result, from end March to early June 1999 the nominal depreciation of the tenge against the dollar reached 33% and the exchange rate settled at the level of around 132 KZT=1USD.

In addition, the host of anti-crisis measures was implemented, including trade and exchange regulations, creation of artificially favorable terms for those willing to hold tenge-denominated assets, easing of prudential regulations for commercial banks and freezing of pubic utility tariffs and charges. The non-market nature of these measures as opposed to the anti-crisis programs adopted by the East Asian economies and supported by the IMF, but criticized by many for their recessionary consequences, became the topic of debates as to which approach is more appropriate once the crisis is underway (Stiglitz, (2000), Rogoff, (2002)).

Russian crisis of 1998 proved to be very serious challenge for the country's policymakers only two years after some economic stabilization was achieved. **The time of the crisis represents an important benchmark against which the monetary policy shift can be evaluated**, and not only due to official announcement of floating the tenge, but also because starting from 1999 the economy was uninterruptedly enjoying robust growth rates, which naturally posed different kind of policy challenges. Hence, we will refer to the official timing of the float (second quarter of 1999) to make distinction between two different periods in the history of Kazakhstan's monetary policy in the analysis that follows. Overall, the first of these

two periods can be well summarized by the abstract from the Washington Times: "One of the things that attracted these investors is that, even though Kazakhstan's economy has contracted considerably in the years since independence, the government is recognized as having one of the most forward – looking economic policies in the Commonwealth of independent states. The focus has been first and foremost on macroeconomics – stabilizing the currency and inflation while building foreign currency reserves as means toward achieving economic strength and creating an environment where private sector can grow. While the latter goal is often thwarted by the bureaucracy, this policy has presented the opportunity for some of the republic's citizens and businesses to build wealth and drive economic recovery that saw modest growth in 1996 and 1997".

2.4 Macroeconomic Developments after the Russian Crises

Starting from the second half of 1999, economic growth started to recover, continuing also in 2000, and equaled 2.7% and 9.6% accordingly. High oil prices on the world markets contributed to the improvement of fiscal position of the government budget. **Monetary policy was aimed at promoting economic recovery while still keeping inflation under control after its surge following the currency devaluation**. The refinancing rate was cut three times from 25% in 1999 to 14% in 2000. Monetary easing led to the growth of money aggregates, which did not, however increase inflation significantly which fell in 2000 to 9.8% from 17.8% in 1999.

Favorable external conditions and buoyant investment activity inside the country contributed to the strong economic performance in 2001 with GDP growth accelerating to 13.2%. Growing economy's need for liquidity triggered the National Bank to further decrease refinancing rate to 9%. **To prevent the national currency from appreciating against the**

dollar in real terms the National Bank continued to sterilize capital inflows, which resulted in relative stability of the tenge's nominal exchange rate.

Prior to 2002 the monetary policy focus was set at maintaining low inflation which was considered desirable to be contained between 5% and 10% so that to "promote the national economy to achieve maximum rates of the economic growth"[3] and that its achievement "shall be provided through regulation of the monetary base level using all the tools of the monetary policy available to the National Bank. At the same time the economic policy of the Government shall be focused on such rates of inflation".

Another target of the monetary policy was determined as prevention of the tenge exchange rate overvaluation, which "shall adequately respond to fluctuations of the world prices, conditions of the foreign trade creating the foundation for progress of the domestic economy". Since 2002 the national currency has been pegged to a basket of 24 currencies of the main trade partners.

In 2003 the National Bank adopted a new monetary policy framework and price stability has become the primary objective instead of the tenge's external and internal stability. The National Bank announced its plans to introduce inflation targeting regime by 2007. Since 2002 monetary policy guidelines are being defined and made public for three upcoming years, and these guidelines are subject to annual revision. This policy shift became possible due to the achievement of certain macroeconomic stability, allowing to make forecasts and to elaborate strategic policy directions over longer horizons given situation in the economy and financial markets. In the Monetary Policy Guidelines for 2002-2004 National Bank has stipulated that the main goals of its monetary policy for the nearest 3 years are preparation and

[3] "Strategic Plan of Development of the Republic of Kazakhstan up to 2010", Section VII, 2001.

transition to inflation targeting. This move assumes a gradual change from setting objectives for monetary indicators and gold/foreign currency reserves to attempting to impact inflation through a variety of intermediate actions[4]. Target indicators were initially set in terms of consumer price index, which starting from 2004 is complemented by the index of base inflation, which allows to eliminate the effects of monetary shocks and to concentrate on the prevailing tendencies in inflationary developments. The role of the primary indicator of the monetary policy stance was further retained by the refinance rate, while open market operations remained the main tool for ensuring the achievement of intermediate monetary targets.

After averaging 11% in 2000-2002 the rate of GDP growth remained strong in 2003 at 9.2%. In 2002-2003 the monetary policy of the National Bank was mostly accommodative and aimed at restraining inflation within 5-7% and keeping the tenge from appreciating in real terms against the dollar. This task was becoming increasingly difficult in the face of rising oil revenues and the National Bank recognized it would have to cease practicing sterilization over time, especially as the shift to inflation targeting takes place.

Management of foreign exchange inflows was somewhat facilitated by the National Fund created in 2000 to accumulate and invest part of states' revenues from oil and gas export, in this way providing some insurance against sharp fall in energy prices. By the mid of 2004 USD 3.8 bln out of total foreign assets of USD 10.5 bln were accumulated by the National Fund.

Regulation of commercial banks liquidity was accomplished using the National Banks' short-term notes in the first place and increasingly through the conduct of REPO operations with government securities.

[4] National Bank of Kazakhstan, Press Release №20 September 14, 2004.

By the end of 2002 the actual inflation moderated at the level of 6.6% which slightly exceeded the forecast value of 4-6% for the years 2002-2004, which did not prevent the National Bank from reducing the refinancing rate from 9 to 7.5% at the end of 2002 and further to 7% by the mid of 2003. Rising foreign exchange inflows were further fostered by buoyant commodity markets and foreign direct investments, which led to the growing foreign exchange reserves and money supply. In its revision of inflation forecast made at the end of 2003 for the years 2004 and 2005-2006 the National Bank kept its target of 4-6% for 2004 and projected further decline in inflation to 3-5% for 2005-2006.

In 2004 regulating and supervisory functions of the National Bank were handed over to the newly created Agency on Supervision and Regulation of Financial Markets and Financial Organizations, and thus, **the National Bank of Kazakhstan became the first bank in the CIS region capable of concentrating on the functions of the classical central bank.** In this light, elaboration of the main directions for the monetary policy was carried out given two assumptions. The first one is that due to the development of financial sector the link between monetary aggregates and inflation is weakening. This diminishes their role under the inflation targeting set-up of the monetary policy, however, monetary aggregates still retain their reference role and are taken into account when making the policy projections. The second assumption is that the policy measures of the current year affect the inflationary developments of the following period, and for this reason annual revision of the policy targets is crucial. The objective of transition to inflation targeting requires the clear picture of transmission mechanism between policy actions and their ultimate effect on inflation by policymakers, and starting from 2004 the National Bank was working on elaborating first the pilot version and later the full-scale model of

monetary transmission, along with studying the interrelations among base inflation and consumer price index, monetary aggregates and interest rates on the financial markets.

Meanwhile, though the inflation outcomes for 2003 and 2004 remained within the target band at 6.8% and 6.7% accordingly, the inflationary pressures in the economy continued to mount due to number of factors. High pace of economic growth was generating robust consumer demand and fuelling investments. The real GDP increased by 63% from 2000 to 2004, real wages by 60% and investments into fixed capital grew 5.5 times. Part of inflationary pressure came from high oil prices on the world markets and higher prices in the main trade partner countries, thus contributing to the imported component of inflation. Expansion of monetary aggregates backed by the increase in the net foreign assets held by the National Bank was another factor behind growing inflation. Moreover, excessive liquidity in the banking sector was produced by the increased borrowings in the international capital markets by domestic companies and banks, with the latter expanding their crediting of the economy. According to the National Bank forecast, the real economy was expected to grow by 26.4% in years 2004-2007 while the bank loans to the economy were projected to more than double. The situation was further exacerbated by the increased expenditures of the government with outlays for wages and social security taking the lion's share of the budget. Inflation was partly constrained by the tendency of the national currency to appreciate against the dollar, though moderated by the National Banks' sterilized interventions.

Given the inflationary pressures the National Bank took stricter monetary stance replacing its policy of decreasing the refinancing rate over the previous years to raising it to 7.5% in the early 2005, with an intention to make revisions of the rate on a regular basis "based

on general situation in the money market, demand and supply in borrowings, and on level of inflation and inflationary expectations"[5].

According to the assessment of economic developments in 2005 made by the National Bank, real GDP rose by 9.8%, real wages by 12%, while inflation picked up to 7.5% which is significantly higher than the upper range of the target set for 2005 (5.2-6.9% for the high oil prices scenario). Higher than expected inflationary outcome was brought about by more than 40% rise in oil and gas prices on the world markets, further hike in government spending (27.9% of GDP from 23.9% in 2004), increased inflationary expectations as well as further expansion of money supply. In response the National Bank continued the policy of monetary tightening, raising the refinancing rate to 8% by the year end. In making projections for 2006-2008 the National Bank used the results of the newly elaborated model of monetary transmission, while at the same time accounting for the fact that the bulk of inflationary pressure comes from foreign borrowings which were to remain significant and not responsive to the level of domestic interest rates.

An upward trend in inflation continued in 2006 with the reading of 8.6% for the whole year, which exceeded the target band of 6.9-8.5% under the high oil prices scenario. This led the National Bank to continue tight monetary policy. Along with other regulatory measures, the refinancing rate was raised twice by 50 basis points during the first half of the year to 9% and stayed at this level throughout the rest of 2006. Though inflationary pressure weakened in the second half of the year, the policy reaction is still seen to be not sufficient to restrain escalating

[5] *Chair of National Bank of Kazakhstan Anvar Saidenov spoke about measures to be undertaken in this direction in an interview with Interfax-Kazakhstan*

risk factors[6]. Further tightening is recommended through the monetary policy measures, including greater flexibility of the currency and letting it to appreciate more quickly.

[6] "Republic of Kazakhstan – 2007 Article IV Consultation" – Preliminary Conclusions of the IMF Mission, April 24, 2007.

3. The Choice of the Monetary Policy Framework

3.1 Monetary Policy Framework in Theory

A monetary policy framework can be defined as "the institutional arrangements under which monetary policy decisions are made and executed" (McNees, 1987, p.3). This results in **the outcomes of a particular monetary policy decision-making process being dependent and determined by a set of various factors including political ones**. This is especially true for the transitional economies that faced the need to transform their economic structure and institutional frameworks in accordance with the principles of market economy.

Based on the results of the survey done by the Bank of England on monetary frameworks in 94 countries, Fry M. (2000) distinguishes the following factors influencing the characteristics of a monetary policy framework:

1. Structural differences such as the structure of the financial sector, types and amounts of debt, openness to trade, commodity dependence, fiscal discipline, etc.

2. Varying degrees of indexation and other nominal rigidities that affect the speed of transmission from monetary policy instruments to inflation.

3. Institutional arrangements and analytical constraints that influence the way in which monetary policy can respond.

Monetary policy independence is key in distinguishing different monetary policy frameworks, implying both the central bank independence from the government or overall ability of the central bank to carry out monetary policy unconstrained by the external factors, such as the Bretton Woods fixed exchange rate system. *De facto* vs. *de jure* independence of the central bank determines whether central bank independence enshrined in the law is enforced in practice.

It is also important to distinguish not only between proclaimed and actual independence but also between full against instrument independence of the central bank.

The survey reveals that the short-term interest rate is the most important **policy instrument** employed by the central banks to regulate monetary conditions and ultimately aggregate demand. Alternatively or often in addition to using short-term interest rates, 61% of the central banks use required reserves, 52% buy and sell securities, while 11 out of 94 use direct controls on interest rates or credit allocation.

The choice of the **monetary policy objective** is another crucial aspect underlying different monetary practices and is closely related to the issue of monetary policy independence. The long debate over proper monetary policy objective has led to the consensus that price stability should be preferred over other alternative objectives, such as full employment or economic growth, because it is conducive to better economic performance and therefore employment and growth. Wider acceptance of inflation targeting framework provides stronger argument for central bank independence due to the well-known problem of time inconsistency displayed by the behavior of fiscal authorities.

Use of the **rules vs. discretion** is yet another determinant of the monetary policy framework. Since the monetary authorities are biased to produce inflationary surprises due to time inconsistency it is desirable from the monetary stability standpoint to limit the scope for such discretionary behavior by making the policy makers to abide by a special rule. In the end, it is all about credibility of the monetary policy which is crucial for price stability which, in turn, is an essential contributor to economic growth.

Literature distinguishes between three major **ways to anchor inflation**: target monetary aggregates, exchange rate or inflation. The difficulty with using the monetary anchor in

transitional economies is that the effectiveness of such policy requires the stability of aggregate demand–inflation relationship which is lacking in the economies which experienced periods of hyperinflation. Under these circumstances it is essential to reach stabilization first and then shift to monetary targeting afterwards (Corbo, 2000). Initial stabilization may be achieved through exchange rate anchor, which serves to tame inflation expectations and is more transparent to the public than monetary target. However, the drawback of fixing the exchange rate lies with the difficulty to choose an adequate anchor. Other disadvantages of relying on the exchange rate anchor include the loss of monetary policy independence and therefore of the ability to respond to asymmetric shocks, potential for extensive risk-taking leading to financial bubbles, excessive vulnerability to exchange rate attacks as well as to occasional exchange rate corrections, with the latter likely to become a major problem for the developing economies where financial sector infrastructure is relatively poor.

Another monetary policy option is to target inflation. From the early 1990s an increasing number of industrialized as well as developing countries have opted in favor of setting an explicit inflation targets by relatively independent central banks. In this case, this target is the ultimate objective of the monetary policy with the inflation target serving as the intermediate one (Corbo, 2000). However, some authors have argued that "from an analytical perspective, the differences between inflation targeting and, say, monetary targeting are probably more semantic than economic" (Haldane, 1997). The argument rests upon the idea that both of the regimes imply targeting the growth rate of either of the nominal variables and both "rely on a forward-looking inflationary assessment when monetary policy is being set". This means that in theory pure variant of monetary targeting would be based on the analysis of monetary factors, while inflation targeting would take into account real variables as well as monetary. But since pure

monetary targeting is almost nowhere to be found in practice, some authors have spoken about monetary targeting and inflation targeting being merely different ways to name the same concept (Clarida and Gertler (1995), Bernarke and Mihov (1996)).

3.2 Monetary Policy Framework in Kazakhstan

We proceed by describing the monetary policy framework of Kazakhstan along the lines presented in the previous section. Given the crucial importance of the central bank independence in determining the country's monetary policy framework, the analysis of the central bank independence can be developed based on four categories: clarity of the mandate; the appointment and dismissal procedures for the members of the Board of Directors; the provisions for the resolution of conflicts between the executive branch and the central bank and the degree of influence of the central bank in the formulation of monetary policy, exchange rate policy and the budgetary process; the existence of legal restrictions on the ability of the public sector to borrow from the central bank (Cukierman, 1992).

The operation of the National Bank of Kazakhstan is regulated by the Law on the National Bank from 1995. According to the Law the primary goal of the National Bank was defined as the external and internal stability of the tenge exchange rate, but starting from 2003 it was restated as maintenance of price stability. The National Bank is accountable to the President, which means that the Chairman of the Bank is appointed to a six-year term and removed from the office by the President with the consent of the Parliament. The Supervisory Board is the highest administrative decision-making body of the National Bank, it is comprised of 9 members, including the Chairman, the Deputy Chairmen and three representatives of the President, the Government and the National Bank (one representative from each entity). As for

the real power and the degree of influence of the Chairman over the monetary policy decision-making by the Board, he has the deciding vote in case of a tie vote by the Board. He also has the right to return a decision with his objections for the second revision by the Board, but only in case if at the first round the decision was voted for by less than two-thirds majority of the Board members.

The authority to formulate monetary policy is an exclusive responsibility of the National Bank of Kazakhstan. Since the tenge is officially a floating currency, the exchange rate policy is not formulated by the National Bank, but foreign exchange regulation is one of its tasks directed at the achievement of the main goal of price stability. Finally, the National Bank is not allowed to finance the budget deficit. Based on the facts regarding the National Bank independence drawn from the Law, **one can conclude that *de jure* the country has progressed a great deal in granting independence to the National Bank**. As for *de facto* independence, it can be recalled that from 1995 when the Law was enacted the National Bank was rather successful in restraining inflation and stabilizing exchange rate, as well as prompting the government to issue securities to finance its' deficits. The management of the Russian crises can also be recorded as the manifestation of the National Bank independence. It can also be argued that the National Bank possesses not only instrument, but also target independence since it engages in annual setting of the targets for the main monetary indicators in line with the broad macroeconomic targets defined in various development Programs for short, medium and long terms.

The main instrument of monetary policy of the National Bank is refinancing rate, but required reserves rate and open market operations are also important instruments of monetary policy. As for the rule vs. discretion based monetary policy, the National Bank officially moved to inflation targeting in 2007, with the benefit of newly developed model of

monetary transmission mechanism. **The empirical section of this paper attempts to establish whether the National Bank used any kind of rule in conducting its monetary policy**.

The case of a proper exchange rate anchor for the Kazakhstan's case is discussed by Frankel (2005). In particular, it is argued that neither of the polar exchange rate regimes is appropriate for Kazakhstan: the country is too small and open for a free float and too large and diversified across trading partners to peg to a single currency. A number of alternative candidates for peg, such as basket of major currencies, basket of basic mineral and agricultural commodities and export prices are considered with their respective advantages and disadvantages. The specificity of Kazakhstan's economy, namely its high dependence on oil prices, makes the exchange rate dynamics of the national currency excessively dependent on the price of oil, leading to appreciations when the latter is high and depreciations when it bounces back. Therefore, the author puts forward the idea of pegging the national currency to the basket made up of foreign currencies and oil with a quite wide target band. In this case a wide band would help to avoid or at least to diminish the negative effects of pegging, among them the loss of independent monetary policy, less flexibility to adjust to shocks, having to dispense with an important source of information on market opinion about the country's prospects as reflected by the exchange rate behavior, which is especially relevant for developing and emerging markets (Bernarke et al., 1999).

Frankel (2005) also provides arguments on the appropriateness of inflation targeting for Kazakhstan. His line of reasoning is that because Kazakhstan's economic performance is dependent on oil price trajectory, it is highly vulnerable to terms of trade shocks. Inflation targeting framework is not supportive of currency depreciation necessary to reverse the adverse effects of the shocks and therefore, acts to exacerbate the consequences of the shocks. The

author stands by his idea to use peg to export prices if inflation targeting is chosen as monetary policy framework, with oil price entering the price index, which in this case becomes the main target of monetary authorities.

One of the most urgent policy objectives for transitional economies, especially those less advanced of the former Soviet Union, was to curb triple-digit inflation and avoid massive depreciation of the national currencies by the newly established central banks. The stabilization efforts were complicated by the persisting budget deficits, melting foreign exchange reserves resulting from the foreign exchange market interventions, dollarization and the lack of confidence in the banking system by the public (Lenain, 1998). **Comprehensive stabilization programs were adopted in Kazakhstan with indicative targets for inflation rate and exchange rate of the tenge announced by the National Bank.** To meet the goals, the growth rate of **monetary aggregates was used as an intermediate target, complemented by the set of other policy measures, including pegging the exchange rate and retaining capital controls.** At the same time, the version of monetary targeting exercised by the transitional economies was different from the traditional in the sense that instability and uncertainty surrounding decision-making process complicated forward-looking assessment of economic situation and inflationary developments.

3.3 Sterilization as Monetary Policy Instrument

Once the challenges of the initial stage of transition had been constrained, some countries of the former Soviet Union, Kazakhstan in particular, started to face another type of policy challenge experienced previously by the Central and Eastern European countries, namely currency appreciation following large inflows of foreign exchange. At this stage the policy

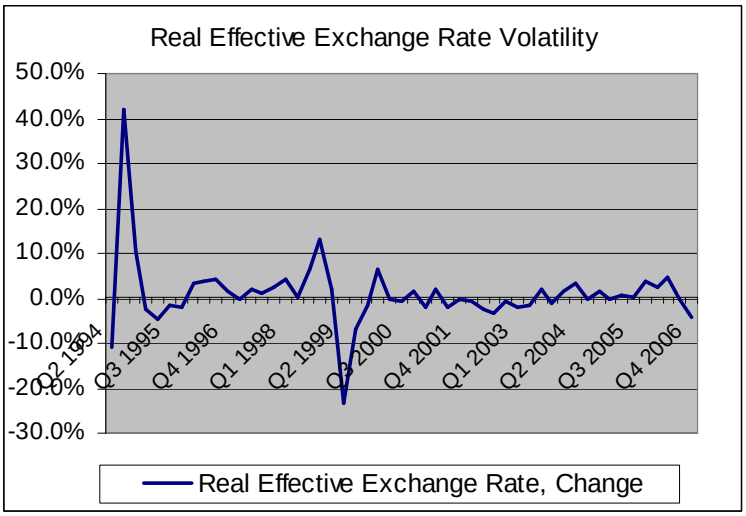
concern became keeping control over the inflation and preventing the real appreciation of the currency. To this end, **interventions into the foreign exchange market and sterilizations of capital inflows grew equally important as key instruments of the monetary policy along with refinancing rate and required reserves rate**. Siklos (1996), discussing the impact of sterilization on monetary policy for the case of Hungary puts that "an assessment of the role of sterilization in the transition countries is a useful means of determining to what extent capital inflows affected the monetary base or the money supply more generally, and consequently the countries' ability to control inflation".

Since the second half of 1995 until the outbreak of the Russian crises, the National Bank pursued the policy of a managed float of the tenge. Despite officially tenge was a floating currency, the primary goal of the National Bank to maintain its external and internal stability resulted in the currency being more managed than floating. For example, from May to December 1997 the exchange rate of the tenge against the dollar was kept fixed at the level of 75.55 KZT = 1USD. This measure was intended at increasing the attractiveness of government securities among the commercial banks due to the planned suspension of the budget deficit financing by the National Bank (Ohno, Zhakparova, 1999). Following the Russian crisis, the tenge was allowed to float while the monetary authorities claimed no future interventions against the market-based exchange rate. However, with surging oil export revenues in 2000 and further on, the National Bank resumed preventing undue fluctuations of the tenge exchange rate by sterilized interventions through the issuance of its short-term notes[7]. A look at the dynamics of the real effective exchange rate of the tenge calculated by the National Bank against a basket of

[7] Antidumping Duty Investigation of Silicomanganese from Kazakhstan - Request for Market Economy Status, March 25, 2002.

the currencies of 24 main trading partners of Kazakhstan using the CPI measure of price changes, demonstrates its rather low volatility after dramatic depreciation in 1999 (Figures 3, 5).

Figure 5



The real exchange rate data is defined in a way that a fall/rise in the real exchange rate corresponds to real depreciation/appreciation of the tenge.

According to the IMF, the tenge was tightly managed against the dollar in 2001-2002, the monthly fluctuations increased in 2003-2004, moderated in late 2004-2005 and increased again from April 2006[8].

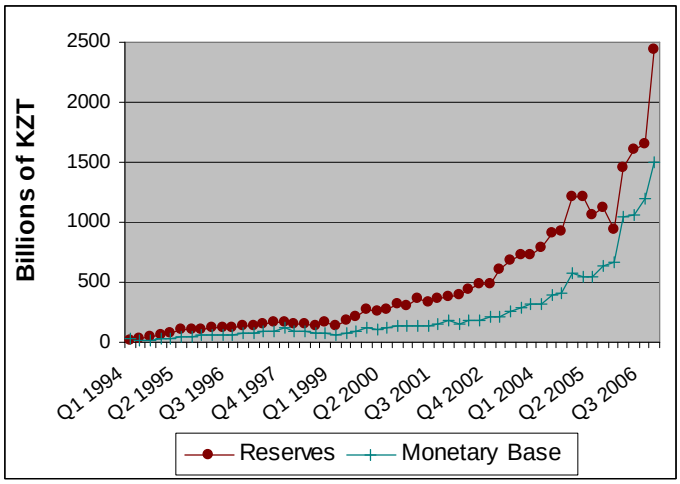
Given the high weight attributed by the National Bank to stability of the real exchange rate of the currency in the face of growing foreign exchange inflows, and constant purchases of the foreign exchange, **it is logical to view continuous accumulation of foreign exchange reserves by the monetary authorities as a policy instrument in pursuing the real exchange**

[8] IMF Country Report No. 06/244: "Republic of Kazakhstan: 2006 Article IV Consultation—Staff Report; and Public Information Notice on the Executive Board Discussion", June 2006.

rate goal. Indeed, foreign exchange reserves accumulation is considered to be the sign of a currency being kept artificially undervalued (Goldstein M., 2004). Theoretical underpinning of reserve accumulation by the countries specializing in exports of natural resources can be found in avoiding the dangers associated with the Dutch Disease phenomenon. Trying to stimulate the growth of non-oil producing sectors of the economy, the central bank finds it optimal to buy foreign exchange to prevent currency appreciation. While the same effect could be achieved by implementation of discriminatory taxation scheme, developing countries may find it difficult to administer such a scheme, therefore opting for the second best solution of reserve accumulation (Sosunov K, Zamulin O., 2006).

To proceed further with the analysis of reserves accumulation as monetary policy instrument we follow Siklos (1996) in examining the relationship between the dynamics of the monetary base and international reserves for Kazakhstan (Figure). The data used is from the IMF IFS database.

Figure 6



From the figure it can be inferred that since both international reserves and the monetary base are not stable in time (the rise of both accelerated significantly from the second half of 2002), the intensity of sterilized interventions has not been the same over the period of interest. The so-called crude measure of the scale of sterilization, calculated as the ratio of the change in international reserves valued in tenge to the change in the monetary base suggests the changing pattern of sterilized interventions. After omitting the outliers the mean value of the ratio for the whole period is 0.92 which is a sign of modest sterilization. To see if the sterilization intensity changed after the tenge float in the second quarter of 1999 the means for the two sub-periods are compared. The average sterilization ratio is not different from zero in the first sub-period, while it is equal 1.5 in the second sub-period. Therefore the data reveals no evidence of significant sterilization in any of the sub-periods.

Alternative rough measure of sterilized interventions, the sterilization coefficient, can be obtained by taking the ratio of the year-on-year change in net domestic assets to the year-on-year change in net foreign assets (Hanke 2002). Sterilization coefficient close to -1 implies full neutralization of the move in net foreign assets by changes in net domestic assets, while the values greater than -1 refer to incomplete neutralization. After omitting outliers we are left with the average coefficient of 0.48 for the whole period, -1 and 1.42 for the first and second sub-periods respectively. This suggests that before the float the National Bank was seriously engaged in compensating the changes in net foreign assets by changing net domestic assets, while after floating the currency net domestic assets and net foreign assets tend to move together.

Following Hanke (2002) who estimated sterilization coefficients for the countries officially operating under currency board arrangements, statistical analysis of sterilization is carried out. For this purpose, the quarterly changes in net foreign assets and net domestic assets

are normalized by dividing each by the previous quarter's stock of reserve money. Then, the normalized net domestic assets variable is regressed against the normalized net foreign assets variable and a constant. The sterilization coefficient obtained is highly significant (t-statistics= -5.31) and equal to -0.76 for the entire period. The coefficients for the sub-periods are equal to -0.92 and -0.6 accordingly (t-statistics are -3.44 and -4.34).

It is also interesting to compare our estimated sterilization coefficient with the ones found for other developing countries. Table 4 is adapted from Emir et.al. (2000) and presents sterilization coefficients estimated to measure the degree of monetary independence (Kamas (1996), Renhack-Mondino (1988), Fry (1996), Savvides (1998)) or alternatively, the sterilization policy (Siklos (1996), Altinkemer (1998), Celasun (1999)). As it can be seen from the Table 4, it is rather common for developing countries' monetary authorities to engage in sterilization policies, though the efficiency of such policies varies across countries and does not necessarily reflect the differences in the official exchange rate systems.

Table 4.

Sterilization Coefficients in Developing Countries

Source	Country	Period	Exchange Rate System	Sterilization Coefficient	Methodology
Kamas L. (1986)	Mexico	1971.3-1981.4	Fixed Exchange Rate	1.55	OLS and TSLS
	Venezuela	1970.4-1982.4		-1.04	Equations derived from a macro-model
Kamas (1985)	Colombia	1970.3-1980.4	Crawling Peg	-0.92	5 equation model TSLS
Renhack-Mondino (1988)		1975.2-1984.2		-1.24	Small structural model, TSLS
Siklos (1996)	Hungary	1991.1-1994.12	Crawling Peg	-0.69	TSLS
Fry (1996)	Pacific Basin Countries	1960-1988	Pegged Exchange rate	-0.62	Iterative 3SLS
Savvides (1998)	Cameroon, Cote d'Ivoire, Gabon, Ghana, Nigeria	1966-1991	Fixed Exchange Rate	-0.13	Iterative 3SLS
Altinkemer (1998)	Turkey	1990.2-1993.10 and 1994.4-1998.6	Managed Float	-1.04 and -0.93 respectively	OLS
Celasun (1999)	Turkey	1990.2-1996.6	Managed Float	-0.37	Instrumental Estimation

Source: Emir et.al. (2000) "Monetary Policy Reaction Function in Turkey"

Before proceeding with more formal analysis of this issue, it is worth to mention that the sterilization coefficients are subject to changes as a result of various disturbances hitting the economy as well as preferences of the monetary authorities, hence the coefficient is not unique (Roubini, 1988). Other things being equal, **higher sterilization coefficient is interpreted as an indicator of independent and efficient monetary policy** (Emir et al, 2000). Moreover, in addition to the sterilization coefficient, the offset coefficient is often estimated in the literature. Offset coefficient is "the fraction of any domestic credit expansion reversed by central bank reserve losses in the same period" (Waheed, 2007), i.e. the ability of central bank to influence monetary base against saving decisions by the public between domestic and foreign assets. Since complete capital account liberalization in Kazakhstan was introduced only from January 1 2007, estimation of the offset coefficient would not be very meaningful.

4. Estimation of the Reaction Function of the National Bank of Kazakhstan

4.1 Theoretical Framework

As it was mentioned earlier, institutional realities of transitional economies make it impossible for their central banks to follow any explicitly formulated monetary policy rules. However, **it is still worth looking at the empirical evidence to determine whether during the transition the monetary authorities acted in any rule-like fashion to economic developments and if yes, then which were the main variables of policy concern**. According to Taylor (1993), it could be useful to employ the concept of a feedback rule even in a framework in which it is difficult, if not impossible, to follow a certain rule mechanically.

The recent literature on monetary policy reaction functions in industrialized countries relies primarily on the methodology developed by Taylor (1993), which specifies the policy rule in terms of a simple backward-looking two-equation model of the economy, with the coefficients on the inflation and output gaps incorporating the parameters of the IS and the Phillips curve (Svensson, 1999):

$$r_t = \alpha + \pi^* + \beta(\pi_t - \pi^*) + \gamma y_t \ , \qquad (1)$$

where α is the real interest rate and π^* denotes central bank's inflation objective.

Clarida et.al. (1998) extended the traditional rule for the case of forward-looking interest rate setting. In this framework, the monetary authority's reaction function is the solution to the optimization problem of minimizing a loss function on the squared differences of inflation and its target and of observed and potential output:

$$r_t^* = \bar{r} + \beta \cdot \left[E(\pi_{t+n} / \Omega_t - \pi^* \right] + \gamma \cdot \left[E(y_{t+k} / \Omega_t) - y_{t+k}^* \right], \quad (2)$$

where r_t^* - target interest rate set by the central bank,

$\bar{r}$ - long-run equilibrium interest rate or the desired rate of interest given that inflation and output are at their target levels,

π_{t+n} - expected rate of inflation between *t* and *t+n*,

y_{t+k} - expected output between *t* and *t+n*,

π^* - target rate of inflation,

y_{t+k}^* - target output between *t* and *t+n*,

Ω_t - information set available at time *t*,

E - expectations operator,

n, k - forecast horizons for inflation and output respectively.

Here $n, k \geq 0$ imply forward-looking specification, i.e. the idea that the central bank's decisions are based on its beliefs about contemporaneous or future values of inflation and the output gap. In contrast, $n, k = -1$ would indicate the backward-looking rule.

Since lower (higher) interest rates stimulate (depress) inflation and output, the monetary stance can be reflected by the coefficients β and γ, i.e. $\beta > 1$ and $\gamma > 0$ would correspond to stabilizing monetary policy, and accommodating otherwise. The partial adjustment mechanism is introduced to account for smoothing behavior by the central bank:

$$r_t = \rho \cdot r_t^* + (1 - \rho) \cdot r_{t-1} + v_t, \quad (3)$$

where v_t is a zero mean exogenous interest rate shock and ρ is the smoothing parameter.

From (2) and (3) one gets the following:

$$r_t = \rho \cdot \left\{ \bar{r} + \beta \cdot \left[E(\pi_{t+n} / \Omega_t) - \pi^*_{t+n} \right] + \gamma \cdot \left[E(y_{t+k} / \Omega_t) - y^*_{t+k} \right] \right\} + (1-\rho) \cdot r_{t-1} + v_t \qquad (4)$$

Assuming rational expectations we obtain:

$$r_t = \rho \cdot \left\{ \bar{r} + \beta \cdot \left[\pi_{t+n} - \pi^*_{t+n} \right] + \gamma \cdot \left[y_{t+k} - y^*_{t+k} \right] \right\} + (1-\rho) \cdot r_{t-1} + \varepsilon_t , \qquad (5)$$

where the error term ε_t is a linear combination of the forecast errors of inflation and output and the true disturbance v_t.

However, it was argued that given the unique transmission mechanism of monetary policy in developing economies, they are less likely to operate through the monetary policy instruments, employed by developed countries' policy makers, such as interest rates (Montiel, 1991). **Deficiencies of the interest rate channel of monetary policy are even more pronounced for transitional economies given poor financial infrastructure and underdeveloped financial intermediation. Therefore, both for developing and transitional economies the most likely monetary policy instrument used to regulate economic activity is the monetary base.**

The National Bank of Kazakhstan has repeatedly emphasized that its' main policy stance indicator is the refinancing rate, and that it is through the refinancing rate that it regulates the monetary base as an intermediate target to achieve the ultimate target of curbing inflation and stabilizing the tenge. Though to this end the refinancing rate was complemented by other instruments, such as required reserves rate and open market operations, it seems questionable whether changes in the refinancing rate alone were able to regulate aggregate demand and supply to the extent desired by the National Bank due to the peculiarities of transitional economies already mentioned. It is worth noting that earlier attempts to estimate a Taylor-like reaction

function for Kazakhstan's monetary authorities did not produce any successful results (Sand, 2004).

Given that the monetary base appears to be the main policy response variable for many developing economies, whether explicit or implicit, **the Taylor-like reaction functions were estimated both for the monetary base and the interest rates as the dependent variables** (Corbo, 2000).

Another issue that arises in terms of monetary function specification, is identification of the forecast horizon, i.e. of reference period with respect to which the monetary policy decision is made. It is hardly disputable now that effective monetary policy should employ the concept of dynamic programming and "think ahead in order to make today's decision", i.e. be forward-looking, rather than "looking out the window", i.e. backward-looking (Blinder, 1998). As far as the policy of the National Bank of Kazakhstan is concerned, it shifted to forward-looking monetary policy making in 2002. However, even prior to 2002 it announced year-end inflation targets, which came as a part of a broader macroeconomic programs developed jointly with the Government. On these grounds we might suspect that the policy of the Naitonal Bank could be characterized as forward-looking. On the other hand, in order for the forward-looking approach to work well, the monetary authorities should possess with a clear picture of the existing and perspective relationships and interdependencies in the economy, the transmission mechanism in particular, which is unlikely to be in place at the early stages of transition. Therefore **we will try to establish empirically whether the National Bank acted in a backward- or forward-looking manner.**

To account for the fact that the National Bank may have as its policy concern variables not only, if at all, inflation and output, but also other economic indicators, (5) can be modified:

$$r_t = \rho \cdot \left\{ \bar{r} + \beta \cdot \left[\pi_{t+n} - \pi^*_{t+n} \right] + \gamma_1 \cdot \left[y_{t+k} - y^*_{t+k} \right] + \gamma_2 \cdot \left[z_{t+j} - z^*_{t+j} \right] \right\} + (1-\rho) \cdot r_{t-1} + \varepsilon_t , \qquad (6)$$

where z_{t+j} and z^*_{t+j} denote actual and target values of policy concern variable, other than inflation and output.

As it was mentioned above, the equation of the type (6) is estimated for deviations of inflation from the target π^*, of actual output from the potential y^* (output gap) as well as for gaps in the other variables of policy concern. However, it can be argued that economies in transition are going through the process of structural change and for this reason it would not be correct to talk about neither potential values of output or other indicators, nor their respective gaps (Siklos, 1996). For this reason, we estimate two versions of (6): the standard one using the gaps of the variables and another, modified, with the growth rates of inflation, output and other policy concern variables on the right hand side:

$$r_t = \rho \cdot \left\{ \bar{r} + \beta \cdot \left[\pi_{t+n} - \pi_{t+n-1} \right] + \gamma_1 \cdot \left[y_{t+k} - y_{t+k-1} \right] + \gamma_2 \cdot \left[z_{t+j} - z_{t+j-1} \right] \right\} + (1-\rho) \cdot r_{t-1} + \varepsilon_t \qquad (7)$$

To summarize, putting the models outlined in this section to an empirical trial, we will first estimate (5) and (6), after which will try the same specifications for the monetary base being an independent variable.

Before going on to empirical estimation of the monetary policy reaction function, it is crucial to mention at least two issues that affect the reliability of the results. First, the relatively short time span of the data available puts limit on our ability to observe sufficient variation in the data series. Second, while such monetary policy instruments as the required reserves rate played an important role in determining the size of the monetary base and were changed together with

the refinancing rate, the fact that these data are unavailable restricts us to concentrate on the refinancing rate as the major instrument of the monetary policy.

Keeping these caveats in mind, we proceed to the estimation of the monetary policy reaction function of the National Bank.

4.2 Data Description and Estimation Results

To estimate monetary policy reaction function of the National Bank Kazakhstan we use quarterly data from the IMF IFS, the National Bank of Kazakhstan and the National Agency of Statistics of Kazakhstan from 1994:1 to 2006:4. The quality of these data, however, is our major concern, since some time series on the same indicator had to be completed from different sources, or some indicators were calculated using data series from different sources. We recognize that some inconsistency in the data may stem from the absence of comprehensive and full database on the Kazakhstan's economy, thereby questioning the validity of the estimation results.

First, the refinancing rate is taken as dependent variable. For the standard type (5) equation the gaps of inflation, measured by the change over four quarters of the consumer price index, output, proxied by real GDP, and real effective exchange rate, rate of unemployment added as the variables of concern of the National Bank, are obtained using the Hodrick-Prescott filter (smoothing parameter λ=1600). Accordingly, to estimate (6) on the growth rates, period-over-period changes in inflation rate, real output growth, rates of change of the real effective tenge exchange rate and unemployment rate are used to explain the variation in the refinancing rate.

All the series were examined for non-stationarity via unit-root tests (Augmented Dickey-Fuller, Phillips-Perron, KPSS) and found to be stationary. Since the right hand side variables in (5) and (6) are likely to be endogenous, GMM estimation procedure is used with instruments being the lagged values of endogenous variables, nominal wages, oil prices, balance of payments, and dollar-tenge nominal exchange rate. These series are found to be non-stationary and are specified in terms of the growth rates. Nominal wages, oil prices, balance of payments and the nominal exchange rate are all believed to influence inflation, GDP growth, unemployment rate and the tenge exchange rate.

Estimation of the equation on the gap variables yields significant, but rather counterintuitive coefficients (Column 1 of Table 2). Namely, positive gaps in inflation and output are associated with lower interest rates, while positive gap in the real effective exchange rate, i.e. more expensive than the trend value of the currency, is associated with hikes in the interest rates. To check for the fact that these counterintuitive results could be driven by the implicit structural break in the data, we introduce a dummy variable corresponding to the second quarter of 1999 as the most appropriate timing of break as justified earlier. Since the dummy variable appears to be strongly significant, we proceed with estimation of (5) for the two sub-periods. However, the estimation results for the sub-periods do not improve the outcome of the model for the whole period, and therefore we try to determine whether (6) specified in terms of the growth rates provides better description of the interest-setting policy by the National Bank. Results of the estimation of (6) are presented in the column 2 of the Table 2.

Table 2. Estimation Results

Dependent Variable	RR_t	**Dependent Variable**	RR_t
Explanatory Variables		**Explanatory Variables**	
C	2.28* (16.74)	**C**	26.86* (2.68)
RR_{t-1}	0.78* (125.5)	RR_{t-1}	0.85* (173.4)
CPI_GAP_{t+4}	–13.95* (–3.65)	ΔCPI_t	38.3* (16.9)
GDP_GAP_{t+3}	–0.37* (–4.15)	G_GDP_{t+4}	23.3* (2.95)
$REER\_GAP_{t+3}$	0.16* (11.43)	G_REER_{t+2}	–27.8* (–20.5)
		G_REER_{t+3}	–8.69* (–6.7)
		G_REER_{t+4}	–12.5* (–4.61)
$\overline{R}^2$	0.92	$\overline{R}^2$	0.87

Note: GMM estimates, sample 1994:1-2006:4; t-statistics in parentheses (), * denotes significance at one percent level. Instruments are lagged predetermined variables, wages, balance of payments, oil prices. Number of observations: 42 after adjustments.

It can be inferred that the National Bank of Kazakhstan adjusted the refinancing rate in response to the contemporaneous inflation rate, the output growth rate expected one year ahead as well as changes in the real effective exchange rate of the tenge anticipated two, three and four quarters ahead. All the explanatory variables have expected signs and are significant at 1% significance level, except for the unemployment rate, which is not significant at conventional levels. **The estimated coefficients support the idea of restrictive monetary policy consistently pursued by the National Bank**. The hawkish behavior is pronounced in reaction to the rise in inflation rate, which emphasizes the determination of the National Bank to maintain

price stability, even when the latter was not its primary objective, as stipulated by the legislation. The coefficients on the changes in the rate of the real effective exchange rate of the tenge are negative and high in value, which means that the appreciation of the real effective exchange rate prompted the National Bank to lower the refinancing rate both before and after the proclaimed float, which supports its argument that "the National Bank will not let exchange rate fluctuations to exceed rational expectations". GDP growth rate expected four quarters ahead proved to make the National Bank to revise the refinancing rate upwards. The coefficient on the lagged value of the refinancing rate is very high (0.85) which implies high persistence of the refinancing rate, i.e. for a given change in the target rate, only 15% of this change is implemented in the same quarter.

The estimations of backward-looking specifications of (5) and (6) did not produce significant results, which combined with the results obtained earlier suggests that **National Bank of Kazakhstan was more concerned about contemporaneous and future, rather than past, values of its target indicators.**

It is interesting to compare our estimation results with the ones obtained by Sand (2004) for the monetary policy in Kazakhstan. The author reports failure to estimate a Taylor rule equation using different combinations of inflation rate, output gap, money growth, unemployment, foreign interest rates, after which the empirical interest rate rule, derived from Kazakhstan's monetary authorities' main targets, was estimated using the quarterly data from 1994:1 to 2001:4. The unsuccessful attempts to estimate a Taylor-type equations can, among other things, be attributed to the choice of policy response variables, such as output gap, which were found to produce counterintuitive results that are also opposite to the ones obtained when changes in the variables are used. Therefore, the evidence of Kazakhstan seems to support the idea that gaps of the main economic indicators, calculated using traditional econometric tools, do

not capture correctly the reality of the economy in transition. However, the results yielded by the estimated empirical interest rate rule are in line with our estimated modified rule of type (6), suggesting high persistence in the interest rates and hawkish reaction to the rising inflation, as well as negative relationship between interest rates and the dollar-tenge nominal exchange rate.

We further tried to estimate the reaction rule with the monetary base growth rate being the dependent variable. Specifying Taylor rule in terms of monetary base is done to account for the above mentioned fact that for many developing countries the monetary base, rather than the interest rates, represents the main policy response variable. According to the same logic as before, two versions of the policy rules are estimated, specified in terms of gaps and growth rates, respectively. The results obtained when the gaps of the variables were used proved insignificant and having the wrong signs again; however, substituting them with the growth rates only improved the signs of the coefficients, leaving the overall explanatory power of the model very poor. This suggests that **variation in monetary base was driven by factors other than variation in inflation and output, and that it was not used by the National Bank to regulate the dynamics of the main economic indicators of its policy interest.**

4.3 Estimation of Sterilization Coefficient

Given the preliminary evidence of the importance of sterilization objective in determining the monetary policy conducted by the National Bank, provided earlier in section 3, **we proceed with empirical estimation of an alternative National Bank reaction function that makes possible evaluation of sterilization coefficient**. Methodology for estimating central bank sterilization reaction function was elaborated by Cumby and Obstfeld (1983) and is based on structural system of equations for changes in domestic credits and changes in foreign assets:

$$\Delta NDA_t = \alpha_1 \cdot \Delta NFA_t + \alpha_2 \cdot X_{1t} + u_{1t} \quad (7)$$

$$\Delta NFA_t = \beta_1 \cdot \Delta NDA_t + \beta_2 \cdot X_{2t} + u_{2t}, \quad (8)$$

where ΔNDA and ΔNFA are changes in the domestic and the foreign assets on the balance sheet of the central bank and X_{it} is a vector of other explanatory variables believed to have an influence on the changes in domestic and foreign assets. In this setting, α_1 is an indicator of the degree of sterilization of net foreign assets, i.e. how much of a change in net foreign assets is compensated by changes in net domestic assets. β_1 is an offset coefficient which is irrelevant for the case of Kazakhstan, because of the capital controls, as discussed earlier. For this reason we estimate only the first of the two equations for the net domestic assets.

Given that differences of the net domestic and net foreign assets are found to be non-stationary, changes in the normalized values as suggested by Hanke (2002) and used in the previous analysis are employed to assess the sterilization coefficient. Different specifications of (7) are estimated with vector X_{it} including changes in inflation, GDP growth rate, budget deficit and unemployment rate. Following Emir et.al. (2000) two-stage least squares estimation technique is employed with instrument list including the lagged values of predetermined variables, wages and nominal exchange rate.

Results of estimation of (7) for the entire period are presented in the first column of Table 3. *NORM_NDA* and *NORM_NFA* are normalized net domestic and net foreign assets, respectively, *G_GDP* is the growth rate of real GDP. The estimate of the sterilization coefficient is -0.62 which means that 62% of the change in net foreign assets is sterilized through the change in net domestic assets. As it was mentioned earlier in the paper, large sterilization coefficient indicates greater independence of the monetary policy. The coefficient for the output growth rate

two quarters ahead is significantly positive, which can be interpreted as accommodation by the National Bank of the expected output growth through expansion of domestic credit. No relationship between budget deficit or unemployment rate and net domestic assets could be established.

Table 3. Estimation Results

Dependent Variable	$NORM\_NDA_t$	
Explanatory Variables	1994:1-2006:4	1998:2-2006:4
C	-17.56^{*} (–4.8)	0.35^{*} (9.6)
$NORM\_NFA_t$	-0.62^{*} (–2.8)	-0.69^{*} (–4.99)
G_GDP_{t+2}	17.53^{*} (4.85)	
ΔCPI_{t+3}		-14.65^{*} (–4.72)
$\overline{R}^2$	0.23	0.65

Note: TSLS estimates, t-statistics in parentheses (), * denotes significance at one percent level. Instruments are lagged predetermined variables, wages, nominal exchange rate.

To check for the presence of the structural break in the relationship between net domestic and net foreign assets after the official exchange rate regime shift to float, Chow test was carried out. The test rejected the null hypothesis of no structural break in the first quarter of 1999 (F statistic 3.67). For this reason (7) was estimated for two sub-periods, before and after the first quarter of 1999. The estimation results for the first sub-period failed to track any significant relationship between net domestic and net foreign assets, which could be attributed to less pressure coming from changes in the net foreign assets in the first years of transition.

Results of estimation of (7) for the second sub-period are presented in the column 2 of Table 3, where ΔCPI is the change in inflation rate, measured by the consumer price index. The estimation output suggests that **starting from the second quarter of 1999 the National Bank sterilized 68% of the change in the net foreign assets**. In this sub-period the National Bank was also found to act in a preemptive fashion with regard to the expected growth in inflation rate, restraining the expansion of domestic credit, which is in line with the shift of primary objective of monetary policy to ensuring price stability. The results yield significant evidence of a large-scale sterilization by the monetary authorities (for comparison, the coefficients found for currency board countries by Hanke (2002) varied between -0.44 and -0.76).

Comparison of these findings with the earlier preliminary results of sterilization coefficient estimations presented in section 3 (sterilization coefficient equal to -0.76 for the entire period, -0.92 for the 1st and -0.6 for the 2nd period) suggests that the preliminary results could be spurious and driven by the use of inappropriate statistical techniques that do not account for the endogeneity of changes in the net foreign assets.

5. Discussion

Results of the empirical analysis of the behavior demonstrated by the National Bank of Kazakhstan are summarized in Table 5. Having started with estimation of the Taylor type reaction function, specified in terms of the refinance rate being the dependent variable, and gaps of inflation, real GDP and real effective exchange rate as independent variables, we found evidence of extremely accommodative monetary policy carried out by the National Bank. Since these findings are in sharp contrast with the historical evidence of rather strict monetary policy stance of the National Bank, second trial of the model has been undertaken, now specified in terms of the growth rates of independent variables, instead of the gaps. Additional motivation for this comes from the possible irrelevance of the concept of gaps to the reality of transitional economy. The new results were found to speak in favor of the hawkish stance of the National Bank with respect to contemporaneous and future dynamics of inflation, output and real effective exchange rate of the tenge, as well as high level of persistency of the policy instrument.

Further specification of the Taylor rule with the monetary base on the right-hand side did not produce any significant results. This is somewhat surprising outcome, provided that one would expect poor financial infrastructure to make monetary authorities rely more on the monetary base to regulate the levels of economic activity. Moreover, since the monetary base was used as an intermediate target of monetary policy, it is particularly confusing to find little evidence of its correlation with major economic indicators. One of the possible explanations of this finding could be the fact, that the refinance rate was usually changed together with other policy tools, such as the required reserves rate, which directly affects the size of the monetary base, and in this way, plays a key role in managing the monetary base dynamics. Unavailability

of the data on the required reserves rate may be the suspect for a greater responsiveness of the refinance rate to the behavior of the National Bank's target indicators.

Table 5. Summary of Empirical Findings

Hypothesis		**Result**
Policy Instrument	**Policy Interest Variables**	
Refinance Rate	Gaps of Inflation, GDP, REER	Counterintuitive Outcome
Refinance Rate	Growth Rates of Inflation, GDP, REER	Forward-looking Taylor Type Monetary Policy Reaction Function
Monetary Base	Gaps of Inflation, GDP, REER	Poor Explanatory Power of the Taylor Type Model
Monetary Base	Growth Rates of Inflation, GDP, REER	
Net Domestic Assets	Net Foreign Assets, Inflation, GDP	Monetary Policy Sterilization coefficient

Given the evidence on the National Bank's involvement in sterilization policies, sterilization coefficient of the monetary policy was estimated, with the methodology linking the changes in net domestic assets to the changes in net foreign assets. The structural break was found in the relationship covering the whole period of observation, coinciding with the official adoption of the floating exchange rate of the tenge. We have failed to detect any evidence on the importance of sterilization policies in the sub-period preceding the shift to float, while substantial degree of sterilization was found in the second sub-period.

Combining the estimation results provided by both types of the policy rules, one can make an inference about primary importance of inflation, real output and real effective exchange rate objectives for the National Bank, with the sterilization policy gaining increasing importance since the end of the last decade due to mounting pressures on the foreign exchange market. The findings also confirm rather strict monetary stance consistently displayed by the National Bank, as attested by the high coefficients on the target variables, while high enough sterilization coefficient can be considered manifestation of the National Bank's independence.

6. Conclusion

In this paper we have made an attempt to find support for a rule-like behavior by the National Bank of Kazakhstan. Based on the information available about the conduct of the monetary policy by the National Bank, incorporated in the legislation and drawn from the statements and comments made by the officials, we have defined Taylor type monetary policy reaction function for the National Bank. Theoretical justification of this lies with the fact that Taylor rule proved to capture best operation of the monetary policy framework designed to pursue inflation targets. Despite the official goal of the monetary policy prior to 2003 was defined as maintenance of the currency stability, it is reasonable to suggest that inflation was the primary concern of the National Bank, because triple- and double-digit inflation rates, accompanying the first years of transition, were incompatible with economic stability in general, and currency stability in particular. To account for the National Bank's currency stability objective, the real effective exchange rate of the tenge has been added to the specification of the Taylor rule.

The refinance rate proved to be the main instrument of the monetary policy of the National Bank, the behavior of which was found to be convincingly forward-looking and rather hawkish with respect to inflation, economic activity and currency targets. Apart from this, sterilization was found to be an important component of the monetary policy, confirming the decisive stance of the National Bank with respect to the currency stability objective.

While admitting that the decision –making process of the National Bank is much more complex and takes into account much broader spectrum of information, particularly in the economy going through the process of structural changes, we believe that the estimated reaction functions, though subject to the data limitations discussed in the text, are able to provide general

picture of the National Bank's behavior, including likely directions and magnitudes of its reactions.

This paper contributes to the body of knowledge about monetary policy conduct in transitional economies and provides perspectives for future analysis of this interesting phenomenon. Given that the National Bank of Kazakhstan has moved to inflation targeting regime since 2007, it would be particularly insightful to compare the monetary policy reactions and outcomes prior to and after this benchmark date.

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Data Appendix

Date	Refinance Rate	Consumer Price Index	REER Index	GDP (Nominal)	Monetary Base	Unemployment Rate
Q1 1994	270.000	4.835	n.a	21.321	23814	9.2
Q2 1994	300.000	10.765	n.a	61.207	13112	7.2
Q3 1994	280.000	20.728	n.a	147.301	22013	6.8
Q4 1994	230.000	31.163	n.a	193.640	31909	8.1
Q1 1995	150.000	40.040	95.3	190.065	33639	11.3
Q2 1995	75.000	44.734	90.7	221.892	45566	12.1
Q3 1995	45.000	48.191	89.1	296.373	52573	11.5
Q4 1995	52.500	53.422	87.4	305.860	63955	13
Q1 1996	44.000	59.048	90.3	288.036	61673	11.4
Q2 1996	36.000	63.356	93.7	315.758	66760	8.9
Q3 1996	32.000	66.537	97.5	402.587	66844	8.6
Q4 1996	35.000	70.476	98.9	409.368	81906	8.6
Q1 1997	35.000	73.897	98.9	349.238	78191	9.2
Q2 1997	24.000	75.728	100.9	377.382	87478	8.3
Q3 1997	19.500	76.597	101.9	490.925	96987	7.5
Q4 1997	18.500	78.354	104.2	454.596	115389	7.3
Q1 1998	18.500	81.553	108.7	399.478	91995	7
Q2 1998	18.500	82.589	109.0	426.203	91614	7
Q3 1998	18.500	81.498	115.9	480.147	82059	6.7
Q4 1998	25.000	80.703	131.0	427.436	81427	6.6
Q1 1999	25.000	81.369	133.6	399.703	65204	n.a
Q2 1999	25.000	87.120	102.5	451.745	74683	n.a
Q3 1999	20.000	91.225	95.6	607.133	84787	n.a
Q4 1999	18.000	93.703	94.2	557.875	126749	n.a
Q1 2000	16.000	97.772	100.4	523.827	101583	13.7
Q2 2000	14.000	98.826	100.0	590.832	119107	13
Q3 2000	14.000	100.176	99.4	778.777	135418	12.4
Q4 2000	14.000	103.227	100.9	706.466	134416	12.2
Q1 2001	12.500	106.426	99.0	634.620	130765	12.7
Q2 2001	12.000	108.276	101.1	798.324	142827	9.8
Q3 2001	11.000	108.423	99.2	975.151	157996	9.2
Q4 2001	9.000	110.291	98.8	842.498	174959	10.2
Q1 2002	8.000	112.344	97.9	745.846	154932	10.8
Q2 2002	8.000	114.027	95.6	925.876	174258	9.0
Q3 2002	8.000	115.210	92.6	1094.500	183732	8.3
Q4 2002	7.500	117.134	91.9	1010.060	208171	9.3
Q1 2003	7.500	120.259	90.0	933.357	205995	9.7
Q2 2003	7.500	121.202	88.4	1107.410	254077	8.6
Q3 2003	7.000	121.572	90.1	1230.530	294449	8.2
Q4 2003	7.000	125.215	89.2	1340.680	316962	8.7
Q1 2004	7.000	128.007	90.5	1270.740	325590	8.9
Q2 2004	7.000	129.265	93.7	1380.820	388535	8.3
Q3 2004	7.000	130.541	93.7	1646.300	404209	8.0
Q4 2004	7.000	134.036	95.2	1572.270	577841	8.4

Q1 2005	7.500	136.921	95.1	1650.150	546087	8.5
Q2 2005	7.500	139.214	95.9	1783.710	550629	8.0
Q3 2005	8.000	141.045	95.9	2042.070	642333	7.8
Q4 2005	8.000	144.226	99.6	1981.130	663005	8.1
Q1 2006	8.000	148.479	101.9	2040.950	1040392	8.2
Q2 2006	8.500	151.715	106.7	2363.810	1058984	7.7
Q3 2006	9.000	153.232	106.5	2648.600	1196181	7.5
Q4 2006	9.000	156.227	102.2	n.a.	1501499	7.7

Notes:
1) Consumer Price Index: Average 2000=100;

2) REER Index: Real Effective Exchange Rate Index, 2000=100. Trade-weighted, 24 currencies;

3) Monetary Base: Millions of tenge;

4) Unemployment Rate: Unofficial Unemployment Rate;

Date	Index of Physical Volume	Net Foreign Assets	Domestic Credit	Total Reserves	Crude Oil Price
Q1 1994	96.9	13345	54824	629.540	13.870
Q2 1994	96.7	-817	88151	585.745	16.270
Q3 1994	94.8	-5477	104507	799.760	17.050
Q4 1994	93.2	-533	123338	837.525	16.603
Q1 1995	93.6	404	138252	967.474	17.223
Q2 1995	91.2	19970	140173	1135.020	18.177
Q3 1995	90.7	42242	121761	1261.970	16.440
Q4 1995	91.8	76568	96834	1135.520	16.977
Q1 1996	102.2	82144	96325	1229.360	18.313
Q2 1996	101.4	90790	84512	1248.490	19.487
Q3 1996	100.7	87819	99142	1165.590	20.630
Q4 1996	100.5	97876	111908	1294.060	23.063
Q1 1997	99.1	148503	60062	1211.070	21.083
Q2 1997	100.4	161930	46791	1396.540	18.490
Q3 1997	102.7	180833	54967	1529.600	18.657
Q4 1997	101.7	135572	108737	1697.120	18.840
Q1 1998	108.6	115078	112199	1414.490	14.163
Q2 1998	107.2	100208	130017	1453.140	13.280
Q3 1998	100.4	86098.4	142608	1176.180	13.003
Q4 1998	97.8	104455	150721	1461.230	11.850
Q1 1999	93	87521.3	139517	1117.710	11.643
Q2 1999	94.7	155855	179099	1012.580	16.030
Q3 1999	98.9	198042	201308	1135.400	20.443
Q4 1999	103.4	257392	204074	1479.230	23.807
Q1 2000	106.1	250711	208112	1375.220	26.617
Q2 2000	109.4	311784	211774	1386.790	26.767
Q3 2000	110.9	336382	230327	1685.300	29.883
Q4 2000	110	303217	321036	1594.120	29.670
Q1 2001	111.4	452310	197229	1978.150	26.070
Q2 2001	112.4	468541	246285	1800.530	26.727
Q3 2001	113.2	527871	278004	1920.590	25.213
Q4 2001	113.6	501460	378684	1997.210	19.313
Q1 2002	110.7	532499	361437	2094.870	20.923
Q2 2002	108.9	615039	385975	2280.630	25.203
Q3 2002	109	671417	445001	2571.270	26.937
Q4 2002	109.7	714938	492993	2555.290	26.737
Q1 2003	111.3	793441	464187	3355.370	31.337
Q2 2003	111.1	891435	493684	3704.320	26.487
Q3 2003	110.2	947477	615041	4269.730	28.383
Q4 2003	109	896504	681017	4236.200	29.360
Q1 2004	109.1	934341	747075	4944.470	32.130
Q2 2004	109	957475	882177	5934.190	35.627
Q3 2004	108.7	940059	1061040	6082.000	40.553
Q4 2004	109.4	1192030	1233300	8473.100	42.730
Q1 2005	108.8	1413910	1107900	8478.160	46.127
Q2 2005	108.7	1284490	1379970	7189.980	50.780

Q3 2005	108.9	1383050	1548720	7407.600	59.963
Q4 2005	109.9	1199520	1878160	6084.200	56.547
Q1 2006	107.2	1473790	1935990	9902.490	61.000
Q2 2006	109.2	1495840	2277020	11929.400	68.300
Q3 2006	110.4	1590870	2734910	12315.100	68.763
Q4 2006	110.6	2300250	3381800	17736.700	59.027

Notes:
5) Index of Physical Volume: data is provided in a year-on-year changes of year-to-date figures' format;

6) Net Foreign Assets: Net foreign assets from banking survey, Millions of tenge;

7) Domestic Credit: Millions of tenge;

8) Crude Oil Price: Average crude oil prices (USD per barrel);

Date	Budget Deficit (-) / Surplus	Total Reserves Minus Gold	USD/KZT	Gold
Q1 1994	-5538.000	629.540	11.687	227.310
Q2 1994	-14084.000	585.745	33.653	270.470
Q3 1994	-6089.000	799.760	45.797	318.070
Q4 1994	-4671.000	837.525	51.017	377.980
Q1 1995	2440.000	967.474	58.197	419.030
Q2 1995	-6086.000	1135.020	62.920	454.600
Q3 1995	-3727.000	1261.970	59.740	441.620
Q4 1995	-17808.000	1135.520	62.943	524.310
Q1 1996	-1657.400	1229.360	64.907	570.782
Q2 1996	-6746.000	1248.490	66.247	584.615
Q3 1996	-10776.000	1165.590	67.500	608.441
Q4 1996	-40385.000	1294.060	70.560	666.550
Q1 1997	5038.000	1211.070	75.257	631.031
Q2 1997	-12766.000	1396.540	75.400	603.480
Q3 1997	-10732.000	1529.600	75.543	594.523
Q4 1997	-45538.000	1697.120	75.550	523.860
Q1 1998	527.000	1414.490	76.310	543.844
Q2 1998	-23941.000	1453.140	76.610	536.745
Q3 1998	-25719.000	1176.180	78.133	498.551
Q4 1998	-22940.000	1461.230	82.160	503.608
Q1 1999	13639.000	1117.710	85.443	477.251
Q2 1999	-11856.000	1012.580	119.960	472.749
Q3 1999	-10442.000	1135.400	133.120	505.824
Q4 1999	-61171.000	1479.230	139.570	522.777
Q1 2000	15232.000	1375.220	140.013	497.073
Q2 2000	4262.000	1386.790	142.323	524.158
Q3 2000	23184.000	1685.300	142.693	504.345
Q4 2000	-45957.000	1594.120	143.503	501.541
Q1 2001	83124.000	1978.150	145.247	476.017
Q2 2001	-35621.000	1800.530	145.957	497.587
Q3 2001	-9115.000	1920.590	147.090	536.838
Q4 2001	-51386.000	1997.210	148.650	510.695
Q1 2002	28529.000	2094.870	151.673	533.580
Q2 2002	-12264.000	2280.630	152.847	555.670
Q3 2002	17648.000	2571.270	154.003	561.740
Q4 2002	-46917.000	2555.290	154.593	585.555
Q1 2003	69273.000	3355.370	153.687	567.969
Q2 2003	-25294.000	3704.320	150.727	789.824
Q3 2003	-44850.000	4269.730	147.200	659.903
Q4 2003	-45311.000	4236.200	146.690	725.916
Q1 2004	24243.300	4944.470	139.797	743.899
Q2 2004	11012.600	5934.190	137.233	701.210
Q3 2004	-54402.300	6082.000	135.713	745.898
Q4 2004	449.503	8473.100	131.397	803.562
Q1 2005	49445.900	8478.160	130.257	793.938
Q2 2005	44808.100	7189.980	132.163	820.759

Q3 2005	50303.300	7407.600	135.163	901.393
Q4 2005	-97895.100	6084.200	133.937	985.512
Q1 2006	75008.400	9902.490	131.094	1180.860
Q2 2006	-8978.670	11929.400	123.107	1154.360
Q3 2006	-42136.500	12315.100	122.320	1157.200
Q4 2006	57726.800	17736.700	127.837	1376.240

Notes:
9) Budget Deficit/Surplus: Millions of tenge;

10) Total Reserves Minus Gold: Millions of USD;

11) Gold: Millions of USD, National valuation;

12) USD/KZT: Nominal Exchange Rate of the tenge.