Boris Brodsky

Dollarization and Monetary Policy in Russia

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Abstract

This study assesses the causes of dollarization in Russia. Dollarization is defined here as the use of foreign currency both as a medium of exchange and store of value.

According to different estimates, the current degree of dollarization of the Russian economy is 40–50 per cent. Inquiry into sources and mechanisms of dollarization in Russia reveals the main factors influencing its evolution – dynamics of inflation and the dollar exchange rate, as well as the uncertainty level of money and credit policy.

The model of dollarization assessing the influence of key parameters of macroeconomic policy – inflation, exchange and interest rates – on dynamics of dollarization is created in the paper. Main conclusions and relationships of the model are tested on Russian data. Implications of obtained results for macroeconomic policy in Russia are discussed.

Keywords: dollarization, monetary policy, models, Russia

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1 Introduction

The phenomenon of dollarization in transition economies has attracted serious interest among researchers during the last five years (Calvo & Vegh 1992, Giovannini & Turtelboom 1992, Sahay & Vegh 1995 and Korhonen 1996). According to Calvo & Vegh, dollarization is the extensive use of foreign currency as both a medium of exchange and store of value.

These studies bear witness to the relation between dollarization and the high and volatile inflation that often marks transition economies. Dollarization precludes control over the money stock and seriously hinders attempts to slow inflation. At the same time, high inflation is by no means the only factor influencing the dollarization process in transition economies. Other factors include the dynamics of exchange rates and interest rates; institutional dynamics connected with priority development of certain sectors of the economy; as well as economic and political risks that influence the preferences of the populace.

Successful anti-inflation monetary policy in Russia resulted in a decline in inflation to 20–25 per cent in 1996. The proposed lowering of interest rates in 1997 from 60 per cent to 25–30 per cent is also aimed at stimulating the real economy and creating the preconditions for long-run economic growth. However, dollarization in Russia, which became very widespread in 1995–1996, is one of the main factors precluding economic growth. According to my private observations, there is double accounting in most Russian firms:

official accounting – in roubles – and unofficial or 'internal' accounting – in foreign currency. Neo-Keynesian macroeconomic theories imply that any expansion of the money supply causes growth in real GDP in the short run. However, for transition economies with high levels of dollarization, this does not hold: all government attempts at monetary and credit stimulation of real business activity turn out to be wasted, since the major part of the new money is converted into foreign currency and circulated in the financial markets, bypassing the real economy.

Therefore, in analysing prospects for long-run economic growth in transition economies, it is essential to study the relationship between dollarization and the main parameters of credit and monetary and foreign exchange policies, as well as the influence of institutional factors on the dynamics of the dollarization process. This study assesses the factors influencing the dollarization of the Russian economy in 1992–1997 and their dependence on the monetary policy of the government and Central Bank of Russia (CBR). We also analyse the strategies of the economic transition in Russia, taking into account the dollarization process.

2   A short history of Russian monetary and credit policy and estimates of the level of dollarization

There is a complete lack of research work on dollarization in Russia. This is due to the difficulty of obtaining access to reliable information, as well as to the multidimensional character of Russian dollarization. However, the influence of dollarization on the Russian economy in 1992–1996 was very negative, perhaps even catastrophic – something like the 'snow-ball' effect of 1993–1994, when the Russian foreign exchange market confiscated enormous amounts of financial resources from the real economy thus fostering rapid money supply growth, which led to high inflation and rouble depreciation against the dollar. In 1994 the CBR declared that 'the existing mechanism of industrial capital transfers into foreign currency savings and speculative activities seriously hinders the restructuring of the Russian

economy, precludes industrial stabilization and presents in itself a serious threat to Russian reforms'.

The 'speculative trap' mechanism of the Russian economy in 1992–1994 can be characterized as follows. The aggressively expansionist credit policy of the central bank in 1992–1993 was motivated by expectations of a Russian economic miracle. The elimination of ideological and institutional barriers to technological development and economic growth unleashed private initiative. This led to an explosion in the money supply, hyperinflation, and persistent attempts by commercial banks and individuals to prevent devaluation of financial assets. Dollarization soon became one of the main defenses against high inflation.

In 1992 Russian commercial banks received huge amounts of credit from the CBR, which they used in an assault on the foreign exchange market. The demand for foreign currency increased sharply, and the rouble began to spiral downward in July 1992. In August it dropped by 18 per cent, in September 33 per cent, in October 57 per cent and in November 21 per cent. Russian enterprises soon became aware of the advantages of speculation. Huge volumes of credit and unpaid taxes were converted into foreign currency and later converted back into greater amounts of depreciated roubles. This simple 'currency turnover' operation enabled Russian commercial banks and enterprises to produce huge profits out of thin air.

In fact however, this was a form of destruction of the real economy of Russia. The Russian government was then faced with the problem of an enormous budget deficit connected with the chain effects of interenterprise and credit arrears. The share of the budget deficit that was covered by new credit from the CRB increased to 14–15 per cent of GDP in June–July 1992 and to 24 per cent in August 1992. Credit grants to commercial banks reached 15 per cent of GDP in July 1992 and 31 per cent in August 1992. The related exponential growth of the money stock produced hyperinflation in Russia: between October 1992 and February 1993 average monthly inflation rates increased to 25 per cent. For 1992 as a whole, the rise in prices amounted to 2610 per cent.

The attempt made by B. Fedorov (together with E. Gaidar from September 1993) to achieve financial stabilization in March 1993-January 1994 led to a lowering of M2 monthly growth rates from

15 per cent to 9.5 per cent. Inflation rates began to drop in March 1994 and soon reached the first minimum for the reform years: 4.6 per cent per month. However, the new-issue financing of the budget deficit continued and soon led to the growth of CBR assets to 13.8 per cent of GDP. The beginning of October 1994 brought panic to the foreign exchange market, which culminated with 'Black Tuesday', 11 October 1994: on that day the rouble exchange rate plunged by 27 per cent. Two days later the exchange rate returned to its previous level but the total rouble depreciation for October was 25 percent. October 1994-January 1995 saw a new wave of inflation: the inflation rate rose to15–18 per cent. A new phase of monetary asset dollarization began.

In these circumstances the government and CBR undertook urgent measures to stabilize monetary and credit policy. The end of new-issue financing of the budget deficit enabled a slowing of monthly growth rates for M2 (to 3–4 per cent) and inflation (from 11 per cent in February to 5.4 per cent in July 1995). The introduction of a rouble corridor in July 1995 further dampened the inflationary expectations of economic agents. The policy of strengthening the real external value of the rouble announced by the CBR was fairly successful: from March to June 1995 there was a clear de-dollarization of savings in Russia. However, from June 1995 dollarization increased again. This was caused mainly by the instability of CBR monetary policy: on the eve of the onset of the rouble corridor, unofficial information and rumours about the introduction of a fixed RUR/USD exchange rate at a higher level created agiotage demand for foreign currency. This is a typical pattern for the savings behaviour of the Russian public: any instability in monetary and price policy creates a substantial rise in foreign currency savings. Even after the introduction of the rouble corridor numerous publications concerning the rapid erosion of the Russian export sector and the necessity of raising the lower boundary of the RUR/USD corridor stimulated strong demand for foreign currency in Russia, which persisted util the end of 1995 and declined slightly only in December 1995.

The downward trend of inflation in Russia continued in 1996. In August 1996 the rate of inflation actually reached zero. Nonetheless, the dollarization of the Russian economy continued at a high rate, apparently contradicting the findings of Calvo & Vegh (1992) and Giovannini & Turtelboom (1992). High rouble interest rates in 1996 were also aimed at increasing rouble-denominated savings. But the expected flow of domestic savings into rouble deposits did not occur in 1996. This suggests the importance of other factors in the Russian dollarization process.

Estimates of the degree of dollarization of the Russian economy, which have appeared in 1995–1996, are generaly based on rather unreliable information. For example, at the end of January 1996 the CBR estimated that there was about USD 20 billion worth of foreign cash in circulation in Russia, most of it in the form of old USD 100 bills (Daily Telegraph, 27 January 1996). The total volume of foreign currency deposits in Russian commercial banks in that period was about RUR 49784.6 billion (CBR 1996, Bulletin of Banking Statistics, 7(38)), which amounted to about USD 10.5 billion at the exchange rate of 30 January 1996, 4730 RUR/USD. Thus the total sum of foreign currency in the Russian economy in that period amounted to about USD 30.5 billion; total Russian M2 at the end of January was approximately USD 50 billion. Therefore, the degree of dollarization of the Russian economy at the beginning of 1996 was about 37.9 per cent. We can compare this figure with information from alternative sources.

Ivanov & Elakhovsky (1995) present the following data on the dynamics of foreign currency savings in Russia: The process of savings accumulation resumed in 1993, mainly in the form of foreign cash holdings. For 1993 the volume of foreign cash savings amounted to about USD 7.5 billion, and in 1994 the Russian public saved almost three times that much in the form of foreign cash, ie about USD 24 billion. Thus by the beginning of 1995 the volume of foreign currency savings of the public amounted to about USD 31.5 billion. In order to estimate the dynamics of the public's demand for foreign cash holdings in 1995, one can use the official information of the CBR (CBR 1996, Vestnik Banka Rossii, 42(134)). Table 1 represents the dynamics of net sales of foreign currency to physical persons (residents and nonresidents) in 1995–1996.

By the end of January 1996 physical persons purchased about USD 16 billion worth of foreign currency and the stock of foreign currency savings

Table 1   **Net sales of foreign currency to physical persons in 1995–1996**

Mth	95:1	95:2	95:3	95:4	95:5	95:6	95:7	95:8
Bill. USD	1.6	0.75	1.1	0.5	0.25	0.6	1.4	1.55
Mth	95:9	95:10	95:11	95:12	96:1	96:2	96:3	96:4
Bill. USD	1.5	1.4	1.6	2.1	1.55	1.65	2.4	2.7

Figure 1   **Monthly dynamics of rates of inflation and exchange rate RUR/USD**

pi=_____   ei=.......................
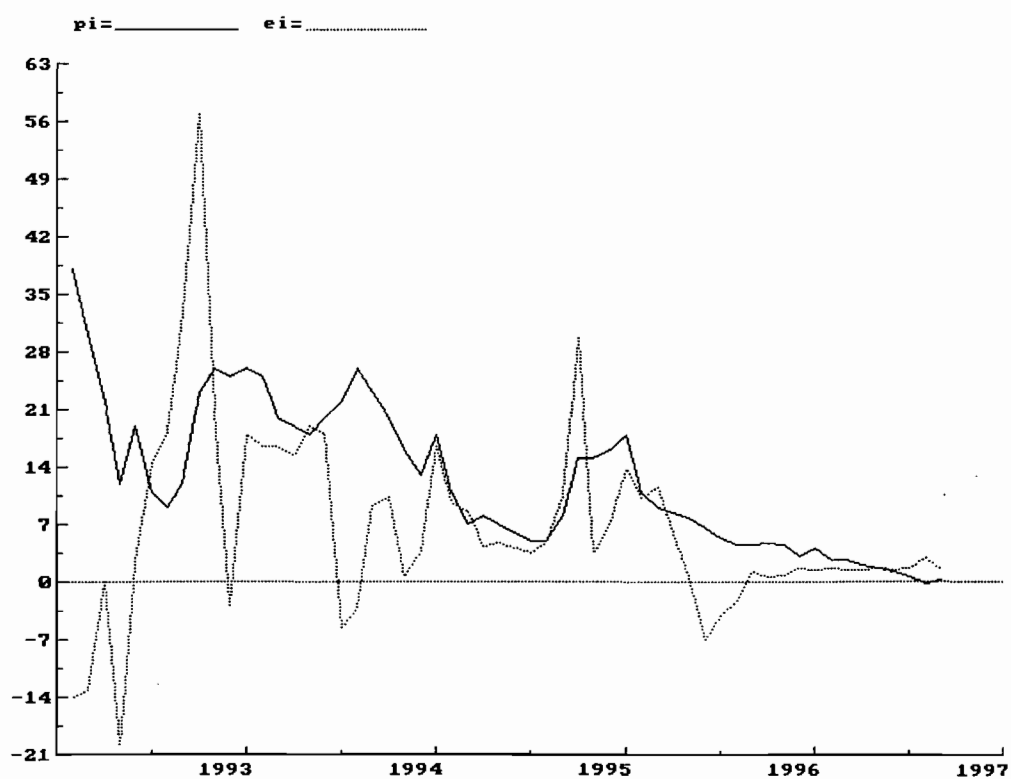
Figure 2   **Dynamics of net volumes of deliveries and sales of foreign currency (bn USD)**
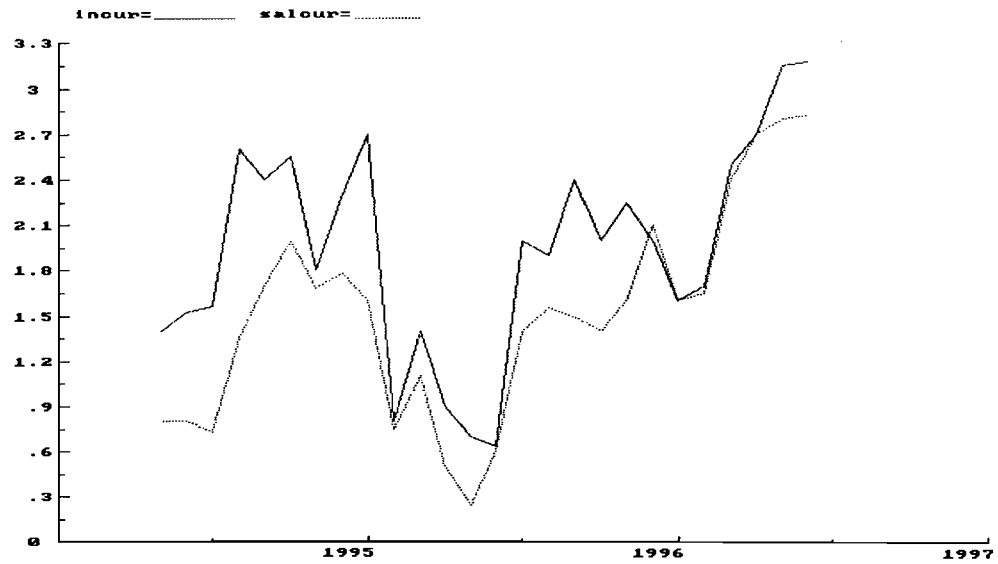
Figure 3   **Dynamics of GKO and interbank interest in 1994–1996**
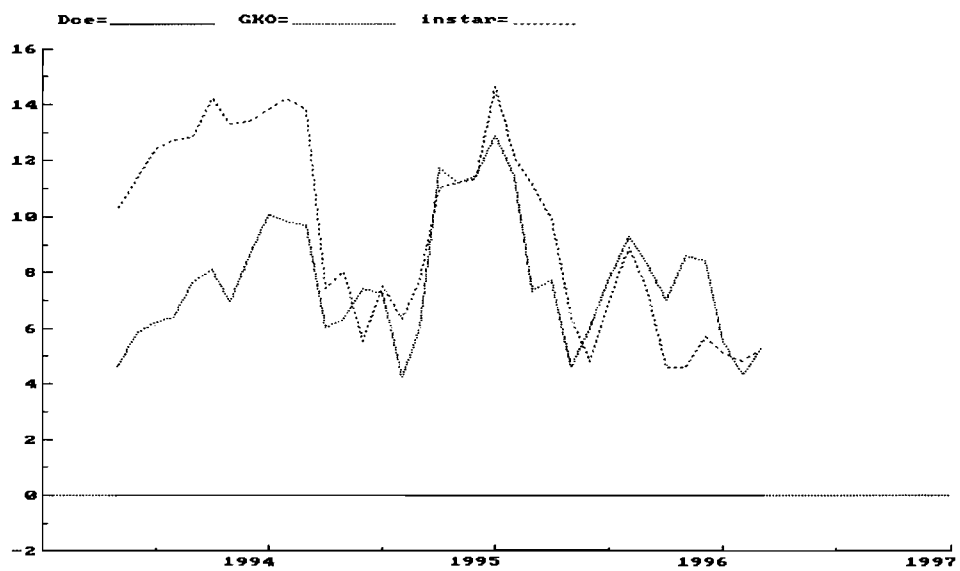
in cash form amounted to USD 47.5 billion. Taking into account currency deposits in commercial banks, the volume of foreign currency in Russia totalled about USD 58 billion at the end of January 1996. From this figure we should subtract the volume of "capital flights", which amounted approximately to 15 bn USD by the end of 1995 (30 bn USD fled Russia by the end of 1994 and about 15 bn of "hot" dollars returned to Russia in 1995) and the accumulated volume of non-registered "shuttle trade" and foreign tourism expenditure – about 15 bn USD by the end of 1995. Thus the degree of dollarization of the Russian economy was about 35.8 per cent at the beginning of 1996.

In the remaining months of 1996 physical persons purchased more than 40 bn USD and spent about 20 bn USD for "shuttle trade", foreign tourism and non-legal currency operations (see Otto Latsis, Izvestia, Dec. 1996). So the increase of foreign currency savings in cash in 1996 was no less than 20 bn USD and the total end-year stock of foreign currency savings in cash amounted to USD 48 billion. Taking into account foreign currency deposits in commercial banks – about 15 bn USD at the end of 1996, and the volume of the aggregate M2 – about 59 bn USD in December 1996, we conclude that the degree of dollarisation of the Russian economy was about 51 per cent at the end of 1996.

According to our research on dollarization in Russia in 1994–1996, the main quantitative parameter that influences the degree of dollarization is represented by the difference between the rate of change of the RUR/USD exchange rate and the inflation rate. Fig.1 shows the monthly inflation dynamics, ie $\pi = p/p(-1) - 1$, and the change in the RUR/USD exchange rate, $\epsilon = e/e(-1) - 1$, in Russia in 1992–1996. All the characteristic periods of Russian monetary and credit and foreign exchange policy can be clearly seen from this figure:

1) 1992:1–1992:4: the beginning of economic reform in Russia; π substantionally exceeds ϵ;

2) 1992:4–1992:12: expansionist monetary and credit policy of the CBR; formation of inflationary expectations and speculative activity; rates of growth of the dollar's exchange value substantionally exceed inflation rates;

3) 1993:3–1993:11: the first attempt at financial stabilization in Russia; π exceeds ϵ;

4) 993:12–1994:12: return to new-issue financing of the budget deficit; Black Tuesday, 10 October 1994; ϵ almost equals or is even greater than π;

5) 1995:1–1995:6: transition to tight monetary and credit policy; declining π exceeds ϵ;

6) 1995:7–1996:5: introduction of rouble corridor in Russia; slowly rising ϵ steadily approaches declining π;

7) 1996:6–1996:12: sloped rouble corridor; rising ϵ exceeds declining π.

The influence of the difference $(\epsilon - \pi)$ on the dynamics of dollarization processes can be estimated on the basis of data on monthly net volumes of deliveries and sales of foreign currency to physical persons (residents and non-residents) in 1994–1996 published by the CBR (Vestnik Banka Rossii, N42(134) 1996). Figure 2 shows that all the characteristic periods in the dynamics of net volumes of foreign currency flows into Russia and net volumes of sales of foreign currency to physical persons almost precisely correspond to the above-mentioned periods of monetary and credit and currency policy in Russia:

1) sharp increase in the degree of dollarization of the Russian economy;

2) declining volumes of net flows of foreign currency into Russia and net sales of foreign currency to the Russian public; the beginning of de-dollarization of the Russian economy;

3) new rise in the degree of dollarization of the Russian economy;

4) sharp growth in volumes of net deliveries and net sales of foreign currency; growth of dollarization of the Russian economy.

Besides the difference $(\epsilon - \pi)$, the dynamics of Russian dollarization are influenced by the main parameters of the Treasury bill (GKO, OFZ) and interbank credit markets, ie the GKO average

secondary market yield and interbank lending rate. The dynamics of these interest rates in 1993–1996 are presented in Figure 3. It can be seen that throughout 1995 a gradual lowering of GKO–OFZ and interbank lending rates was observed in Russia, which has influenced the corresponding increase of the demand for currency.

In general, we can conclude that the degree of dollarization of the Russian economy is greatly influenced by monetary and credit and exchange rate policy of the government and CBR. The difference between rates of change in the exchange rate and the price level is the main quantitative parameter influencing the degree of dollarization. The situation regarding the Treasury bill and interbank credit markets, determined by the GKO and interbank interest rates, is also of paramount importance for estimating the degree of - dollarization in Russia.

3   Mechanisms and models of Russian dollarization

Consider the main mechanism of the influence of the difference $\epsilon - \pi$ on the dynamics of financial asset dollarization by economic agents. Let W be the sum of the real financial assets of an economic agent, which he distributes between roubles and foreign currency. The problem of optimization in this situation is to choose an optimal ratio between rouble and foreign currency assets. Let k be the share of rouble assets and $(1-k)$ the share of foreign currency assets. The dynamics of inflation and the exchange rate (RUR/USD) are described by the following equations:

$$\frac{p_{t+1}}{p_t} = 1 + \pi, \quad \frac{e_{t+1}}{e_t} = 1 + \epsilon$$

where t and $t+1$ are sequential time intervals.

Then, on condition of invesment of foreign currency amounting to the share $(1-k)$ of all assets at period t and the subsequent conversion into roubles at $t+1$, we obtain the sum of real assets of an economic agent at $t+1$:

$$W_{t+1} = \frac{Wp_t}{p_{t+1}} k + \frac{Wp_t}{p_{t+1}} \frac{e_{t+1}}{e_t} (1-k)$$

The problem of portfolio optimization is formulated as follows (perfect foresight is assumed):

$$W_{t+1} \rightarrow \max_{k_{min} \leq k \leq 1}$$

where $k_{min} > 0$ is the low liquidity limit in rouble assets.

Suppose $\pi > 0$ (in most of transition economies inflation rates are positive). Then the optimal choice of k is as follows:

$$k^* = \begin{matrix} k_{min}, if \ \epsilon > 0 \\ 1, \ if \ \epsilon \leq 0 \end{matrix}$$

and, on condition that $\epsilon > 0$, the amount of foreign currency in the financial assets portfolio of an economic agent is equal to:

$$C = (1 - k_{min}) W[1 + (\epsilon - \pi)],$$

ie it is proportional to the difference $(\epsilon - \pi)$.

The perfect foresight assumption can be weakened to the rational expectations hypothesis, which leads to the criterion $E W_{t+1} \rightarrow \max_{k_{min} \leq k \leq 1}$, where E denotes the mathematical expectation of the random variable W_{t+1}. Since π and ϵ are also random variables with the expectations $E\pi$, $E\epsilon$ and dispersions $D\pi$, $D\epsilon$ correspondingly, we obtain the following expected value of real foreign currency assets of an economic agent:

$$EC = (1 - k_{min}) W[1 + E(\epsilon - \pi)].$$

At this point we can take into account **the effect of uncertainty on dollarization** dynamics.

In periods of unstable monetary policy the degree of uncertainty about future values of inflation rises significantly, ie $D\pi \uparrow$. However, the

difference $\Delta = \epsilon - \pi$ is characterized by a much smaller degree of uncertainty, since money authorities are supposed to abide with general agreements on the real exchange rate dynamics. So $D\Delta \ll D\pi$ and the degree of uncertainty of the real assets of an economic agent equals to:

$$D W_{t+1} \cong W^2 k^2 D\pi + W^2(1-k)^2 D\Delta$$

Therefore, in order to minimize the degree of uncertainty

$$D W_{t+1} \rightarrow \min_{k_{min} \le k \le 1}$$

in periods of unstable monetary policy, an economic agent should choose the following optimal value of $k^* = k_{min}$ ie again minimize the share of rouble assets in his portfolio.

This mechanism of the influence of the difference $(\epsilon - \pi)$ on the degree of dollarization is only a first approximation to reality and does not account for many factors, such as interest rates, transaction costs, etc. At the same time, this simple analysis takes directly into consideration the rate of inflation, π, and is thus different from other dollarization models (eg Vegh 1989). In these models it is often assumed that the price dynamics are represented by the Brownian stochastic law and therefore the rate of inflation does not enter explicitly into the equations for the degree of dollarization.

Korhonen (1996) notes that '*ceteris paribus*, the degree of dollarization responds negatively to an increase in the domestic interest rate'. In the previous section, we saw that this thesis is empirically confirmed by Russian statistics on dollarization. In order to provide a theoretical assessment of this fact and to include major transaction costs in our analysis, we shall consider a model of the dollarization process.

In this model, based on the Baumol–Tobin theory of the demand for money, it is supposed that individuals can hold three financial assets: domestic currency (cash), foreign currency, and interest-bearing assets (bonds, shares, etc). Cash is used for current consumption and foreign currency for savings and large transactions.

Suppose that the annual volume of consumption is equal to C; the annual rate of inflation π; the annual change in the dollar exchange rate ϵ; and the annual interest rate i. An agent chooses T from the interval $0 < T < 1$, for conversion of foreign currency savings and interest-bearing assets into domestic currency (cash). Assume that an agent's transaction costs are equal to γ per transaction and the share of currency in the total of converted assets is k, $0 < k < 1$.

Then, for sequential moments of transactions

$$0, 1, ..., \frac{1}{T},$$

the annual transaction cost of an agent is equal to:

$$\frac{\gamma}{p_0} + \frac{\gamma}{p_1} + ... + \frac{\gamma}{p_{\frac{1}{T}}} \quad , \quad p_0 = p$$

The forgone yield on currency for one transaction is equal to:

$$kCT(\frac{p_t}{e_t} \frac{e_{t+1}}{p_{t+1}} - 1) \approx CT^2 k(\epsilon - \pi)$$

and the forgone interest for one transaction is equal to:

$$(1-k)CT \frac{iT}{1 + \pi T}.$$

Thus, the total annual cost of an agent can be written as:

$$\frac{ \cdot + \pi T}{\pi T} + CTk(\epsilon - \pi) + CT(1-k) \frac{i}{1 + \pi T} = L($$

The problem of an optimal choice is to minimize the annual cost:

$$L(T, k) \rightarrow \min_{\substack{0 < T < 1 \\ 0 < k < 1}}$$

By solving this problem, we find that the volume

of converted assets (foreign currency and interest-bearing assets) is proportional to the factor $i/(\epsilon - \pi)$. Therefore, the degree of dollarization of financial assets of an agent increases as the factor $(\epsilon - \pi)$ increases and decreases as the interest rate i increases.

However, it can be seen from this model that the factor $(\epsilon - \pi)$ is the most important factor in determining the degree of dollarization and that the interest rate exerts much less influence on the dollarization process.

In the sequel, we analyze a statistical hypothesis on the dependence of the dollarization process in Russia on the factor $(\epsilon - \pi)$ and the interest rate.

4   Description of the data

The data used for statistical testing were collected from publications of the CBR and the State Statistics Committee of Russia. Official data was used in estimating the degree of dollarization of the Russian economy, the dynamics of net supplies of foreign currency by Russian commercial banks, and the dynamics of net sales of foreign currency to physical persons (residents and nonresidents) in 1994–1996. Figure 2 shows that foreign currency delivered to the country by Russian commercial banks is mainly used for sales to the public; much less flows into deposits of legal and physical persons. Overall, the dynamics of net supplies of foreign currency by commercial banks reflect rather well the dynamics of dollarization in the Russian economy, including the dynamics of foreign currency deposits in commercial banks and sales of foreign currency to physical persons (residents and nonresidents). Therefore, for estimating the degree of dollarization, the following relationship can be used:

$$q = \frac{IC}{M2} \, e,$$

where q is the dollarization degree in per cent, IC is the volume foreign currency supplied by commercial bank in billion USD, M2 is the monetary aggregate in trillion RUR, and e is the nominal exchange rate RUR/USD.

The data range from 1994:5 to 1996:6. The data on the monetary aggregate M2 and the nominal exchange rate RUR/USD are official CBR data. The data on monthly rates inflation rates are official data of the State Statistics Committee of Russia. The data on Russian interest rates, the interbank lending rate on maturities of up to 1 month and the GKO average secondary market yield, were taken from the publication Russian Economic Trends, October 1996.

Figure 4 shows the dynamics of the degree of dollarization, q, and the difference $(\epsilon - \pi)$. It can be seen that all the characteristic periods in the dynamics of the dollarization degree, q, are clearly reflected in changes in the difference $(\epsilon - \pi)$.

5   Testing the dollarization hypothesis

The above theory can be tested empirically by assessing the effect of the difference $(\epsilon - \pi)$ and the interest rate on the degree of dollarization, q. As mentioned above, as the term $(\epsilon - \pi)$ increases and the interest rate decreases, the degree of dollarization increases.

Before we can estimate the regression, we must check whether the variables in the model are stationary or not. We do this by means of the augmented Dickey–Fuller test. The test statistics are reported in Table 2.

We can see from these results that, while the variables q_t and i_t are clearly not I(0), the situation the variable $(\epsilon - \pi)_t$ is not so evident. Further analysis shows that it is definitely I(0) in the interval 1992:4–1996:9 (the ADF(1) test statistic is –4.4916 ** and the null hypothesis I(1) is rejected at the 1 per cent significance level) but I(0) is not rejected at the 5 level in the interval 1994:5–1996:6. Presumably, this is due to the influence of structural breaks in the interval 1994:11–1995:2.

Therefore, we must test the hypothesis that all variables are I(1) against the null hypothesis I(2). The test statistics are reported in Table 3.

Thus, we conclude that the q_t, $(\epsilon - \pi)_t$, i_t are I(1). Therefore, stationary linear combinations between them may exist. The presence of cointegrating vectors was tested using the method of Johanson. The long-term cointegration

Figure 4   **Dynamics of the degree of dollarization and the differencer regarding $\epsilon - \pi$**
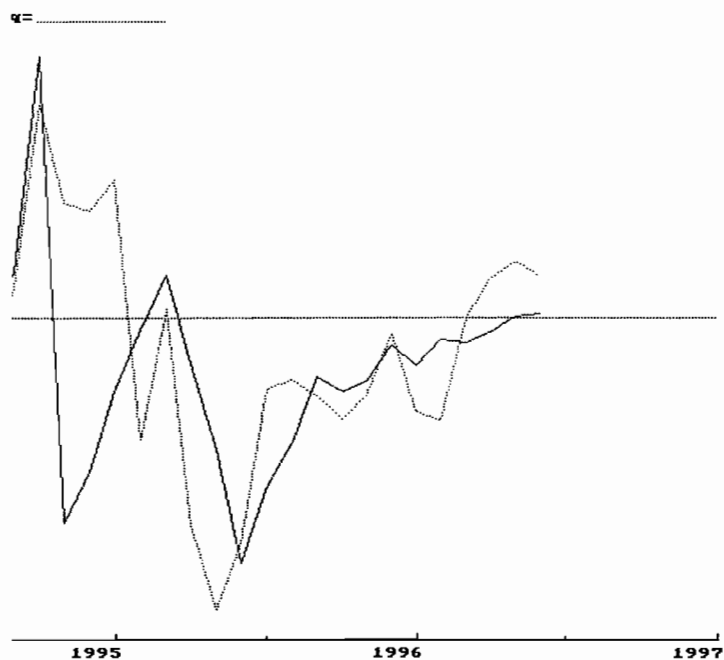
Table 2   **Unit root tests**

q_t	$(\epsilon - \pi)_t$	i_t
–0.39696	–3.5827 *	–2.5509
Augmented Dickey–Fuller test with one lag and no constant; * denotes rejecton of the null hypothesis ($H_0 : I(1)$) at the 10 % level.		

Table 3   **Unit root test**

Δq_t	$\Delta(\epsilon - \pi)_t$	Δi_t
–5.3756 **	–6.5004 **	–4.6084 **
Dickey–Fuller test, constant and trend included, ** denotes rejection of the null hypothesis I(2) at the 1 % level.		

Table 4   **Eigenvalues and trace statistics**

Eigenvalues	Trace statistics	95 % confidence values
$\lambda_1 = 0.6383$	39.42 **	29.7
$\lambda_2 = 0.3256$	16.03 *	15.4
$\lambda_3 = 0.2616$	6.97 **	3.8

Table 5   **Normalized cointegrating vectors**

q_t	$(\epsilon - \pi)_t$	i_t
1.000	−1.768	−5.834
0.1426	−0.2353	1.000

Table 6   **Estimated model for Δq**

Constant	Δq_{-1}	$(\epsilon - \pi)$	Δi
2.994	−0.450	0.492	3.343
(1.052)	(−2.073)	(2.034)	(2.428)
t-values in parentheses; $R^2 = 0.311$; DW = 2.05. Test for the normality of errors: $\chi^2(2) = 5.1683[0.0755]$, skewness= −0.574. Test for the heteroscedasticity of errors: $F(6,13=0.2498[0.9507]$. Error term auto- correlation (lags 1–3): $\chi^2(3) = 0.493[0.9204]$.			

relationships were estimated with a constant and one lag for each variable. Eigenvalues and trace statistics, adjusted for degrees of freedom, as well as their 95 per cent confidence values are reported in Table 4.

We see that the null hypothesis of no cointegration is very clearly rejected. There appear to be three cointegrating vectors, which are reported in Table 5. However, the eigenvalue λ_2 is close to the threshold at 5 % critical level and therefore is only of the second-order significance.

Inspection of other two long-term relationships confirms the hypothesis of a positive relationship between degree of dollarization, q_t, and the difference $(\epsilon - \pi)_t$. However, no negative dependence of the degree of dollarization on interest rates was revealed in the Russian data.

However, in view of the small volume of the available empirical sample, the power of Johanson's test is not sufficiently high and the error correction model does not provide plausible results. Therefore, it makes sense to consider an ordinary least squares model for the difference of the degree of dollarization Δq. The corresponding results are presented in Table 6.

6   Some implications for macroeconomic policy

Our analysis suggests that there is a strong dependence of the degree of dollarization of the Russian economy on monetary and credit and foreign exchange policy of the government and CBR. This

high degree of dollarization (35–55 per cent) of the Russian economy exerts its own influence on the present macroeconomic situation and certainly should be taken into account in economic and policy decisionmaking. Here we discuss some institutional factors related to Russian current macroeconomic policy and the interrelations vis-à-vis dollarization.

The lowering of inflation rates to 10–20 per cent per year and the decline of interest rates to 20–25 per cent per year is aimed at stimulating the real sector of the Russian economy. In accord with the current regime of strict monetary policy in Russia, the future growth of production in Russia will be based on the rapid development of competitive sectors of the economy (mainly export-oriented) at the expense of noncompetitive industries (mainly domestic-oriented), which will not be able to live with monetary tightening and will release labour and capital for the use of profitable enterprises.

However, this policy completely ignores the powerful force of dollarization of the Russian economy, which is sharply at odds with these 'rainbow' goals. The erosion of the domestic-oriented markets and relative immobility of the Russian population are factors in the growth of unemployment in Russia. At the same time, the Russian export sector is clearly profit-oriented and is thus striving to expand exports and raise profits. This exerts upward pressure on the dollar exchange rate and on the sector's relative foreign currency holdings. The state's interests in this situation coincide with the interests of export-oriented sector: the necessity to replenish budget revenues in the face of a shrinking tax base due to the depression in the domestic-oriented sector and the growing shadow economy will finally convince the state to support the interests of the powerful export lobby, ie to favour a weaker rouble and increase the foreign currency priviledges of exporters. This situation will soon affect the foreign currency market, monetary policy as regards the commercial banks and the structure of spending by the Russian public. In conditions of growing unemployment, inflation rates will drop in the long run and the rate of appreciation of the dollar exchange rate will eventually exceed the rate of inflation. At that moment, the dollarization mechanism will be re-triggered: commercial banks, enterprises and citizens will gain profits from the

simple 'currency turnover' operation, and this speculative orientation of the foreign currency market will again reduce tax revnues and repayment of credit and will stimulate the growth of interenterprise arrears. Even in the case of the fixed official exchange rate, the situation will remain very difficult. A parallel unofficial exchange rate will soon appear, and the priviledged position of export enterprises will enable them to dictate a high unofficial foreign exchange rate, thus accelerating the process of dollarization of the Russian economy.

Thus, the strategy of 'free transfer of resources' from noncompetitive sectors of the economy to profitable sectors turns out to be rather controversial in terms of its socioeconomic consequences. The high degree of dollarization of the Russian economy is certainly a crucial macroeconomic factor that should be accounted for in strategic planning.

7 Concluding remarks

* Dollarization is one of the most characteristic phenomena in any transition economy and is promoted by high inflation in the initial stage of economic reform (liberalization of prices and currency turnover).

* The degree of dollarization depends on the adequacy of monetary and credit and foreign currency policy in the particular country. Errors and inconsistencies in Russian monetary policy have led to a substantial degree of dollarization of the Russian economy. According to different estimates, it is now about 40–50 per cent.

* One of the main factors determining the dynamics of the dollarization processes is the difference between the growth rate of dollar exchange rate and the rate of inflation $(\epsilon - \pi)$. This factor in particular determined the dynamics of the dollarization process in Russia in 1993–1996. The influence of interest rates (refunding rate of the CBR, average yield on GKO, interbank lending rate) on Russian dollarization dynamics is fairly weak.

* The existing models of dollarization (Calvo, Vegh et al) do not account for the influence of inflation on the degree of dollarization (stochastic price dynamics is assumed). A model explaining the influence of the difference ($\epsilon - \pi$) on the degree of dollarization is developed in this paper.

* Experimental testing of theoretical results using official statistical data for 1994–1996 confirmed the existence of a strong dependence of the degree of dollarization in Russia on the difference ($\epsilon - \pi$). No negative influence of Russian interest rates on the degree of dollarization was found.

* Besides the influence of the difference $\epsilon - \pi$, there exists a strong impact of the uncertainty factor on dollarization dynamics. In periods of monetary instability economic agents try to mini- mize the degree of uncertainty about future values of their assets by means of increases in foreign currency savings.

* The negative impact of high dollarization on macroeconomic dynamics consists in low domestic investment and aggregate demand, as well as in high degree of uncertainty in implementation of money & credit policies.

References

Calvo, G.A. – Vegh, C.A. (1992) **Currency substitution in developing countries.**

Center for Economic Analysis at the Russian Government (1995) **Analysis of the Russian currency market in 1994–1995** (in Russian).

Central Bank of Russia (1994) **Current Trends in Money and Credit**, issue 12 (in Russian).

Central Bank of Russia (1996) **Vestnik Banka Rossii**, n42(134) (in Russian).

Giovannini, A. – Turtelboom, B. (1992) **Currency Substitution.** NBER Working Paper, n4232.

Ivanov, V. – Elakhovsky, V. (1995) **Double increase of savings is expected this year.** Izvestia, June 22.

Korhonen, I. (1996) **Dollarization in Lithuania.** Review of Economies in Transition, 5/96.

Latsis, O. (1996) **The lost year.** Izvestia, Dec.

Sahay, R. – Vegh, C.A. (1995) **Dollarization in Transition Economies: Evidence and Policy Implications.**

Vegh, C.A. (1989) **The Optimal Inflation Tax in the Presence of Currency Substitution.** Journal of Monetary Economics, 24.

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