Alexander O. Baranov

(NOVOSIBIRSK STATE UNIVERSITY, NOVOSIBIRSK, RUSSIA)

DEVELOPMENT OF MONETARY BLOCK OF THE DYNAMIC INPUT – OUTPUT MODEL OF RUSSIAN ECONOMY

In this article we pay main attention to the impact of money supply, exchange rate and interest rate on GDP, industry output and inflation on the Russian economy in the period of 1994 – 2002[1]. The research has been done in the framework of the monetary block development of the Dynamic Input – Output Models system which has been developing at the Institute of Economics and Industrial Engineering of the Siberian Branch of Russian Academy of Sciences since the middle of 60th by N. Shatilov, V. Ozerov and later by V. Pavlov and A. Baranov [1].

In the period after the 1998 financial crisis (1999 – 2002) the calculations with a monthly step use the so called Basic Industries Index (BII) as the dependent variable. It shows an average growth rate of the industry, agriculture, construction, trade, transportation and communication. We used the MIBOR interest rate as an index of the interest rate in the Russian economy for the period of 1994-1999 in calculations with a monthly step and for the period of 1994 – 2002 in calculations with a quarterly step. MIBOR is an average inter-bank loans interest rate in Moscow and in our opinion it is a very good indicator of the money market. For the 1999 – 2002 period we used a credit interest rate for legal entities as an interest rate indicator.

All calculations have been made with the use of the Matrixer software package, which was developed by A. Tsyplakov (the Department of Economics of the Novosibirsk State University) [2].

1. Main Types of Equations

In the analysis we will build similar equations for the GDP, industry output, GDP deflator and consumer price index. Therefore, we will use $\varDelta Y$ to describe the GDP, industry output, deflator and consumer price index increase.

In this work we did not intend to build a model which describes all aspects of the GDP, industry output and inflation dynamics in Russia in the transition period. We paid main attention to the monetary instruments' impact on the above-mentioned indexes.

The following type of equation has been used in the calculations.

$$\varDelta Y_t = a + \sum_{j=0}^{n} \lambda_j \Delta M_{t-j} + \sum_{j=0}^{n} b_j \Delta EX_{t-j} + \sum_{j=0}^{n} c_j \Delta i_{t-j} + \xi_t, \quad (1),$$

---

[1] This article describes the results of the work done by the author in 2002 – 2003 at the Department of Economics of Novosibirsk State University.

Deleted: In t

Deleted: are

Deleted: d

Deleted: which have been fulfilled

Deleted: in the period of his work

Where ΔM_t – money supply increase in the period t;

ΔEX_t – Rub/\$US exchange rate increase in the period t;

Δi_t – MIBOR interest rate or credit interest rate for legal entities increase in the period t;

n – length of the lag;

ξ_t – the equation's error;

a – constant;

λ_j, b_j, c_j – regression coefficients.

2. The Data formation

The following data with a monthly and quarterly step have been used for the calculations:

- GDP and industry output;
- money supply M2;
- MIBOR interest rate (30 days loans) for the period 1994-1999 in calculations with monthly step and for the period 1994 – 2002 in calculations with quarterly step;
- credit interest rate for legal entities in the calculations for the period 1999 – 2002 with a monthly step;
- Basic Industries Index (BII) in the calculations for the period 1999 – 2002 with a monthly step;
- Rub/\$US exchange rate [2]

These data is published in Russian statistical books and journals: Statistical Review. Quarterly journal, Russian Economy Review, Banking Statistics Bulletin, Current tendencies in monetary – credit sphere, Money and Credit, Central Bank of Russia Bulletin and Government Statistical Committee, Central Bank of Russia, Ministry of Finance sites. MIBOR interest rate is published in Vedomosty and Kommersant newspapers.

The calculations have been done for nominal and real values. The table with the data for the period of 1994 – 1999 with a monthly step is in the Appendix 2. The table with the data for the period of 1999 – 2002 with a monthly step is in the Appendix 3. Quarterly data for the period of 1999 – 2002 is given in the Appendix 4.

When building a regression model the researcher can meet with a false regression problem. To avoid this problem it's necessary that the equation's error be a stationary accidental variable.

Let us introduce the integrated series description. If it's necessary to calculate first difference for the series to make the equation error a stationary accidental variable, the series is 1-st rank integrated. If it's necessary to calculate second difference for the series to make the equation error a stationary accidental variable, the series is 2nd rank integrated. In a common case, if it's necessary to calculate n difference for the series to make the equation error a stationary accidental variable, the series is n rank integrated.

The Dickey-Fuller criteria have been used in this work to check the series on integration. This criteria is included in the Matrixer software package. This check showed that all time series used in the calculations are 1-st rank integrated. So we have used for all equations estimation first difference of all time series.

3. Results of the regression equations parameters estimation (monthly step)

A. Results for 1994 – 1999 period.

Calculations results for nominal GDP

`

The results of calculations for the nominal GDP regression equation showed that the nominal money supply M2 increase and the nominal exchange rate increase (with a 2 months lag) were significant factors for the GDP dynamics. The MIBOR interest rate was not a significant factor for all lags. The results of calculations are shown in Table 1.

Durbin- Watson statistics in this table shows that there is no autocorrelation of residuals in the equation. F statistics is equal to 14,1054 and shows that the regression is significant (see for example the tables with F-statistics critical values in [3] pp. 369-370). The coefficient of multiple determination value (R^2_{adj}= 30,8%) points out two circumstances: 1) the nominal money supply M2 increase and the nominal exchange rate increase are significant factors for the nominal GDP dynamics in the period; 2) these two variables explain only 30 % of the GDP variation in the period.

Table 1.

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value [1]	t-statistic significance level [2]	The equation's characteristics
Nominal GDP increase	Rub/$US nominal exchange rate increase (2 months lag)	-4.4930	-2.0627	0.0437	R^2_{adj}= 30,8% [3]
	Nominal M2 increase	0,9414	5.2569	0.0000	DW =
	Intercept	-1,2644	-0.4325	0.6670	1.9935 [4]
					F(2,57)= 14.1054 [0.0000] [5]

1) For the hypothesis that this parameter equals zero.
2) **T-**statistic significance level shows that if this value is small for some independent variable, for example less than 5 %, this variable is statistically significant.
3) R^2_{adj} – multiple determination value adjusted with account for degrees of freedom.
4) **DW** - Durbin- Watson statistics

---

[2] Rub/$US exchange rate was calculated as <u>an </u>average official Central Bank of Russia exchange rate per month or per quarter.

5) Fischer ***F*** - statistics for the hypothesis that? regression coefficients equal zero for all independent variables except an intercept. If the significance level in the brackets is small, it means that the regression is statistically significant.

Calculations' results for the real GDP

The results of calculations for the real GDP regression equation showed that significant GDP dependence on the real money supply M2 increase (length of lag equals 10 months) and the real exchange rate increase (with a 4 months lag) can be achieved only for the period before the August 1998 financial crisis. For the full series (1994 – 1999) we did not get significant GDP dependence on the above mentioned independent variables. The real MIBOR interest rate was not a significant factor for the real GDP with all lags. The results of calculations are shown in Table 2.

Durbin- Watson statistics in this table shows that there is no autocorrelation of residuals in the equation. F statistics is equal to 5.6913 and is close to the critical value for this index. For two independent variables and 32 points in the series the F-statistics' critical value equals 5.39 ([3], pp. 369-370].

Taking into account the low level of multiple determination value (R^2_{adj}= 21,6%) it is necessary to conclude that even best results of calculations *do not allow to observe a significant GDP increase' dependence on the real money supply M2 increase.* Results of many calculations showed that the real exchange rate increase inclusion in the regression equation improved its quality significantly. Therefore, we can conclude that this index had a negative impact on the real GDP increase.

Table 2.

Dependent variable	Independent variables	Reg. Coefficients	t-statistic value	t-statistic significance level	The equation's characteristics
Real GDP increase	Rub/$US real exchange rate increase (4 months lag)	-1.0956	-2.1346	0.0406	R^2_{adj}= 21,6% DW = 2.1507 F(2,32)= 5.6913 [0.0077]
	Real M2 increase (10 months lag)	0.0413	2.5314	0.0165	
	Intercept	-1.7764	-2.1795	0.0368	

This can be observed in Graph 1. In the period of the August 1998 financial crisis a big growth of the real exchange rate is accompanied by substantial real GDP fall. The year 1998 exactly explains the unusual results when the national currency devaluation is accompanied by a big GDP fall. We tried to exclude points in the series after August 1998, but achieved the same result.
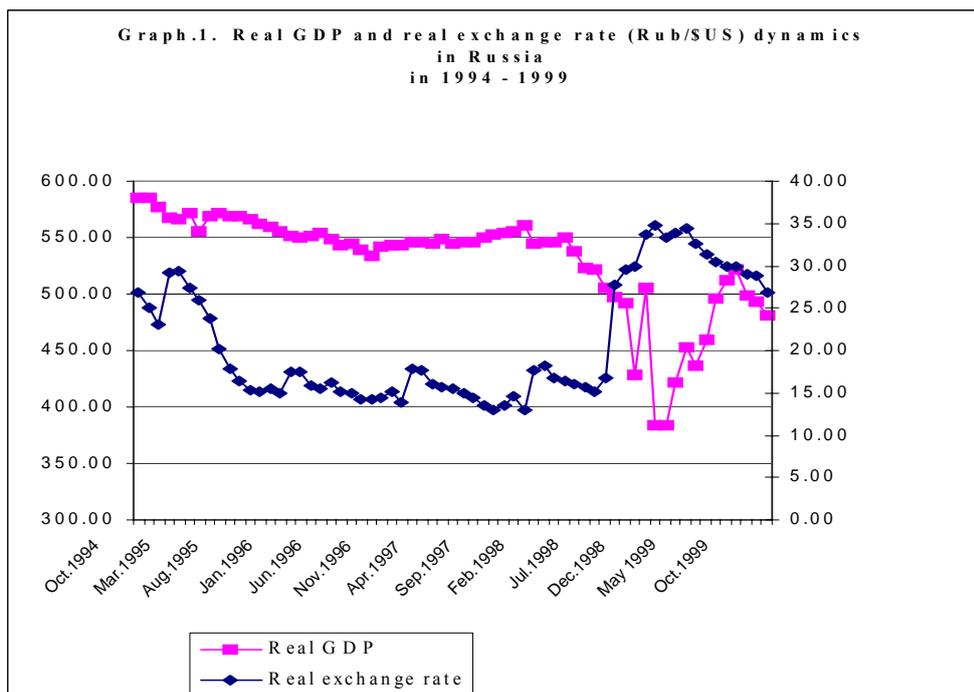
Graph.1. Real GDP and real exchange rate (Rub/$US) dynamics in Russia in 1994 - 1999

The calculations results for the regression equations which describe the GDP deflator, consumer price index and industry output dependence on money supply M2, exchange rate and interest rate in the Russian economy for the period since October 1994 till December 1999 is given in tables 1.1, 1.2, 1.3, 1.4 of the Appendix 1.

Main conclusions from the calculations result for the 1994 – 1999 period.

1. Statistically significant positive dependence was shown for nominal GDP and industry output from the money supply increase. M2 increase leads to nominal GDP increase and nominal industry output increase in the same month. This impact can be explained first of all by significant positive dependence of the GDP deflator and the consumer price index on M2 increase (see Table 1.1 and 1.2 in Appendix 1).

2. Consequently, the calculations results have shown that in the analyzed period inflation in Russia was determined essentially by money supply variations.

3. Ruble devaluation (Rub/$US exchange rate growth) impacted negatively on the nominal GDP growth (see Table 1 and Table 2 above). Two circumstances can explain this result. The first one is connected with the 1998 financial crisis. the essential real exchange rate growth in the fall of 1998 (two times in September – October) is accompanied by a big real GDP decrease

5

which was the result of the financial system destruction and a sharp import decrease. The second one is a negative impact of import prices on the GDP dynamics. The last factor was more important for the Russian economy as compared with export stimulation as the result of Ruble devaluation.

4. The nominal Rub/$US exchange rate increase (in the same month and with a 6 months lag) impacted positively on nominal industry output (see Table 1.3 of Appendix 1).

5. The real Rub/$US exchange rate increase (3 months lag) impacted positively on the nominal industry output (see Table 1.4 of Appendix 1). The positive impact of Ruble devaluation on the industry output is explained by stimulation of export in the following sectors: oil and gas, ferrous and non-ferrous metallurgy, chemical and oil-chemical industry. These sectors' output forms about 80% of Russian export ([4], p. 378).

6. In the analyzed period a significant impact of the real M2 increase on the real GDP increase was not found. The real M2 increase impacts significantly on the real industry output increase. The result for the GDP can be explained by a big share of barter deals in the Russian economy in the analyzed period and bank sector's orientation mainly on securities and foreign currency markets because of their high profitability. In these conditions high-powered money increase could not impact significantly on the production development.

7. The interest rate impacted on the macroeconomic indexes in the following directions.

1) The MIBOR interest rate was statistically significant for the consumer price index (see Table 1.2 of Appendix 1). The interest rate increase led to consumer price growth in the same month.

2) The MIBOR interest rate was a statistically significant factor, which impacted negatively on the real industry output (see Table 1.2 of Appendix 1).

B. Calculation results for the post crisis period
1999 – 2002

Basic Industries' Index dependence on the nominal money supply M2 growth rate increase, nominal exchange rate growth rate increase and interest rate

BII (Basic Industries Index) began to be published after 1998. It shows a monthly average real growth rate of industry, agriculture, construction, trade, transportation and communication. The Government Statistical Committee calculates this index officially. Therefore, it has been used in our calculations for the post-crisis period as more reliable in comparison with the GDP growth rate non-official estimations.

The equation (1) has been used for the estimation of BII dependence on the nominal money supply M2 growth rate increase, nominal exchange rate growth rate increase and MIBOR interest rate. Apart from that, increase of the real credit interest rate for legal entities was used as a regressor instead of

6

MIBOR interest rate in some calculations. All regressors were deflated by the consumer price index because we did not have monthly series of GDP deflator for 1999 – 2002 periods.

The MIBOR real interest rate and the real credit interest rate for legal entities were not significant factors for BII for all lags.

The results of calculations for BII regression equation showed that real money supply M2 growth rate increase (in the same month and with 3 months lag) and real exchange rate growth rate increase (with 2 months lag – negative impact) were significant factors for BII dynamics. The results of calculations are given in Table 3.

Durbin- Watson statistics in Table 3 shows that there is no autocorrelation of residuals in the equation. F-statistic is equal to 14,0461 and shows that the regression is significant (see for example tables with F-statistics critical values in [3] pp. 369-370). Coefficient of multiple determination value (R^2_{adj}= 47,1%) says that in the period half of BII dynamics was determined by money supply and exchange rate increase.

Table 3

Dependent variable	Independent variables	Reg. Coef Ficients	t-statistic value	t-statistic significan ce level	The equation's characteristics
Basic industries index increase	Real M2 growth rate	1.0722	5.0994	0.0000	R^2_{adj}= 47.1%
	Real M2 growth rate (3 months lag)	0.8353	4.2774	0.0001	DW = 1.6288
	Rub/$US real exchange rate growth rate (2 months lag)	-1.0511	-2.1252	0.0396	$F_{(3,41)}$= 14.0461 [0.0000]
	Intercept	-3.3875	-3.4132	0.0015	

The calculation results for the regression equations which describe consumer price index dependence on money supply M2 increase, exchange rate increase, interest rate and industry output dependence from money supply M2 increase, exchange rate increase in the Russian economy for the period of 1999 – 2002 is given in tables 1.5, 1.6 of Appendix 1.

Main conclusions from the calculations results for the 1999 – 2002 period.

1. In the period after the 1998 financial crisis production increase in basic sectors of the Russian economy depended significantly on real money supply M2 and real exchange rate Rub/$US increase. These two indexes explain about 50% of the production variation. This fact allows to speak about increase of monetary policy impact on the Russian economy in the post-crisis period. We can propose the following explanation of these phenomena.

♦ Decrease of barter deals' share in the post-crisis period as compared with the middle of 90th.

♦ Financial sector switching to the business with real sectors of national economy because of profitability decrease on the securities and currency markets.

2. Money supply and exchange rate impact on the consumer price index in post crises period was two times lower as compared with the 1994 – 1998 period. The exchange rate stabilization and Ruble strengthening in 2000 – 2002 can explain it. It decreases the Russian economy dollarisation and the consumer price index dependence on the exchange rate. Decrease of money supply impact can be explained by the inflation expectation decrease as the result of social and political stabilization in the Russian society in the period after 2000.

3. Money supply M2 change and increase of nominal credit interest rate for legal entities have formed One third of the industry output variation in the analyzed period. Exchange rate in the period was not a significant factor for industry output dynamics. This is a different result as compared with BII equation regression estimation. For other Russian economy industries the exchange rate impact was more significant (see Table 3).

4. Interest rate variation in the periods before and after the financial crisis of 1998 was a significant factor for the industry output. This fact is additional confirmation of necessity to decrease interest rates in the Russian economy to the level, which would be acceptable for industrial enterprises (3-4% in real terms).

4. Results of the regression equations estimation for the 1994-2002 period (quarterly step)

Monthly data about the GDP size and its dynamics is non-official. The government Statistical Committee prepares and publishes officially only the quarterly GDP data. Therefore results of calculations with the quarterly data are more reliable as compared with the calculation results in which monthly data have been used.

Money supply, exchange rate and interest rate impact on the GDP dynamics in 1994 –2002
Calculations for nominal GDP

The results of calculations for the nominal GDP regression equation (quarterly step) showed that good quality estimations might be got only for the series, which exclude the 1994-year data. Therefore Table 4 gives the results for the 1995 – 2002 period.

Table 4.

Dependent variable	Independent variables	Reg. Coefficients	t-statistic value	t-statistic significance level	The equation's characteristics
Nominal GDP increase	Nominal M2 increase	4.8409	5.1272	0.0000	R^2_{adj}= 46,1%

8

	Nominal M2 increase (1 quarter lag)	-3.7542	-3.8312	0.0007	DW = 2.2612
	Intercept	7.8503	0.2201	0.8274	F(2,28)= 13.8543 [0.0001]

The calculation results for the nominal GDP equation show that in the analyzed period only the nominal money supply increase (in the same quarter and with 1-quarter lag) was a statistically significant factor for GDP. The nominal MIBOR interest rate increase and nominal exchange rate increase were not significant factors for all lags.

Durbin- Watson statistics in Table 4 shows that there is no autocorrelation of residuals in the equation. F-statistics is equal to 13.8543 and shows that the regression is significant. The coefficient of multiple determination value (R^2_{adj}= 46,1%) points out two circumstances: 1) the nominal money supply M2 increase variables explain about half of the GDP variation in the period; 2) monetary policy instruments should be supplemented by other variables for more careful explanation of the GDP behavior in Russia.

Calculations for real GDP

The real GDP growth rate increase was under significant impact of the real money supply M2 growth rate increase (3 quarters lag) and the real exchange rate growth rate increase, deflated by the GDP deflator (3 quarters lag). These two regressors have been deflated by the GDP deflator. The real MIBOR interest rate increase was not a significant factor for the real GDP.

Durbin- Watson statistics in Table 5 (DW = 2.0533) shows that there is no autocorrelation of residuals in the equation. F-statistics is equal to 6.2993 and shows that the regression is significant. F-statistics' critical level for a 1% significance level is 5,42 and for a 5% significance level equals 3,33 [3, p. 369-370].

Table 5.

Dependent variable	Independent variables	Reg. Coefficients	t-statistic value	t-statistic significance level	The equation's characteristics
Real GDP growth rate increase	Rub/$US real exchange rate growth rate (3 quarters lag)	0.4013	2.1311	0.0417	R^2_{adj}= 25,5% DW = 2.0533
	Real M2 growth rate (3 quarters lag)	0.2691	3.2055	0.0033	F(2,29)= 6.2993 [0.0053]
	Intercept	-0.2666	-0.1952	0.8466	

9

The coefficient of multiple determination value (R^2_{adj}= 25,5%) says that two factors (increase of 5real money supply growth rate and increase of real exchange rate growth rate) explained about one quarter of the GDP variation in 1994 – 2002. These regressors were significant but not principal factors for the real GDP development. Comparison with the results for monthly series shows that the money supply impact was enforced in the period after the 1998 financial crisis because for the period of 1994 – 1998 we did not get the result which shows the significance of money supply variation for the GDP development. This conclusion is confirmed by the calculation results for BII for the period 1999 – 2002 (see Table 3).

The calculation results for the regression equations which describe the GDP deflator, consumer price index and industry real and nominal output dependence from money supply M2 growth rate increase, exchange rate growth rate increase and interest rate in Russian economy for 1994 - 2002 is given in tables 1.7 - 1.10 of Appendix 1.

Main conclusions from the calculation results for the 1994 – 2002 period with quarterly data use.

1. The money supply variation had an essential impact on the nominal GDP variation in the Russian economy in the period 1994 – 2002. This factor determined about half of nominal GDP variation (see Table 4).

2. A significant impact of money supply variation on the GDP dynamics is explained by essential GDP deflator dependence from this factor. 70 % of GDP deflator variation was determined by money supply change and variation of the exchange rate (see Table 1.7 of Appendix 1).

3. Calculation results for the regression equation, which describes money supply and exchange rate impact on the real GDP variation in Russia have confirmed mainly the results of the calculations with monthly series. Statistical dependence of real GDP variation on real money supply and real exchange rate was much lower as compared with the nominal GDP variation dependence on the same indexes. Only a quarter of real GDP fluctuations were formed as the result of real money supply and real exchange rate variation. But these factors' impact on the GDP dynamics was statistically significant for quarterly series. **In other words, money was not neutral in the Russian economy during the transition period 1994 –2002 and monetary expansion with exchange rate variation were quite important factors which impacted on production in the short term.**

4. The consumer price index dynamics in the analyzed period was determined mainly (about 74 % - see Table 1.8 in Appendix 1) by money supply M2 and exchange rate variation.

5. The industry output has reacted positively on money supply expansion and ruble devaluation in the analyzed period. These macroeconomic indexes variation was statistically significant for the nominal and real industry output variation. The nominal industry output variation has been determined by these factors on 60 % (see Table 1.9 in the Appendix 1). The real industry output variation has been determined by these factors on 28 % (see Table 1.10 in the Appendix 1).

10

Bibliography

1. Baranov A., Pavlov V. Dynamic Input- Output Model Taking Account of the Investmen Lag. Structural Change and Economic Dynamics, vol. 5, no.1, 1994.
2. Internet: http://www.nsu.ru/ef/tsv/
3. C. Dougherty. Introduction to Econometrics. New York, Oxford. Oxford University Press. 1992.
4. Russia in Figures. Brief Statistical Yearbook. Moscow. State Statistical Committee. 1999 (Россия в цифрах. Краткий статистический сборник. М.: Госкомстат России, 1999).

APPENDIX 1

Table 1.1. The period 1994 – 1999 (monthly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
GDP deflator increase	Nominal M2 growth rate	0.8874	4.8444	0.0000	R^2_{adj}= 32.0%
	Rub/$US nominal exchange rate growth rate	0.1469	2.4076	0.0191	DW = 2.0460 F(3,48)= 15.6068 [0.0000]
	Intercept	0.0206	0.0191	0.9848	

Table 1.2. The period 1994 – 1999 (monthly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Consumer price index growth rate increase	Nominal M2 growth rate	0.3444	6.2194	0.0000	R^2_{adj}= 91.0%
	Rub/$US nominal exchange rate growth rate	0.3448	21.0797	0.0000	DW = 1.6697 F(3,48)= 147.6727 [0.0000]
	Rub/$US nominal exchange rate growth rate (4 months lag)	0.0453	2.8544	0.0061	
	Nominal MIBOR interest rate	0.2344	3.0914	0.0032	
	Intercept	-0.5237	-1.2048	0.2335	

Table 1.3. The period 1994 – 1999 (monthly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Nominal industry output increase	Nominal M2 increase	0.2738	2.8553	0.0062	R^2_{adj} = 32,7%
	Rub/$US nominal exchange rate increase	2.5866	2.2648	0.0277	DW = 2.3400
	Rub/$US nominal exchange rate increase (6 months lag)	3.4191	3.0479	0.0036	F(3,52)= 9.912799 [0.0000]
	Intercept	-1.0684	-0.6584	0.5132	

Table 1.4. The period 1994 – 1999 (monthly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Real industry output increase	Real M2 increase (9 months lag)	0.1075	2.3954	0.0205	R^2_{adj}= 22,2%
	Rub/$US real exchange rate increase (3 months lag)	2.0463	1.7405	0.0881	DW = 2.5234
	Real MIBOR interest rate increase	-1.6501	-4.0761	0.0002	F(3,49)= 5.9542 [0.0015]
	Intercept	0.4019	0.1667	0.8683	

13

Table 1.5. The period 1999 – 2002 (monthly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Consumer price index increase	Nominal M2 increase (6 months lag)	0.00541	2.0348	0.0531	R^2_{adj}= 38.5% DW = 1.6714
	Nominal M2 increase (9 months lag)	0.0072	2.7462	0.0112	$F(4,24)$= 5.3747 [0.0031]
	Rub/$US nominal exchange rate increase	2.4517	3.0665	0.0053	
	Nominal credit interest rate for legal entities	0.0702	2.6249	0.0148	
	Intercept	-0.8231	-1.3581	0.1871	

Table 1.6. The period 1999 – 2002 (monthly step)

Dependent variable	Independent Variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Nominal industry output increase	Nominal M2 increase	0.1304	2.0557	0.0467	R^2_{adj}= 34,7% DW = 2.1797
	Nominal M2 increase (3 months lag)	0.2578	3.5771	0.0010	$F(3,38)$= 8.2752 [0.0002]
	Increase of nominal credit interest rate for legal entities (6 months lag)	-2.2511	-2.1803	0.0355	
	Intercept	-5.2763	-1.2346	0.2246	

Table 1.7. The period 1994 – 2002 (quarterly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
GDP deflator increase	Nominal M2 growth rate	0.8860	7.7437	0.0000	R^2_{adj}= 69.6% DW = 2.1560
	Rub/$US nominal exchange rate growth rate	0.1993	3.3794	0.0019	$F_{(2,32)}$= 39.8638 [0.0000]
	Intercept	-2.4992	-1.3469	0.1875	

Table 1.8. The period 1994 – 2002 (quarterly step)

Dependent variable	Independent variables	Reg. Coef ficients	t-statistic value	t-statistic significance level	The equation's characteristics
Consumer price index increase	Nominal M2 growth rate (1 quarter lag)	0.6119	5.0127	0.0000	R^2_{adj}= 73.8% DW = 2.1268
	Rub/$US nominal exchange rate growth rate	0.5465	8.6913	0.0000	$F_{(2,31)}$= 47.4888 [0.0000]
	Intercept	-3.4998	-1.6681	0.1054	

Table 1.9. The period 1994 – 2002 (quarterly step)

Dependent variable	Independent variables	Reg. Coefficients	t-statistic value	t-statistic significance level	The equation's characteristics
Nominal industry output growth rate	Nominal M2 growth rate	0.7522	3.7042	0.0009	$R^2_{adj} = 58,8\%$ DW = 1.9821
	Rub/$US nominal exchange rate growth rate	0.3623	4.8419	0.0000	F(3,28)= 15.7265 [0.0000]
	Rub/$US nominal exchange rate growth rate (3 quarters lag)	0.1509	1.9985	0.0555	
	Intercept	-3.2046	-1.2679	0.2153	

Table 1.10. The period 1994 – 2002 (quarterly step)

Dependent variable	Independent variables	Reg. Coefficients	t-statistic value	t-statistic significance level	The equation's characteristics
Real industry output growth rate	Real M2 growth rate	0.6398	2.3995	0.0233	$R^2_{adj} = 28,1\%$ DW = 2.2730
	Rub/$US real exchange rate growth rate	0.2566	2.4771	0.0196	F(3,28)= 5.0298 [0.0065]
	Rub/$US real exchange rate growth rate (3 quarters lag)	0.2603	2.6682	0.0125	
	Intercept	-0.0607	-0.0366	0.9711	