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THE BULLETIN OF MODEL CALCULATION OF SHORT-TERM FORECASTS OF SOCIAL AND ECONOMIC INDICES OF THE RUSSIAN FEDERATION

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INTRODUCTION TO ALL THE ISSUES

This Bulletin presents calculations of values of different economic indices of the Russian Federation in *September 2012 – February* 2013 made on the basis on the time-series models developed as a result of research carried out by the IEP in the past few years[1]. The utilized method of forecasting belongs to the group of *formal* or *statistical* methods. In other words, the obtained values are not the expression of the *opinion* or *expert evaluation* of the researcher, but calculations of future values of the specific economic index made on the basis of formal models of ARIMA (p, d, q) time series with taking into account the existing trend and, in some cases, its significant changes. The presented forecasts are of inertial nature because the respective models take into account the dynamics of the data till the date of making of the forecast and particularly depend to a great extent on the trends which are typical of the time series in the period which is just before the time interval for which the forecast is made. The evaluations of the future values of the economic indices of the Russian Federation can be used for approval of decisions related to the economic policy provided that the general trends observed till the date on which the forecast is made in respect of each particular index do not change, that is, there will be no serious shocks or changes in the existing long-term trends.

Despite the fact that a large volume of the data related to the period prior to the 1998 crisis is available, the analysis and model building for forecasting were carried out in the period after August 1998. It was justified by outputs of the pervious research[2] whose main conclusion was the fact that with the pre-crisis period taken into account the quality of forecasts in most cases declines. On the other hand, now it seems incorrect to use ever shorter series (after the 2008 crisis), as statistical qualities of the models built on the basis of such a short period happen to be rather low.

The evaluation of the models of the economic indices was carried out on the basis of the standard methods of analysis of time series. At the first stage, correlograms of the researched series and their first differences were analyzed in order to determine the maximum number of the delayed values which need to be included into the specifications of the model. Then, on the basis if the outputs of the analysis of the correlograms all the series were tested for weak stationarity (or stationarity around the trend) by means of the Dickey–Fuller test. In some cases, testing of series for stationarity around the segmented trend by means of the Perron and Zivot–Andrews tests for endogenous structural changes[3] was carried out.

Upon division of the series into those with weak stationary, trend stationary, segmented trend stationary or difference stationary, models corresponding to each of the above types were evaluated (as regards the levels and if necessary with inclusion of the trend, segmented trend or the differences). On the basis the Akaike and Schwartz information criteria and the parameters of the rest of the models (lack of autocorrelation, homoscedasticity and normality) and the quality of in-sample-forecasts obtained by means of those models, the best one was selected. Calculations of the forecast values were carried out on the basis of the best model which was built for each economic index.

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1 See, for example, R.M. Entov, S.M. Drobyshevsky, V.P. Nosko, A.D. Yudin. *The Econometric Analysis of the Time Series of the Main Macroeconomic Indices.* M., IET, 2001; R.M. Entov, V.P. Nosko, A.D. Yudin, P.A. Kadochnikov, S.S. Ponamarenko. *Problems of Forecasting of Some Macroeconomic Indices.* M., IET, 2002; V. Nosko, A. Buzaev, P. Kadochnikov, S. Ponamorenko. *Analysis of the Forecasting Parameters of Structural Models and Models with the Outputs of the Polls of Industries.* M., IET, 2003; M.Yu. Turuntseva and T.R. Kiblitskaya, *Qualitative Properties of Different Approaches to Forecasting of Social and Economic Indices of the Russian Federation.* M.: IET, 2010.

2 Ibid.

3 See.: Perron, P. Further Evidence on Breaking Trend Functions in Macroeconomic Variables, *Journal of Econometrics*, 1997, 80, pp. 355–385; Zivot, E. and D.W.K. Andrews. Further Evidence on the Great Crash, the Oil-Price Shock, and Unit-Root Hypothesis. *Journal of Business and Economic Statistics,* 1992, 10, pp. 251–270.

In addition to the above, on the basis of the models developed by the IEP *the Bulletin* presents the calculations of future values of monthly indices of the CPI, the volume of the import from all the countries and the export to all the countries on the basis of structural models (SM). The forecast values obtained on the basis of structural models can in a number of cases produce better results as compared to ARIMA-models because in building of such models the additional information on the dynamics of exogenous variables is used. In addition to the above, inclusion of structural forecasts in building of aggregated forecasts (that is, forecasts obtained as an average value by a few models) may contribute to adjustment of forecast values.

In modeling the dynamics of the consumer price index, theoretical hypotheses resulting from the monetary theory were used. Utilized as explanatory variables were: the money supply, output volume and the dynamics of the nominal RUR/USD exchange rate which defines the dynamics of the alternative cost of money safe-keeping. Also, the model for the consumer price index included the index of prices on power because that index determined to a great extent the dynamics of manufacturers' costs.

It is to be noted that the main index which may have an effect on the value of the export and the import is the real exchange rate which fluctuations result in the change in the relative value of domestic and import goods. However, in the econometric models that effect is insignificant. The most important factors which determine the dynamics of the export are the global prices on the exported resources, particularly, oil prices: price rises result in growth in export of goods. Used as a parameter of relative competitiveness of Russian goods was the level of households' income in the economy (the cost of the work force). In order to take into account seasonal fluctuations of the export, fictitious variables D12 and D01 equal to one in December and January, respectively, and zero in the other periods were introduced. The dynamics of the import is influenced by the income of households and industries; growth in income results in growth in demand in all the goods, including imported ones. The parameter of the households' income is the real disposable cash income, while that of the income of industries is the index of industrial production.

The forecast values of currency exchange rates are also based on structural models of their dependence on international oil prices.

Forecast values of explanatory variables required for making of forecasts on the basis of structural models were calculated on the basis of ARIMA(p, d, q)-models.

Also, the paper presents calculations of the values of the indices of industrial production, producer price index and the index of the total number of the unemployed calculated with use of the results of the business surveys (BS) carried out by the IEP. The empirical studies show[1] that utilization of the series of the business polls as explanatory variables[2] in prediction models improves on average the accuracy of the forecast. Calculations of future values of those indices were made on the basis of the ADL-model (with addition of seasonal autoregressive delays).

All the calculations were carried out with use of the Eviews econometric package.●

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[1] See, for example: V. Nosko, A. Buzaev, P. Kadochnikov, S. Ponomarenko. *The Analysis of Forecasting Parameters of Structural Models and Models with Business Surveys Results.* M., IEP, 2003.

[2] Used as explanatory variables were the following series of the business polls: the current/expected change in production, the expected changes in the solvent demand, the current/expected price changes and the expected change in employment.

Table 1

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF INDICES OF INDUSTRIAL PRODUCTION[1], (%)

| | Index of industrial production | | | | IIP as regards production of primary products | | IIP as regards manufacturing industry | | IIP as regards production and distribution of power, gas and water | | IIP as regards production of food products | | IIP as regards production of charred coal and oil products | | IIP as regards iron and steel industry and production of finished metallurgic products | | IIP as regards production of machines and equipment | |
| | Rosstat | | NRU HSE | | | | | | | | | | | | | | | |
	ARIMA	BS	ARIMA	BS	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE
Expected growth on the respective month of the previous year																		
Sept. 2012	4.9	3.1	4.7	2.7	-0.4	0.4	5.5	4.0	3.6	2.2	5.8	4.2	1.4	3.8	5.7	4.8	-2.7	-6.6
October 2012	2.0	3.1	3.0	2.4	0.2	0.5	4.7	3.4	3.1	4.9	4.5	3.2	-1.9	3.3	2.2	3.7	6.9	0.9
Nov. 2012	5.3	3.1	1.9	2.8	-0.8	-0.7	5.4	6.3	-0.2	1.9	2.4	2.6	-1.0	3.9	7.1	7.5	-11.1	-1.3
Dec. 2012	3.3	3.6	4.0	2.7	-0.2	-0.1	5.3	3.6	3.2	7.5	2.5	2.6	-2.2	4.2	5.4	4.9	5.3	-1.8
January 2013	1.3	3.3	2.6	3.1	-0.6	-0.9	5.8	6.3	0.6	1.7	4.7	4.3	-1.1	1.6	9.2	5.5	-10.9	6.0
February 2013	2.2	3.4	1.0	3.0	-1.8	-2.7	4.9	5.6	-6.2	-3.6	3.1	3.0	4.5	-1.1	9.7	4.1	8.5	5.3
For reference: actual growth in 2011/2012 on the respective month of 2010/2011																		
Sept. 2011	3.9		2.4		1.4	2.1	4.4	2.8	0.2	0.1	0.0	2.2	-1.2	-3.3	4.6	0.7	2.0	2.5
October 2011	3.6		2.0		-0.3	0.1	5.7	3.8	-2.2	-3.4	1.7	3.8	1.9	-2.2	7.1	3.1	3.0	-3.3
Nov. 2011	3.9		3.1		1.3	1.7	4.9	3.6	3.2	3.7	2.1	5.1	0.5	-0.4	-1.2	-3.2	23.5	18.8
Dec. 2011	2.5		0.6		1.8	1.7	3.3	2.0	-5.1	-8.3	3.8	5.8	-1.3	-1.9	2.6	0.0	-15.2	-12.2
January 2012	3.8		1.9		1.4	1.9	4.8	2.5	-0.2	-0.4	5.6	6.8	0.9	-0.2	5.7	-0.5	42.0	9.5
February 2012	6.5		6.1		3.7	5.1	6.3	6.4	6.7	6.9	7.9	9.2	5.4	5.9	6.1	3.0	14.6	13.6

Note: in the time spans under review, the series of the Rosstat and NRU HSE chain indices of industrial production as regards industry in general, as well as the NRU HSE chain indices of industrial production as regards manufacturing of machines and equipment are identified as stationary processes around the trend with an endogenous structural change; the series of the Rosstat and NRU HSE chain indices of industrial production as regards manufacturing industry, iron and steel industry and production of finished metal goods, as well as the NRU HSE chain indices of industrial production as regards production of primary products and Rosstat chain index as regards production of machines and equipment are identified as stationary processes around the trend with two endogenous structural changes. The time series of other chain indices are stationary at levels.

1 It is to be noted that for making of forecasts so-called "raw" indices (without seasonal and calendar adjustment) were used and for that reason in most models existence of the season factor is taken into account and, as a consequence, the obtained outputs reflect the seasonal dynamics of the series.

INDUSTRIAL PRODUCTION AND RETAIL SALES

Industrial production

For building of the forecast for September 2012 – February 2013, the series of monthly data of the indices of industrial production of the Federal State Statistics Service (Rosstat) from January 2002 till June 2012, as well as the series of the base indices of industrial production of the Center for the Economic Situation under the National Research University Higher School of Economics (NRU HSE) in the period from January 1999 till July 2012 were used (the value of January 1995 was equal to 100%). The forecast values of the series were calculated on the basis of ARIMA-class models. The forecast values of the FSSS and CES–NRU HSE indices of industrial production are calculated with use of business surveys (BS) as well. The obtained outputs are shown in Table 1.

As seen from *Table 1*, the average growth[1] of NRU HSE industrial production index in industry as a whole in September 2012 – February 2013 rose on the same period of 2011–2012 by 2.9%. For Rosstat industrial production index this value amounts to 3.2%. By the end of 2012, the forecasted annual growth of Rosstat industrial production index will amount to 2.8%, and that of NRU HSE industrial production index in industry – to 3.2%.

The average monthly values of Rosstat and NRU HSE industrial production indices in the extraction of mineral resources in September 2012 – February 2013 will amount to (-0.6%) and (-0.6%) 0.2 % respectively. The average growth values for Rosstat and NRU HSE indices in the production of coke and petroleum products will be at the level of 0.0 % and 2.6% respectively

The average growth of NRU HSE industrial production index for manufacturing industries in September 2012 – February 2013, by comparison with the same period of 2011–2012, is forecasted to be 4.9%, that of Rosstat index – 5.3 %. The average monthly values of Rosstat and NRU HSE industrial production indices for the production of foodstuffs will amount to 3.8% and 3.3% respectively. The average monthly values of Rosstat and NRU HSE industrial production indices for metallurgical production and production of finished metal products in September 2012 – February 2013 will amount to 6.5% and 5.1% respectively. In the production of machinery and equipment average growth is forecasted to be at the level of (-0.7%) and 0.4% in respect of Rosstat and NRU HSE indices, respectively

The average growth of Rosstat industrial production index for the production and distribution of gas and water in September 2012 – February 2013, against that in the same period of 2011–2012, will amount to 0.7 %; the corresponding value of the NRU HSE industrial production index amounts to 2.4%.

In 2012, the annual growth of Rosstat industrial production indices by type of economic activity will be 2.8%, and that of the NRU HSE industrial production indices – 3.0 %.

Retail Sales

This section (Table 2) presents forecasts of monthly retail sales made on the basis of monthly Rosstat data in the January 1999 – June 2012 period.

Table 2

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF THE RETAIL SALES AND REAL RETAIL SALES

	Forecast value according to ARIMA-model	
	Retail sales, billion Rb (in brackets – growth on the respective month of the previous year, %)	Real retail sales (as % of the respective period of the previous year)
September 2012	1849.5 (12.6)	105.3
October 2012	1922.4 (13.0)	105.2
November 2012	1919.5 (13.3)	105.5
December 2012	2340.3 (14.5)	105.5
January 2013	1741.4 (14.5)	105.7
February 2013	1733.3 (14.3)	106.3
For reference: actual value in the same months of 2011/2012		
September 2011	1643.2	109.3
October 2011	1701.3	109.1
November 2011	1693.9	108.4
December 2011	2044.0	109.3
January 2012	1520.8	107.4
February 2012	1516.5	107.9

Note: series of retail sales and real retail sales in the January 1999 – June 2012 period.

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[1] The average growth of industrial production indices is understood here as the average value of the said indices for six forecasted months.

From *Table 2* it follows that the average forecasted rise on the same period of 2011–2012 in the monthly volumes of retail turnover in the period of September 2012 through February 2013 will amount to approximately 13.7%.

The real average increase of the retail turnover index for the period from August 2012 through January 2013 will amount to 5.6 % against the corresponding period of 2011–2012.

In per annum terms, the forecasted nominal growth of retail turnover index by the end of 2012 will be 14.5%, its growth in real terms – 5.5%.

INVESTMENTS IN CAPITAL ASSETS

Table 3

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF THE VOLUME OF INVESTMENTS IN CAPITAL ASSETS AND REAL INVESTMENTS IN CAPITAL ASSETS

Forecast values according to ARIMA-model		
	Investments in capital assets, billion Rb (in brackets – growth on the respective month of the previous year, %)	Real investments in capital assets (as % of the respective period of the previous year)
September 2012	1140.9 (9.1)	101.6
October 2012	1253.7 (9.1)	99.3
November 2012	1290.9 (8.3)	98.9
December 2012	2334.7 (13.1)	96.6
January 2013	350.1 (-20.5)	97.8
February 2013	495.9 (-13.5)	101.2
For reference: actual values in the same months of 2011/2012		
September 2011	1045.9	109.5
October 2011	1149.4	113.7
November 2011	1192.3	112.8
December 2011	2064.0	114.0
January 2012	440.4	115.6
February 2012	573.0	116.2

Note: series of investments in capital assets in the January 1999 – June 2012 period are series of DS type.

Table 3 presents the outputs of calculations of forecast values of investments in capital assets in September-February 2012. The forecasts were made on the basis of time-series models with utilization of the Rosstat data of the January 1999 – June 2012 period.

The results presented in *Table 3* indicate that the average forecasted growth, on the same period of 2011–2012, of investments over the period of September 2012 through February 2013 will amount to approximately 0.9%.

The average forecasted decline of investment in real terms over the period of September 2012 through February on the same period of 2011–2012 will be 0.8%.

The forecasted per annum growth, in nominal terms, of investments in capital assets will amount in 2012 to 13.1%. The decline of real investments in capital assets by the results of the year 2012 is forecasted at the level of 3.4%.

FOREIGN TRADE INDICES

Model calculations of forecast values of the export and export to countries outside the CIS and the import and import from countries outside the CIS were made on the basis of the models of time series and structural models evaluated on the basis of the monthly data in the period from September 1998 till June 2012 on the basis of the data of the Central Bank of Russia[1]. The outputs of the calculations are shown in Table 4.

The average forecasted increase in the indices of exports, imports, export to countries outside the CIS, and import from the countries outside the CIS over the period of September 2012 through February 2013 will amount to 42%, 38%, 36% and 37 % respectively on the same period of 2011–

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1 The data on the foreign trade turnover is calculated by the CBR in accordance with the methods for making of the balance of payment in prices of the exporter-country (FOB) in billion USD.

2012. The average forecasted balance of trade with all countries in September 2012 – February 2013 will amount to $ 100.5bn, thus pointing to a decline of 9.5% on the same period of 2011–2012.

Table 4

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF VOLUMES OF FOREIGN TRADE TURNOVER WITH COUNTRIES OUTSIDE THE CIS

Month	Export, total				Import, total				Export to countries outside the CIS				Import from countries outside the CIS			
	Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year	
	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM
September 2012	36.4	43.0	83	98	27.1	27.5	98	100	30.6	32.1	84	88	24.8	25.3	106	109
October 2012	39.9	47.5	87	103	27.7	28.7	94	98	31.4	35.5	81	92	23.1	22.9	92	91
November 2012	42.5	50.6	90	107	31.4	28.5	103	94	33.1	35.4	83	89	23.4	24.1	89	92
December 2012	42.3	53.8	82	105	30.8	29.6	101	97	35.8	35.2	84	82	24.8	24.4	95	93
January 2013	38.7	50.7	97	127	27.4	25.4	140	130	29.8	35.8	87	105	24.5	20.1	149	123
February 2013	42.4	51.9	94	114	28.1	26.4	113	106	32.0	35.6	84	94	23.7	21.0	111	98
For reference: actual values in respective months of 2011/2012 (billion USD)																
September 2011	43.8				27.6				36.4				23.3			
October 2011	46.0				29.4				38.7				25.2			
November 2011	47.3				30.4				39.9				26.2			
December 2011	51.3				30.7				42.8				26.1			
January 2012	39.8				19.6				34.2				16.4			
February 2012	45.3				25.0				37.9				21.4			

Note: in the period from January 1999 till June 2012, the series of the export, import, export to the countries outside the CIS and import from the countries outside the CIS were identified as stationary series in the first-order differences. In all the cases, seasonal components were included in the specification of the models.

DYNAMICS OF PRICES

The Consumer Price index and Producer Price Indices

This section presents calculations of forecast values of the consumer price index and producer price indices (as regards both the industry in general and some types of its activities under the National Industry Classification Standard (NICS)) made on the basis of the time-series models evaluated on the basis of the Rosstat data in the period from January 1999 to June 2012[1]. Table 5 presents the outputs of model calculations of forecast values in September 2012 – February 2013 in accordance with ARIMA-models, structural models (SM) and models built with utilization of business surveys (BS).

The forecasted average monthly growth rate of the consumer price index (CPI) over the period of September 2012 through February 2013 will amount to 0.6%. For that period, the growth rate of producer price indices is forecasted, on the average, at the level of 0.5% per month. The average per annum growth of the consumer price index (based on two models) will be 6.6%. The same index for producer prices will be at the level of 5.7%.

As regards the OKVED's indices of manufacturing prices, the following monthly rates of growth are forecasted for the period of September 2012 through February 2013: 2.1% in the extraction of mineral resources, 0.4% in manufacturing industries, 1.3 % in the production and distribution of electric power, gas and water, 0.4% in the production of foodstuffs, 0.4% in textile and clothing manufacture, 0.9 %

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1 Structural models were evaluated in the period from October 1998.

in the processing of timber and the production of millwork, 0.5% in pulp and paper production, 1.8% in the production of coke and petroleum products, 1.0% in chemical production, 1.6% in metallurgical production and the production of finished metal products, 0.4% in the production of machinery and equipment, and 0.7% in the production of transport facilities and equipment.

Table 5

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF PRICE INDICES

Month	The consumer price index (ARIMA)	The consumer price index (SM)	Producer price indices:													
			PPI of industrial goods (ARIMA)	PPI of industrial goods (BS)	Production of primary products	Manufacturing	Production of power, gas and water	Production of food products	Textile and sewing industry	Woodworking and production of wood products	Pulp and paper industry	Production of charred coal and oil products	Chemical industry	Iron and steel industry and production of finished metal goods	Production of machines and equipment	Production of transport vehicles and equipment
Forecast values (% of the previous month)																
September 2012	100.5	100.5	100.8	100.7	100.2	100.5	100.0	100.1	100.5	100.4	100.4	102.8	101.3	103.1	100.0	100.1
October 2012	100.6	100.4	100.6	100.6	101.2	100.7	100.0	100.4	100.5	100.9	100.4	101.9	101.6	102.1	100.1	100.8
November 2012	100.5	100.1	101.0	101.0	103.0	100.6	100.1	100.5	100.6	101.2	100.4	102.0	101.0	101.7	100.2	100.3
December 2012	100.5	100.3	101.5	100.5	102.7	99.7	99.7	100.5	100.1	100.9	100.3	101.5	101.0	100.9	100.5	100.9
January 2013	101.5	101.0	101.0	95.2	102.2	100.2	101.3	100.3	100.6	100.7	101.2	101.1	101.0	101.2	101.0	101.4
February 2013	100.5	100.8	101.1	101.9	103.1	100.8	107.0	100.6	100.4	101.1	100.4	101.4	100.4	100.6	100.8	100.5
Forecast values (% of December 2011/2012)																
September 2012	105.0	105.1	103.6	102.4	110.8	102.7	96.7	102.0	100.3	102.9	101.8	103.7	101.3	105.8	104.0	103.7
October 2012	105.6	105.5	104.2	103.0	112.2	103.3	96.7	102.4	100.8	103.8	102.2	105.7	102.9	108.1	104.0	104.5
November 2012	106.1	105.6	105.2	104.0	115.6	103.9	96.8	103.0	101.3	105.1	102.6	107.9	103.9	110.0	104.3	104.8
December 2012	106.6	106.0	106.9	104.5	118.6	103.6	96.4	103.5	101.4	106.0	102.9	109.5	104.9	110.9	104.8	105.8
January 2013	101.5	101.0	101.0	99.5	102.2	100.2	101.3	100.3	100.6	100.7	101.2	101.1	101.0	101.2	101.0	101.4
February 2013	102.0	101.8	102.1	101.4	105.4	101.0	108.3	100.9	101.1	101.8	101.6	102.6	101.4	101.8	101.8	101.9
For reference: actual values in the same periods of 2011/2012 (% of December 2010/2011)																
September 2011	104.8		110.1		118.0	108.3	103.5	101.6	112.9	105.8	103.1	115.4	112.2	107.5	105.4	108.1
October 2011	105.3		111.1		119.0	109.1	105.0	101.5	113.4	107.6	103.4	118.2	114.5	107.4	105.7	108.5
November 2011	105.7		112.2		123.3	109.2	105.0	101.9	113.7	108.5	103.4	119.7	113.7	106.3	105.6	108.4
December 2011	106.1		112.4		126.5	108.4	105.3	102.0	112.6	108.8	102.9	117.6	110.5	104.7	105.5	109.4
January 2012	100.5		99.7		101.8	98.9	99.7	99.4	98.7	99.5	100.4	95.7	99.3	99.2	100.3	99.5
February 2012	100.9		100.8		106.4	98.9	99.4	99.2	98.3	99.9	100.5	94.1	100.4	99.9	100.7	100.8

Note: in the period from January 1999 till June 2012, the series of the chain producer price index of industrial goods as regards production of machines and equipment are identified as a stationary process around the trend with two endogenous snatructural changes. The series of other chain price indices are stationary at levels.

Thus, the forecasted average growth of manufacturing prices in 2008 will be 29.5 %. The maximum growth is forecasted for manufacturing prices in metallurgical production and the production of finished metal products (63.2 %), as well as in the extraction of mineral resources (58.1 %) and in chemical production (46.6 %).

Thus, the forecasted average growth of manufacturing prices, by type of economic activity, in 2008 will be 5.7%. The maximum growth is forecasted for manufacturing prices in the extraction of mineral resources – 18.6%. It is expected that manufacturing prices in the production of electric power, gas and water will decline, in annual terms, by around 3.6% by the end of 2012.

The dynamics of the cost of the minimum package of food products

This section presents the outputs of calculations of forecast values of the cost of the minimum package of food products in September2012 – February 2013. The forecasts were made on the basis of time series with use the Rosstat data in the period from January 2000 till June 2012. The outputs of calculations are shown in Table 6.

As seen from *Table 6*, it is forecasted that the price of the minimum set of food products will indeed rise on the corresponding level of last year. At the same time, the average forecasted price of the minimum set of food products amounts to approximately Rb 2,636.4. The forecasted rise in the cost of the minimum set of food products amounts, on the average, to approximately 9.0%, by comparison with the level of the corresponding period of last year. In 2012, the annual rise in the cost of the minimum set of food product will amount to 9.0%.

Indices of Transportation Tariffs on Cargo Carriage

This section presents calculations of forecast values of price indices of transportation tariffs on cargo carriage[1], made on the basis of time-series models evaluated on the basis of the Rosstat data in the period from September 1998 till June 2012. Table 7 shows the outputs of model calculations of forecast values in September 2012 – February 2013. It is to be noted that some of the indices under review (for instance, the index of tariffs on pipeline transportation) are adjustable ones and for that reason their behavior is hard to describe by means of the time-series models. As a result, the future values may differ greatly from the real ones in case of the centralized increase of the tariffs in the period of forecasting or in case of absence of such an increase in the forecasting period, but with it taking place shortly before the beginning of that period.

Table 6

THE FORECAST OF THE COST OF THE MINIMUM PACKAGE OF FOOD PRODUCTS (PER PERSON A MONTH)

Forecast values according to ARIMA-model (Rb)	
September 2012	2614.2
October 2012	2611.4
November 2012	2624.4
December 2012	2638.9
January 2013	2659.3
February 2013	2669.9
For reference: actual values in the same months of 2011/2012 (billion Rb)	
September 2011	2409.1
October 2011	2390.8
November 2011	2399.6
December 2011	2419.9
January 2012	2437.4
February 2012	2456.0
Expected growth on the respective month of the previous year (%)	
September 2012	8.5
October 2012	9.2
November 2012	9.4
December 2012	9.0
January 2013	9.1
February 2013	8.7

Note: the series of the cost of the minimum package of food products in the period from January 2000 till June 2012 are stationary in the first-order differences.

Table 7

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF INDICES OF TRANSPORTATION TARIFFS

Period	Composite index of transportation tariffs on cargo carriage	Index of tariffs on motor cargo carriage	Index of tariffs on pipeline transportation
Forecast values according to ARIMA-models (% of the previous month)			
September 2012	100.4	100.3	101.4
October 2012	100.4	100.3	101.0
November 2012	100.4	100.3	101.7
December 2012	100.4	100.2	101.6
January 2013	105.8	102.0	101.3
February 2013	100.3	100.2	101.5
Forecast values according to ARIMA-models (% of December of the previous year)			
September 2012	99.6	106.4	95.4
October 2012	105.0	106.7	107.4
November 2012	105.4	106.9	109.3
December 2012	105.5	107.2	109.9
January 2013	105.8	102.0	101.3
February 2013	106.1	102.2	102.8

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1 The Bulletin presents a review of the composite index of transportation tariffs on cargo carriage and the index of transportation tariffs on motor cargo carriage, as well as the index of tariffs on pipeline transportation. The composite index of transportation tariffs on cargo carriage is calculated on the basis of the indices of tariffs on cargo carriage by individual types of transport: railway, pipeline, shipping, domestic water-borne, motor and air service (for more detailed information, pls. refer, for instance, to: Prices in Russia. The Official Publication of Goskomstat of RF, 1998).

Table 7, cont'd

Period	Composite index of transportation tariffs on cargo carriage	Index of tariffs on motor cargo carriage	Index of tariffs on pipeline transportation
For reference: actual values in the same period of 2011/2012 (% of the previous month)			
September 2011	100.5	100.4	100.7
October 2011	92.7	100.0	85.9
November 2011	100.5	100.5	100.9
December 2011	99	100.3	97.7
January 2012	99.1	102.2	93.0
February 2012	100.0	101.2	99.9

Note: in the period from November 2000 till June 2012, the series of the index of tariffs on motor cargo carriage were identified as stationary ones; the other series were identified as stationary ones in the period from November 1998 till June 2012, too; fictitious variables for taking into account particularly dramatic fluctuations were used in respect of all the series.

According to the results of the forecast for the period from September 2012 through December 2012, the behavior of the cargo transportation rate composite index will be relatively stable: the average monthly growth of the index of the cargo transportation tariffs is forecasted at around 0.4%. During the next six months, the average monthly increase of this indicator will amount to 1.1 %. It is planned that in January 2013 there will be a 5.8 pp seasonal leap in the value of this index. The annual growth of the index in 2012 will be around 5.5%.

The motor vehicle cargo transportation rate index will grow at an average monthly rate of 0.2% until December 2012. As a result, its annual growth in 2012 will amount to 7.2%. It is forecasted that in January 2013 the value of this index will show a seasonal leap of 2 pp.

In the next six months, the index of the pipeline transportation tariffs will be gradually rising at a monthly rate of 1.5%, which will result in an annual growth of 9.9%.

The dynamics of prices on some types of primary products on the global market

This section presents calculations of such average monthly values of prices on Brent oil ($ per barrel), Aluminum ($ per ton), gold ($ per ounce), copper ($ per ton) and nickel ($ per ton) in September 2012 – February 2013 as were received on the basis of nonlinear models of time series evaluated on the basis of the IMF data in the period from January 1980 till July 2012.

Table 8

THE OUTPUTS OF CALCULATIONS OF FORECAST VALUES OF PRICES ON PRIMARY PRODUCTS

Month	Brent oil ($ per barrel)	Aluminum ($ per ton)	Gold ($ per ounce)	Copper ($ per ton)	Nickel ($ per ton)
Forecast values according to ARIMA–models					
September 2012	112.50	1822	1600	7763	15977
October 2012	114.14	1810	1607	7699	16035
November 2012	112.21	1807	1614	7651	15970
December 2012	112.27	1793	1621	7621	15965
January 2013	113.86	1784	1629	7602	15910
February 2013	116.00	1782	1636	7562	15823
Growth on the respective month of the previous year (%)					
September 2012	1.5	-20.6	-9.6	-6.5	-21.6
October 2012	4.3	-17.0	-3.5	4.1	-15.8
November 2012	1.5	-13.1	-7.2	0.9	-10.6
December 2012	4.0	-11.4	-1.3	0.8	-12.5
January 2013	2.6	-17.1	-1.4	-5.7	-20.1
February 2013	-3.1	-19.3	-6.1	-10.4	-22.4
For reference: actual values in the same period of 2011/2012					
September 2011	110.88	2294	1771	8300	20378
October 2011	109.48	2181	1665	7394	19039

Table 8, cont'd

Month	Brent oil ($ per barrel)	Aluminum ($ per ton)	Gold ($ per ounce)	Copper ($ per ton)	Nickel ($ per ton)
November 2011	110.51	2080	1738	7581	17873
December 2011	107.97	2024	1642	7559	18246
January 2012	110.99	2151	1652	8062	19909
February 2012	119.70	2208	1743	8441	20394

Note: in the period from January 1980 till July 2012, the series of prices on oil, nickel, gold, copper and aluminum are series of DS type.

The average forecasted level of oil prices amounts to approximately $ 113.5 per barrel, which exceeds last year's corresponding indicators by 1.8% on the average. Prices of aluminum are forecasted at the level of approximately $ 1,800 per ton, and their average forecasted increase amounts to approximately 16% against the corresponding level of last year. Prices of gold are forecasted at approximately $ 1,617 per ounce. The average forecasted prices of copper amount to approximately $ 7,650 per ton, while those of nickel – to approximately $ 15,947 per ton. The average forecasted drop in prices of gold amounts to approximately 5%, the average forecasted drop in prices of copper – to approximately 3%, while that in prices of nickel – to approximately 17% by comparison with the corresponding level of last year.

By the end of 2012 the per barrel price of Brent crude oil is forecasted at around $ 112.27 (an annual growth of 21%); the per ton price of aluminum – at $ 1,793 (a decline by 11.4%); the per ounce price of gold – at $ 1,621 (a 1.3% decline); the per ton price of copper – at $ 7,621 (a 0.8% growth); the per ton price of nickel – at $ 15,965(a 20.1% decline).

MONETARY INDICES

The future values of the monetary base (in the narrow definition: cash funds and the Fund of Mandatory Reserves (FMR)) and M_2 monetary aggregate in September 2012 – February 2013 were received on the basis of models of time-series of respective indices calculated by the CBR[1] in the period from October 1998 till June 2012. Table 9 presents the outputs of calculations of forecast values and actual values of those indices in the same period of the previous year. It is to be noted that due to the fact that the monetary base is an instrument of the policy of the CBR the forecasts of the monetary base on the basis of time-series models are to a certain extent notional as the future value of that index is determined to a great extent by decisions of the CBR, rather than the inherent specifics of the series.

Table 9

THE FORECAST OF M_2 MONETARY AGGREGATE AND THE MONETARY BASE

Period	Monetary base		M_2	
	Billion Rb	Growth on the previous month, %	Billion Rb	Growth on the previous month, %
September 2012	7404.6	3.8	25505.9	1.0
October 2012	7362.5	-0.6	25753.6	1.0
November 2012	7632.8	3.7	26000.0	1.0
December 2012	10267.2	34.5	26245.3	0.9
January 2013	7868.2	-23.4	26489.4	0.9
February 2013	7837.8	-0.4	26732.2	0.9
For reference: actual value in the respective months of 2011/2012 (growth on the previous month, %)				
September 2011	0.6		1.9	
October 2011	1.5		-0.5	
November 2011	0.9		2.7	
December 2011	10.6		11.7	

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1 The data on the specific month is given in accordance with the methods of the CBR as of the beginning of the following month.

Table 9, cont'd

Period	Monetary base		M_2	
	Billion Rb	Growth on the previous month, %	Billion Rb	Growth on the previous month, %
January 2012		-5.9		-3.5
February 2012		1.2		0.7

Note: in the period from October 1998 to June 2011, all the time series of monetary indices were attributed to the class of series which are stationary in the first-order differences and have an explicit seasonal component.

In September–November 2012, the average forecasted increase of the monetary base in the period from October through March 2009 will amount to 3% per month, and a 34.5% seasonal leap in the value of this index is forecasted to take place in December 2012. According to forecasts, the annual growth of the monetary base in 2012 will amount to 43.6%. The average monthly increase of M_2 is forecasted at the level of 1%. As a result, the annual growth of this index in 2012 is forecasted to be around 6.9%.

INTERNATIONAL (GOLD AND FOREIGN EXCHANGE) RESERVES

This section presents the outputs of the statistical evaluation of such future values of the international reserves of the Russian Federation[1] as were received on the basis of evaluation of the model of time series of the gold and foreign exchange reserves on the basis of the data of the CBR in the period from October 1998 till June 2012. That index is forecasted without taking into account a decrease in the amount of the reserves due to payment of the foreign debt and for that reason the values of the volumes of the international reserves in the months where foreign debt payments are made may happen to be overestimated (or, otherwise, underestimated) as compared to the actual ones.

As indicated by the results of our forecasts for September 2012 – February 2013, the gold and foreign exchange reserves will be increasing at an average monthly rate of 1.4%. Annual growth of the gold and foreign exchange reserves in 2012 is predicted to be at the level of 9.2%.

Table 10

THE FORECAST OF INTERNATIONAL (GOLD AND FOREIGN EXCHANGE) RESERVES

Period	Forecast values according to ARIMA-models	
	Billion USD	Growth on the previous month, %
September 2012	526.7	2.2
October 2012	537.2	2.0
November 2012	541.5	0.8
December 2012	544.5	0.6
January 2013	551.2	1.2
February 2013	559.7	1.5
For reference: actual values in the same period of 2011/2012		
September 2011	516.8	-5.2
October 2011	525.6	1.7
November 2011	510.9	-2.8
December 2011	498.6	-2.4
January 2012	505.4	1.3
February 2012	513.9	1.7

Note: in the period from October 1998 till June 2012, the series of the gold and foreign exchange reserves of the Russian Federation were identified as stationary series in difference.

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1 The data on the volume of the gold and foreign exchange reserves is presented as of the first day of the following month.

FOREIGN EXCHANGE RATES

The model calculations of prospective values of the foreign exchange rates (RUR per USD and euro) were made on the basis of assessment of the time series models (ARIMA) and structural models (SM) of the relevant indicators quoted by the RF Central Bank as the last date of each month over the periods between October 1998 and August 2012 and between January 1999 and August 2012[1] respectively.

As forecasted for the period of September 2012 – February 2013, the average USD to ruble exchange rate (based on two models) will be Rb 32.23 per USD. The index forecasted for the end of 2012 will be Rb 32.29 per USD.

The average euro – USD exchange rate (based on two models) will be 1.25 USD per 1 euro – the same as its index for the end of 2012.

Table 11

FORECASTS OF THE RUR/USD AND USD/EUR EXCHANGE RATES

Period	Forecast values of the RUR/USD exchange rate (RUR per USD) according to ARIMA–-model		Forecast values of the USD/EUR (USD per EUR) according to ARIMA-model	
	ARIMA	SM	ARIMA	SM
September 2012	32.12	31.97	1.24	1.25
October 2012	32.17	32.00	1.24	1.25
November 2012	32.25	32.18	1.24	1.25
December 2012	32.30	32.28	1.24	1.25
January 2013	32.37	32.31	1.24	1.26
February 2013	32.43	32.32	1.24	1.27
For reference: actual values in the similar period of 2011/2012				
September 2011	30.50		1.38	
October 2011	30.50		1.38	
November 2011	30.67		1.36	
December 2011	31.30		1.31	
January 2012	31.26		1.29	
February 2012	29.80		1.32	

Note: in the respective periods, the series under review were identified as integrated series of the first order with a seasonal component.

INDICES OF THE STANDARD OF LIVING

This section (Table 12) presents such outputs of calculations of forecast values of indices of real wages, real disposable cash income and real cash income [2] as were received on the basis of the model of time series of respective indices calculated by Rosstat and taken in the period from January 1999 till July 2012. The above indices depend to a certain extent on the centralized decisions on raising of wages and salaries to public sector workers, as well as those on raising of pensions, scholarships and allowances; such a situation introduces some changes in the dynamics of the indices under review. As a result, the future values of the indices of real wages and real disposable cash income calculated on the basis of the series which last observations are either considerably higher or lower than the previous ones due to such a raising may differ greatly from those which are implemented in reality.

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1 The Bulletin applies the IMF's data for the period between January 1999 and August 2012. The data for August and September 2012 were obtained from the foreign exchange rate statistics website www.oanda.com

2 *Real cash income* is a relative index which is calculated by means of division of the index of the nominal size (which was actually formed in the period under review) of households' cash income by the CPI. *Real disposable cash income* is cash income minus mandatory payments and contributions. (See: *Rossiisky Statistichesky Ezhegodnik*, Moscow, Rosstat, 2004, p. 212).

The results shown in *Table 12* predict growth, on the same period of 2011, of real disposable cash income, real accrued wages and salaries and real cash income. Thus, real disposable cash income is expected to increase, on the average, by approximately 2.5%; growth of real cash income will be somewhat similar – 2.3% on its last year's index; and real accrued wages and salaries will increase by 1.7% on the same period of last year.

It is forecasted that, by the results of the year 2012, all the indices of the standards of loving are going to increase: real disposable cash income – 3.4%; real cash income – by 3.8%; and real accrued wages and salaries – by 10.6% over 12 months.

Table 12

THE FORECAST OF THE INDICES OF THE STANDARD OF LIVING

Period	Real disposable cash income	Real cash income	Real accrued wages and salaries
	Forecast values according to ARIMA-models (% of the respective month of 2011/2012)		
September 2012	104.0	104.1	110.4
October 2012	104.3	104.6	110.5
November 2012	105.1	105.3	110.5
December 2012	105.2	105.1	110.6
January 2013	105.1	105.2	110.7
February 2013	105.7	105.9	110.7
For reference: actual values in the respective period of 2011/2012 (% of the same period of 2010/2011)			
September 2011	102.7	102.3	105.3
October 2011	100.1	100.0	106.2
November 2011	100.7	100.8	107.0
December 2011	106.3	106.9	111.4
January 2012	101.0	101.9	110.5
February 2012	103.1	103.8	112.1

Note: for calculating purposes, the series of the disposable cash income, real cash income and real wages in the base form were used (March 1999 was adopted as a base period). In the period from January 1999 till July 2011, those series were attributed to the class of processes which are stationary in differences and have an explicit seasonal component.

EMPLOYMENT AND UNEMPLOYMENT

For the purpose of calculation of the future values of the employment (of the number the gainfully employed population) and the unemployment (the total number of the unemployed), models of time series evaluated in the period from October 1998 till June2012 on the basis of the monthly data of Rosstat[1] were used. The unemployment was calculated on the basis of the models with results of the outputs of business polls[2], too.

It is to be noted that possible logical differences[3] in forecasts of the employment and the unemployment which totals should be equal to the index of the economically active population may arise due to the fact that each series is forecasted individually and not as the difference between the forecast values of the economically active population and another index.

According to the forecasts based on the ARIMA-models (*Table 13*), over the period of September 2012 – February 2013 the average monthly growth of employment across the national economy will amount to 0.9% on the same period of the previous year. The employment index forecasted for the end of 2012 will be 71.2m for the national economy taken as a whole.

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1 The index is calculated in accordance with the methods of the International Labor Organization (ILO) and is given as of the end of the month.

2 The model is evaluated in the period from January 1999 till June 2012.

3 For example, deemed as such a difference may be a simultaneous decrease both in the number of the gainfully employed population and the total number of the unemployed. However, it is to be noted that in principle such a situation is possible provided that there is a simultaneous decrease in the number of the economically active population.

The average decline in the overall number of unemployed is forecasted to be at the level of 7.6% per month against the index registered in the corresponding period of last year. The average number of unemployed at the end of 2012 is forecasted to be 4.4m.

Table 13

THE OUTPUTS OF CALCULATION OF FORECAST VALUES OF THE INDICES THE EMPLOYMENT AND THE UNEMPLOYMENT

Month	Employment (ARIMA)		Unemployment (ARIMA)			Unemployment (BS)		
	Million people	Growth on the respective month of 2011 (%)	Million people	Growth on the respective month of 2011 (%)	% of the index of the number of the gainfully employed population	Million people	Growth on the respective month of 2011 (%)	% of the index of the number of the gainfully employed population
September 2012	72.4	0.5	4.4	-5.3	6.0	4.0	-13.7	5.5
October 2012	71.7	1.2	4.4	-8.4	6.1	4.1	-14.0	5.7
November 2012	71.6	0.8	4.5	-5.7	6.3	4.1	-14.0	5.7
December 2012	71.2	0.4	4.7	2.6	6.6	4.1	-12.0	5.8
January 2013	70.7	1.0	5.0	2.0	7.1	4.2	-14.3	5.9
February 2013	70.8	1.3	5.1	6.1	7.2	4.1	-14.0	5.8
For reference: actual values in the same periods of 2011/2012 (million people)								
September 2011	72.0		4.6					
October 2011	70.8		4.8					
November 2011	71.0		4.8					
December 2011	70.9		4.6					
January 2012	70.0		4.9					
February 2012	69.9		4.8					

Note: in the period from October 1998 till June 2012, the series of the number of the gainfully employed population is a stochastic process which is stationary around the trend. The series of the index of the total number of the unemployed is a stochastic process with the first order integration. Both the indices include a seasonal component.

ANNEX

Diagrams of the Time Series of the Economic Indices of the Russian

Fig. 1a. The FSSS index of industrial production (ARIMA-model) (% of December 2001)
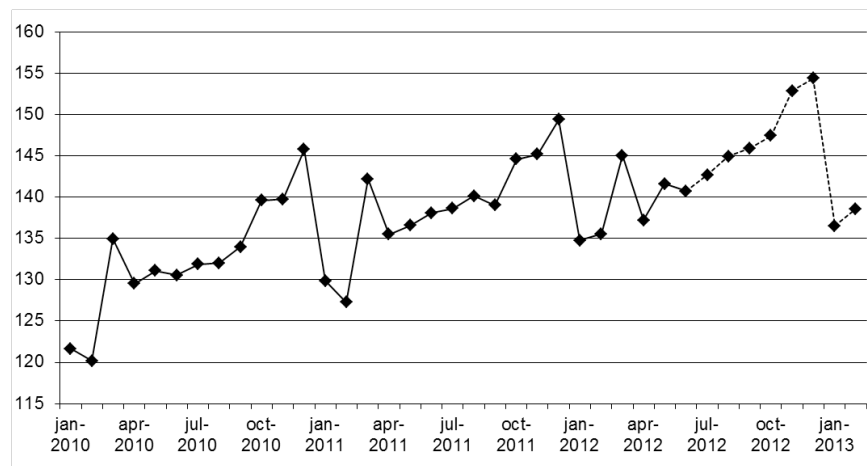
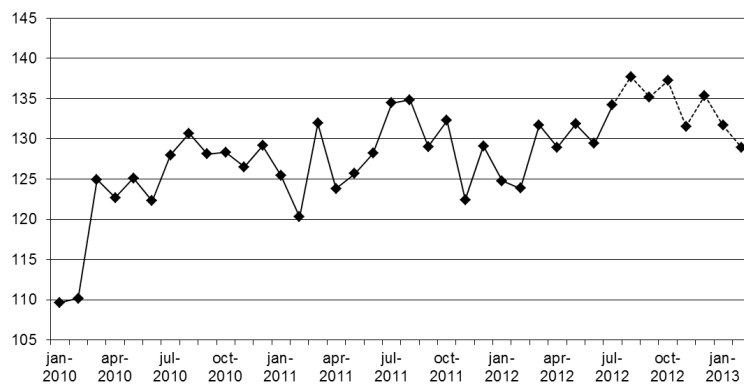*Fig. 1b. The CEC–NRU HSE index of industrial production (ARIMA-model) (% of January 1995)*
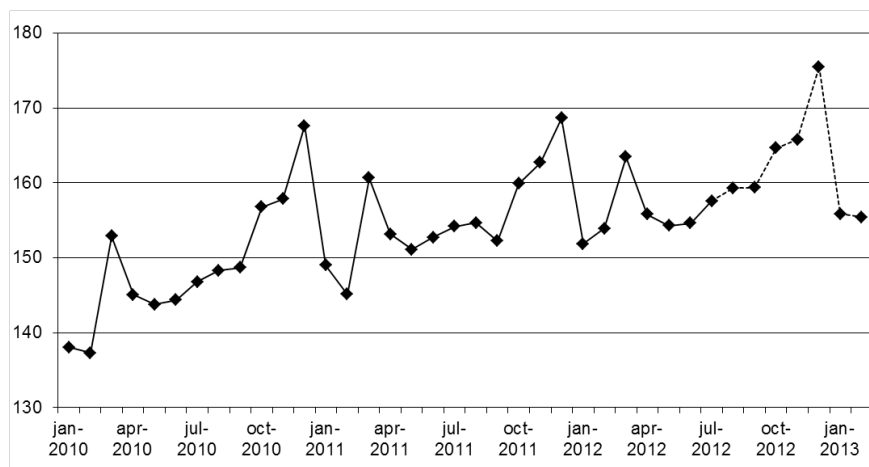
Fig. 2a. The FSSS index of industrial production as regards production of primary products (% of December 2001)
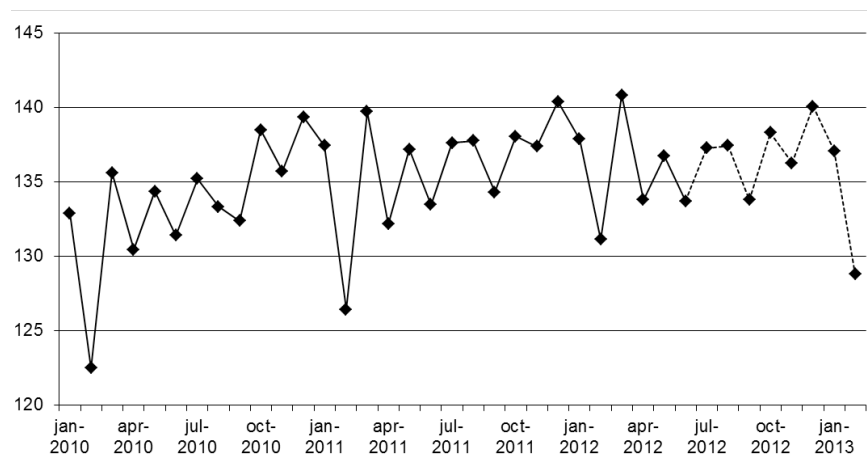
Fig. 2b. The CEC–NRU HSE index of industrial production as regards production of primary products (% of January 1995)
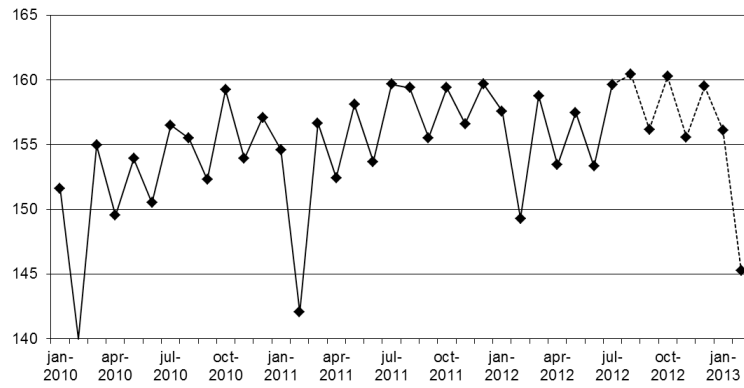
Fig. 3a. The FSSS index of industrial production as regards manufacturing industry (% of December 2001)
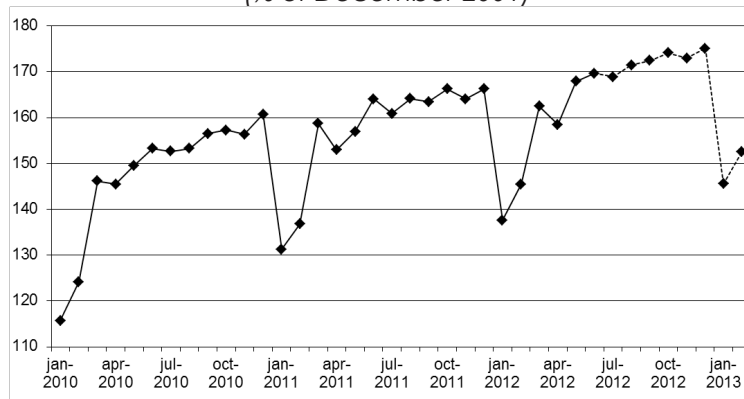
Fig. 3b. The CEC–NRU HSE index of industrial production as regards manufacturing industry (% of January 1995)
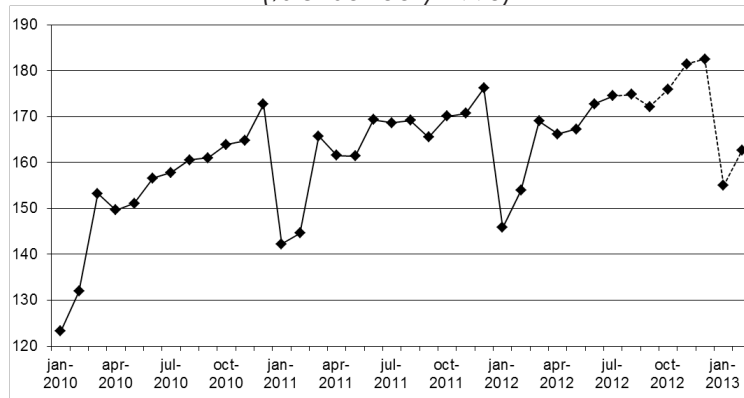
Fig. 4a. The FSSS index of industrial production as regards production and distribution of power, gas and water (% of December 1998)
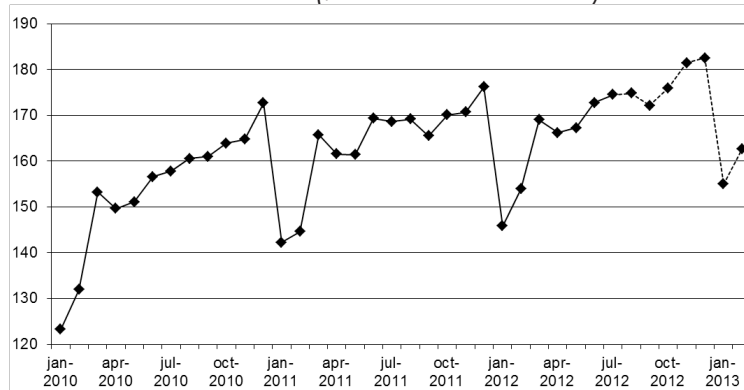
Fig. 4b. The CEC–NRU HSE index of industrial production as regards production and distribution of power, gas and water (% of January 1995)
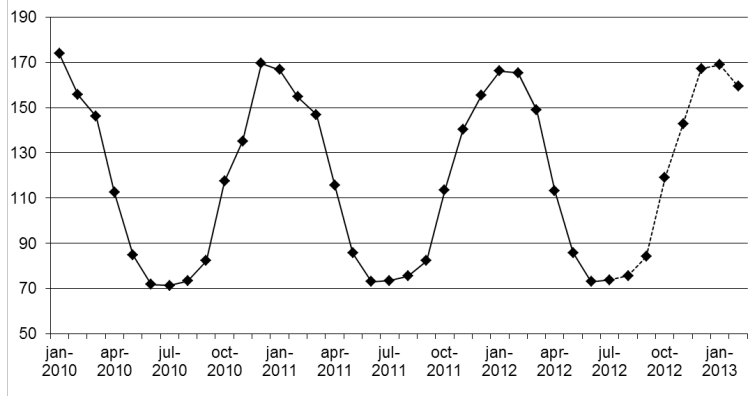
Fig. 5a. The FSSS index of industrial production as regards production of food products (% of December 2001)
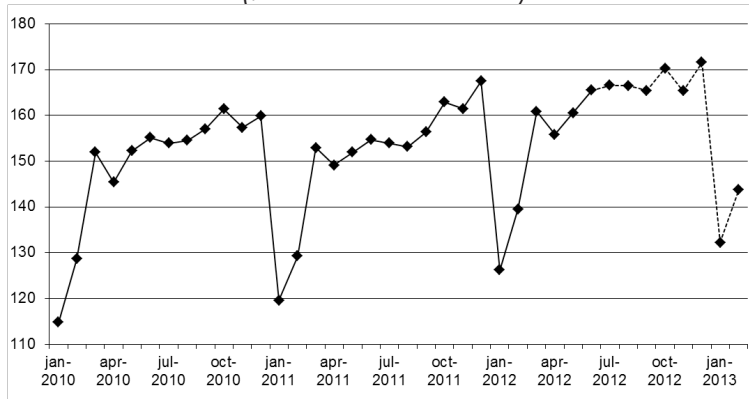
Fig. 5b. The CEC–NRU HSE index of industrial production as regards production of food products (% of January 1995)
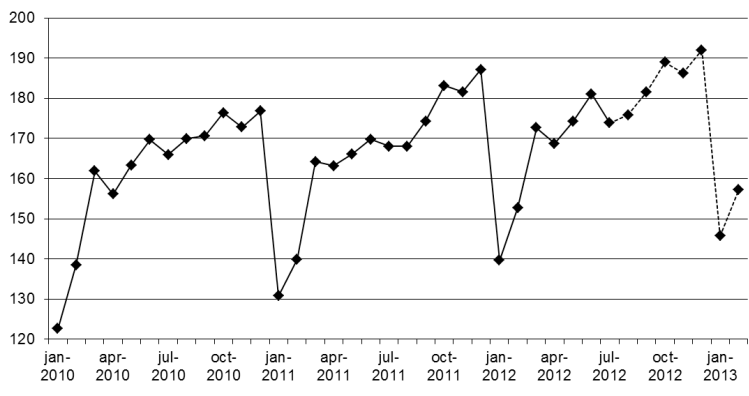
Fig. 6a. The FSSS index of industrial production as regards production of charred coal and oil products (% of December 2001)
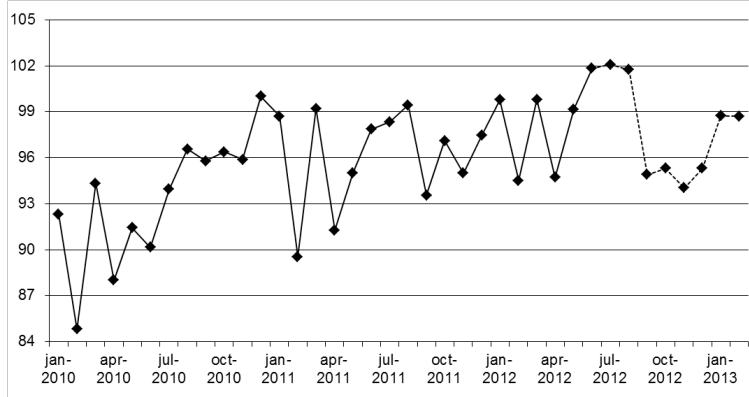
Fig. 6b. The CEC–NRU HSE index of industrial production as regards production of charred coal and oil products (% of January 1995)
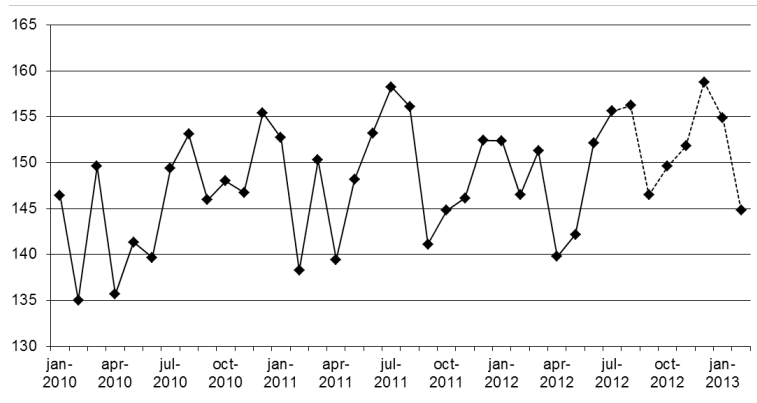
Fig.7a. The FSSS index of industrial production as regards iron and steel industry and production of finished metal goods (% of December 1998)
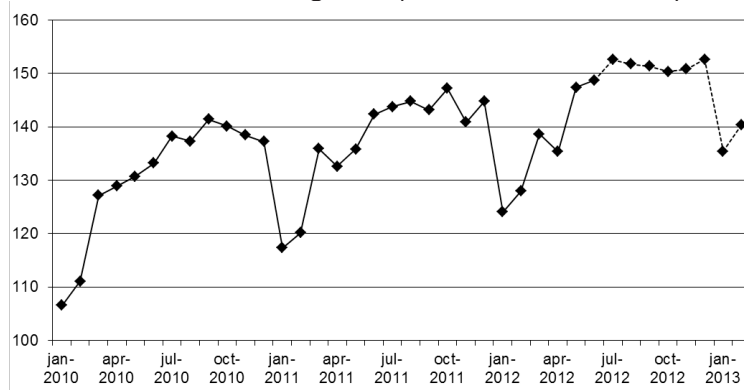
Fig. 7b. The CEC–NRU HSE index of industrial production as regards iron and steel industry and production of finished metal goods (% of January 1995)

Fig. 8a. The FSSS index of industrial production as regards production of machines and equipment (% of December 1998)
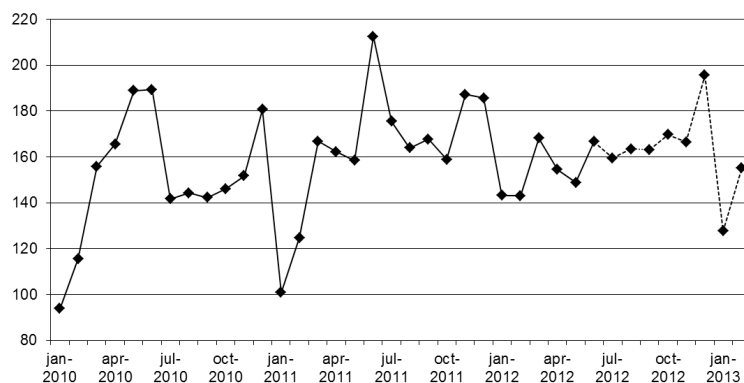
Fig. 8b. The CEC–NRU HSE index of industrial production as regards production of machines and equipment (% of January 1995)
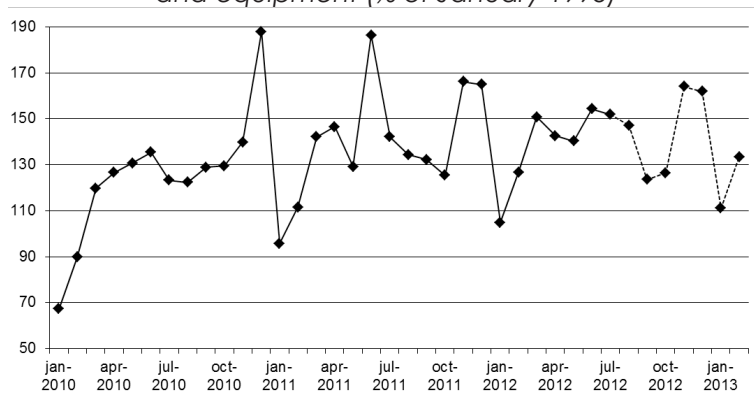
Fig. 9. The volume of retail sales (billion Rb)
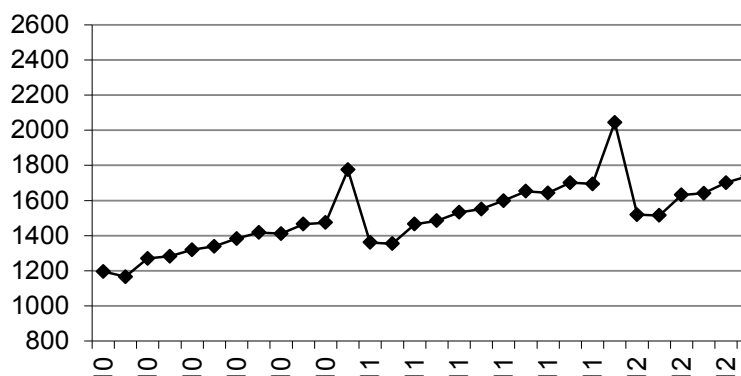
Fig. 9a. The real turnover of the retail trade (% of the respective period of last year)
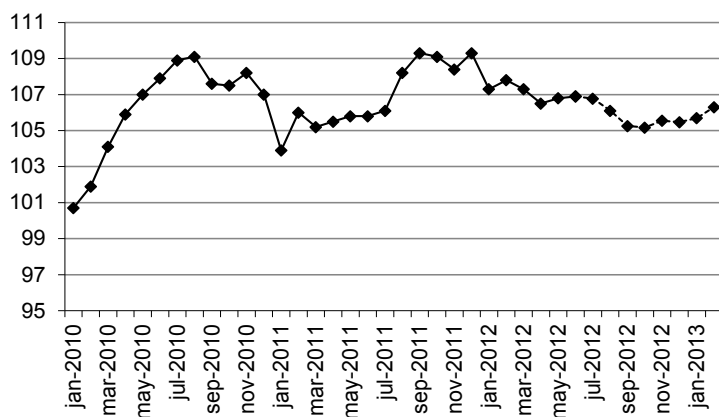
Fig. 10. Investments in capital assets (billion Rb)
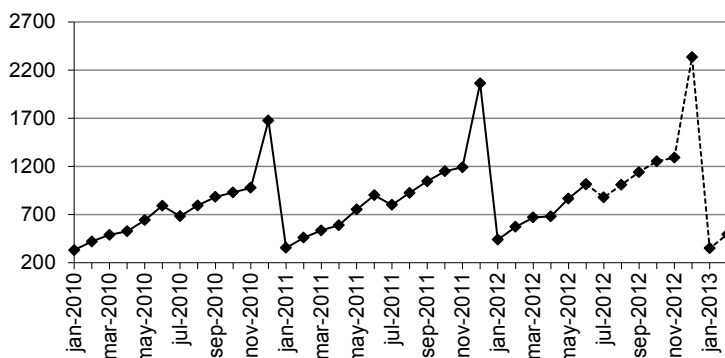
Fig. 10a. Real investments in capital assets (% of the respective period of the previous year)
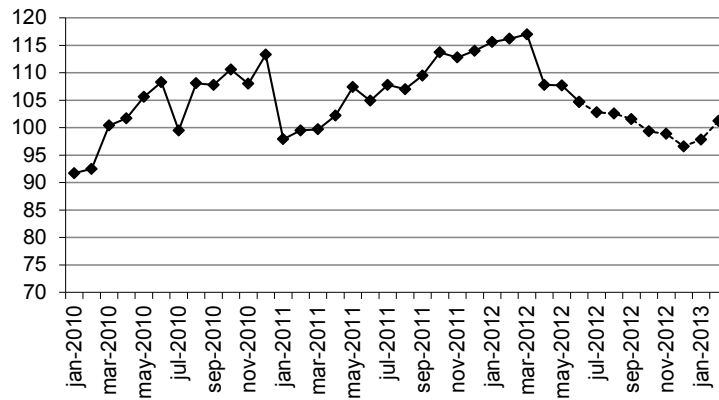
Fig.11. Export to all the countries (billion USD)
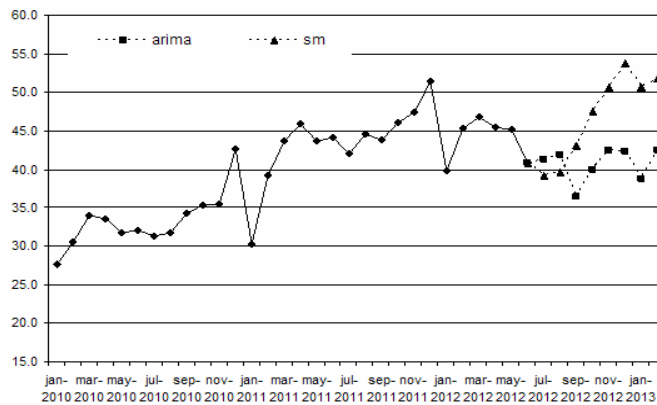
Fig. 12. Export to countries outside the CIS (billion USD)
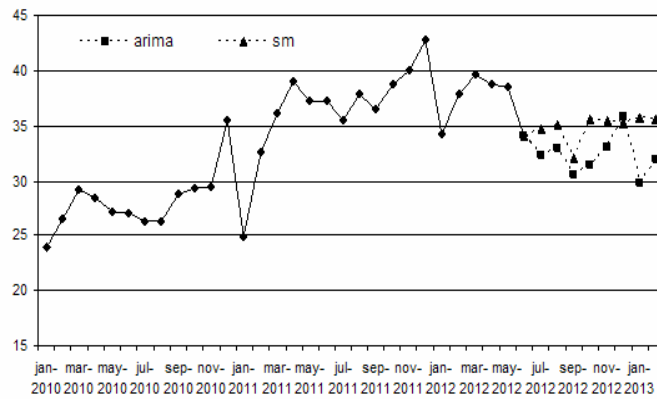
Fig. 13. Import from all the countries (billion USD)
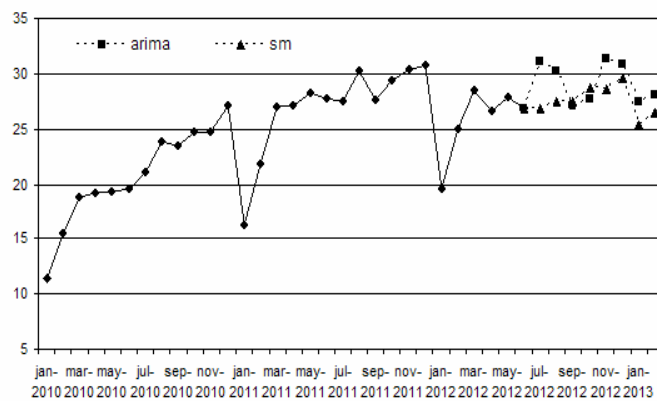
Fig. 14. Import from countries outside the CIS (billion USD)
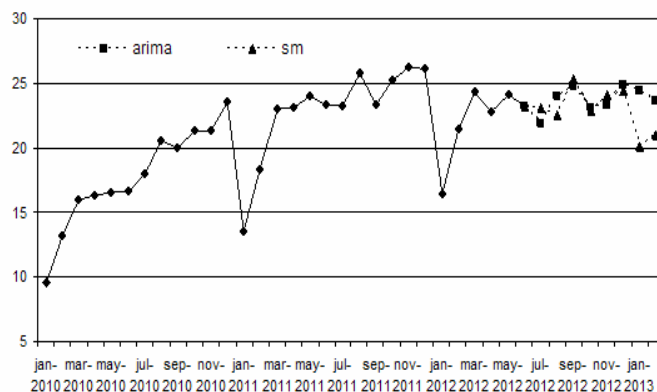
Fig. 15. Consumer price index as % of December of the previous year
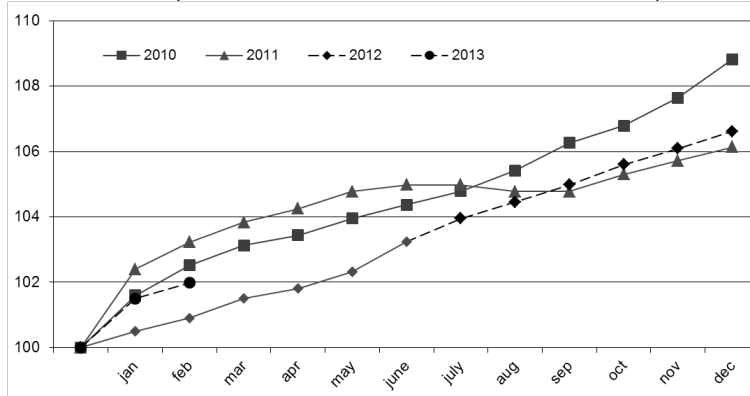
Fig. 15a. Consumer price index as % of December of the preceding year (SM)
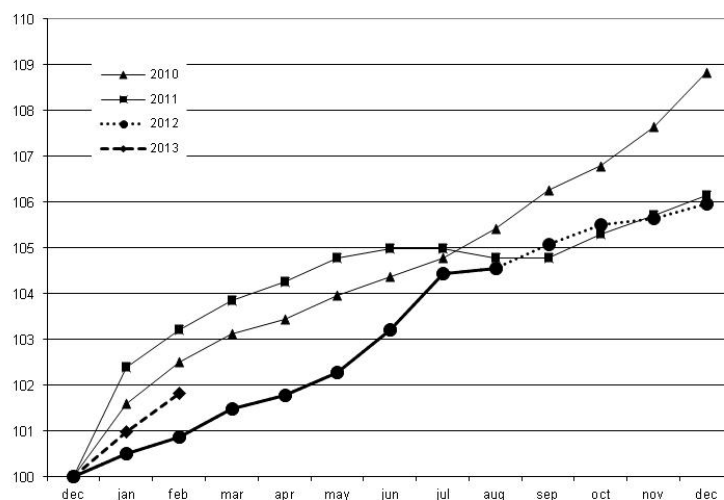
Fig.16. Producer price index (industrial goods), % of December of the previous year
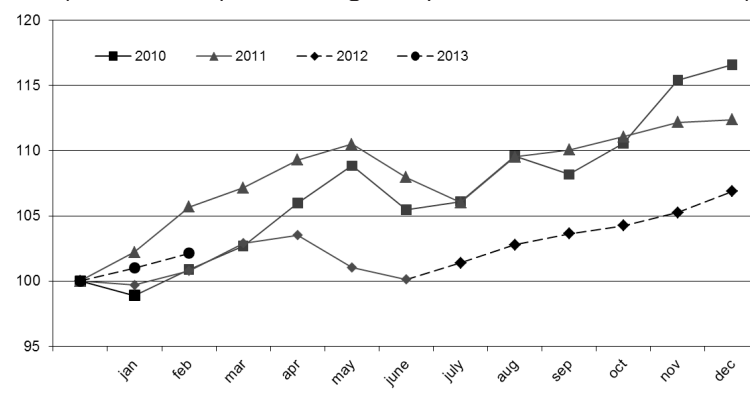
Fig. 17. Price index as regards production of primary products,
% of December of the previous year
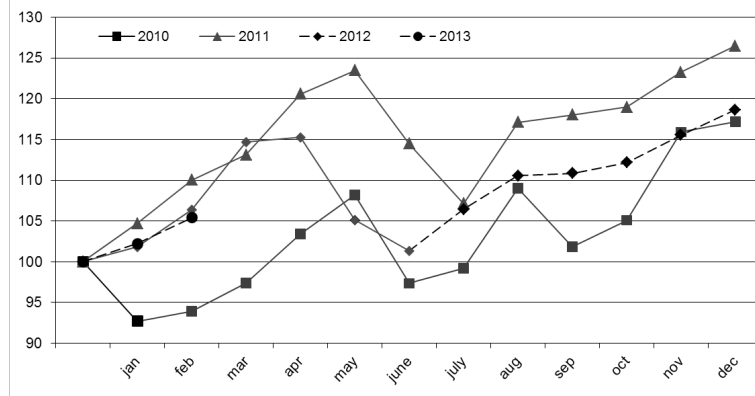
Fig. 18. Price index as regards manufacturing industries, % of December of the previous year
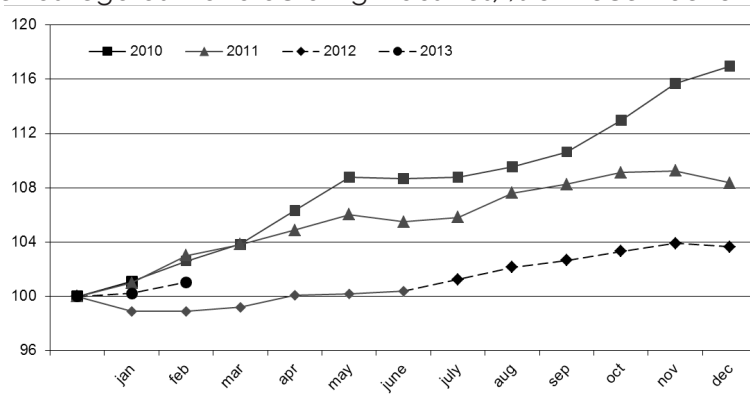
Fig. 19. Price index as regards production and distribution of power, gas and water,
% of December of the previous year
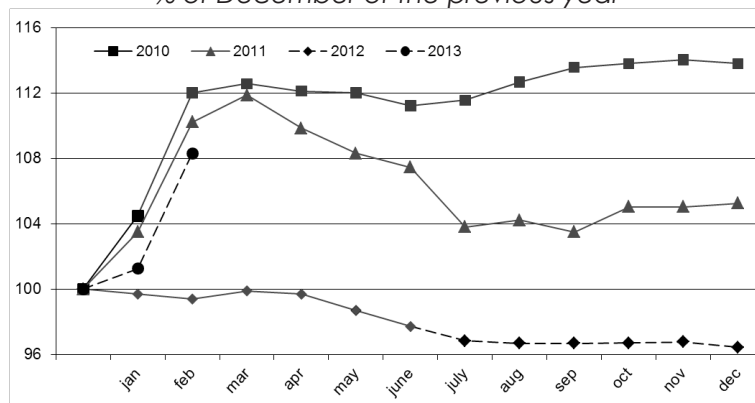
Fig. 20. Price index as regards production of food products,
% of December of the previous year
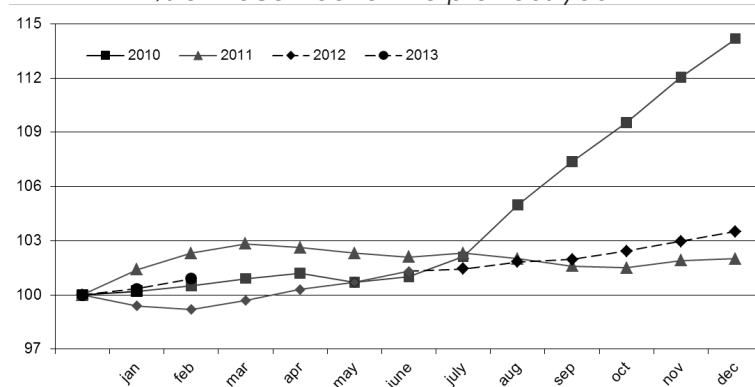
Fig. 21. Price index as regards textile and sewing industry, % of December of the previous year
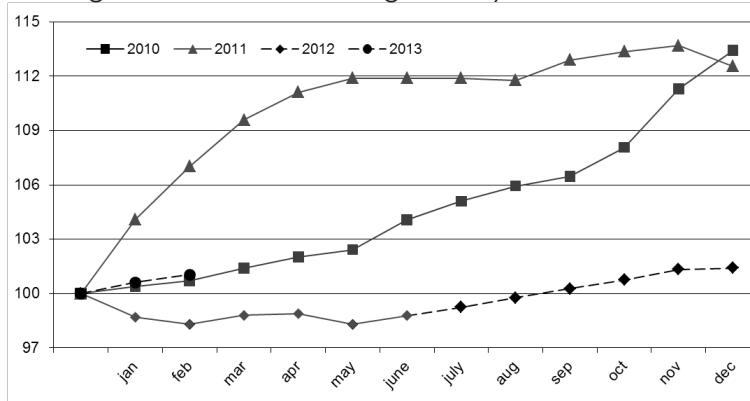
Fig. 22. Price index as regards woodworking and production of wood products, % of December of the previous year
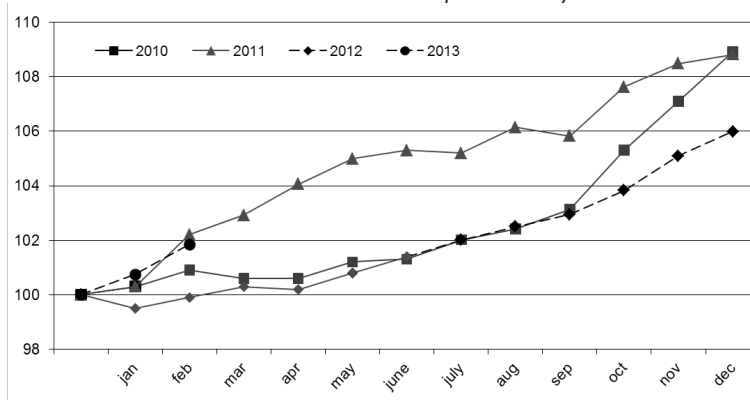
Fig. 23. Price index as regards pulp and paper industry, % of December of the previous year
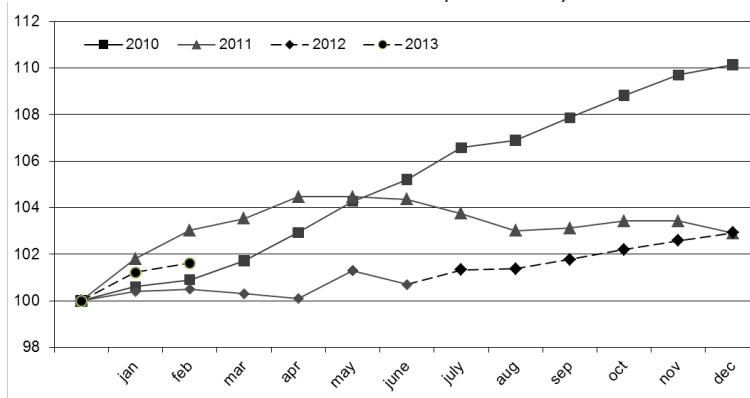
Fig. 24. Price index as regards production of charred coal and oil products, % of December of the previous year
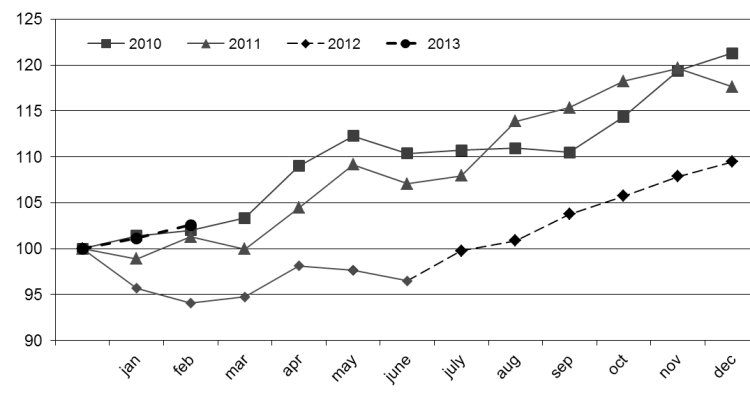
Fig. 25. Price index as regards chemical industry, % of December of the previous year
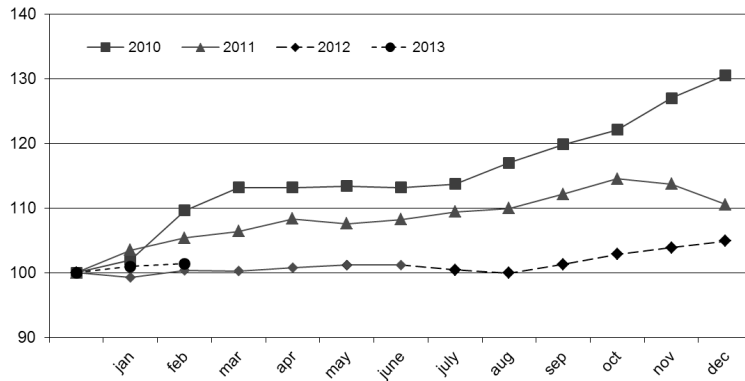
Fig.26. Price index as regards iron and steel industry and production of finished metal goods, % of December of the previous year
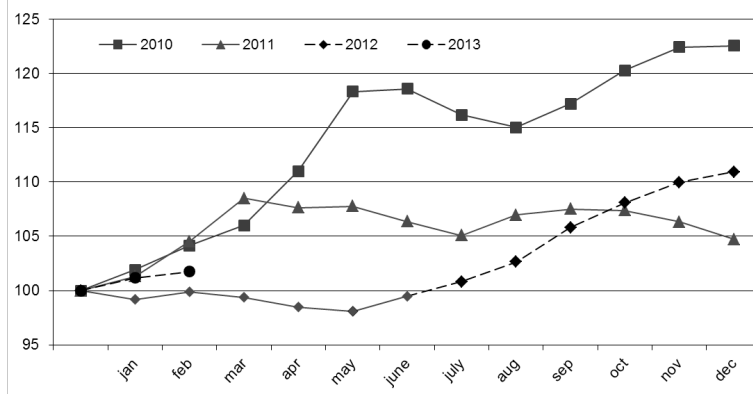
Fig.27. Price index as regards production of machines and equipment, % of December of the previous year
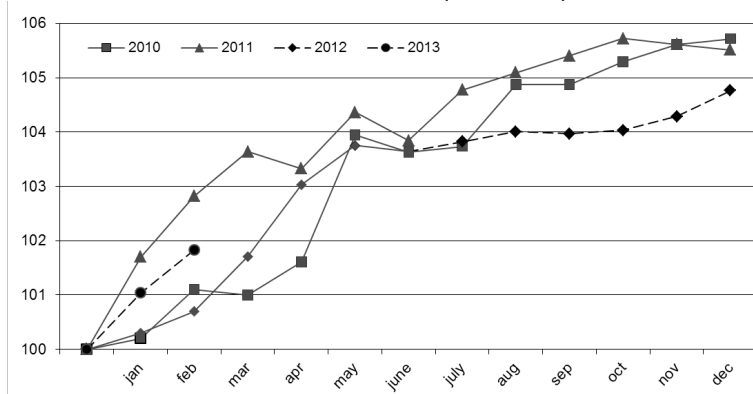
Fig.28. Price index as regards production of transportation vehicles and equipment, % of December of the previous year
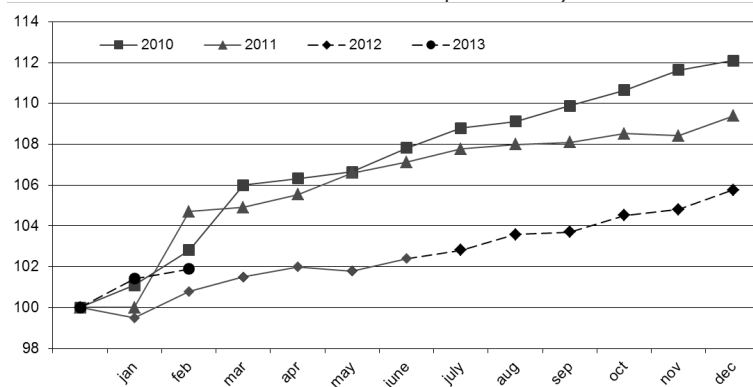
Fig. 29. The cost of the minimum package of food products per person a month (Rb)
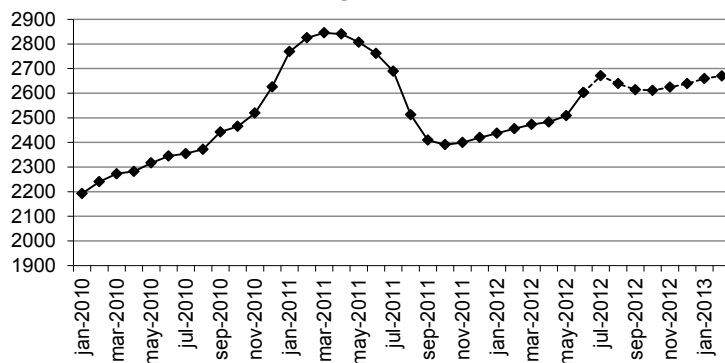
*Fig. 30. The composite index of transportation tariffs
(for each year as % of the previous month)*
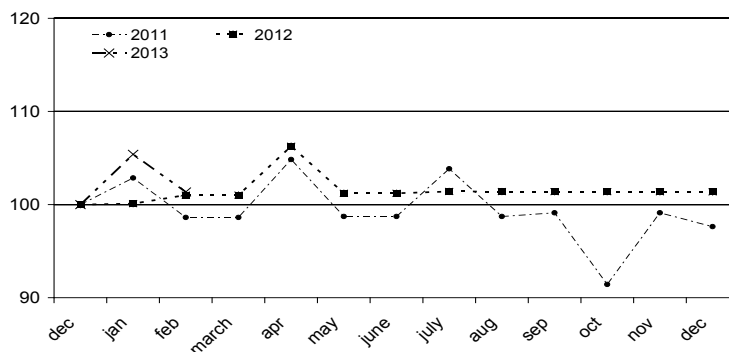
*Fig. 31. Index of tariffs on motor cargo carriage
(for each year as % of the previous month)*
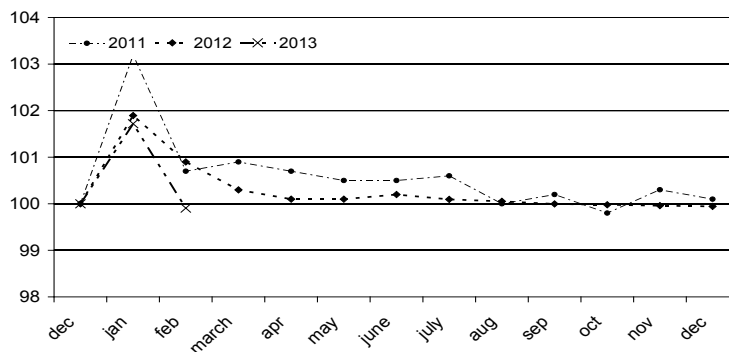
*Fig. 32. Index of tariffs on pipeline transportation
(for each year as % of the previous month)*
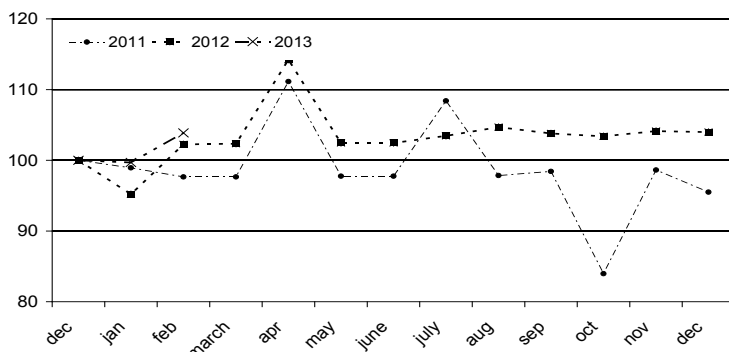
Fig. 33. Prices on Brent oil ($ a barrel)
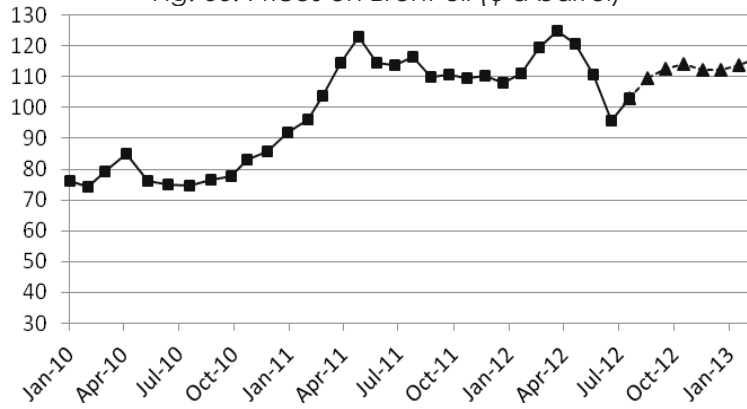
Fig. 34. Prices on aluminum ($ per ton)
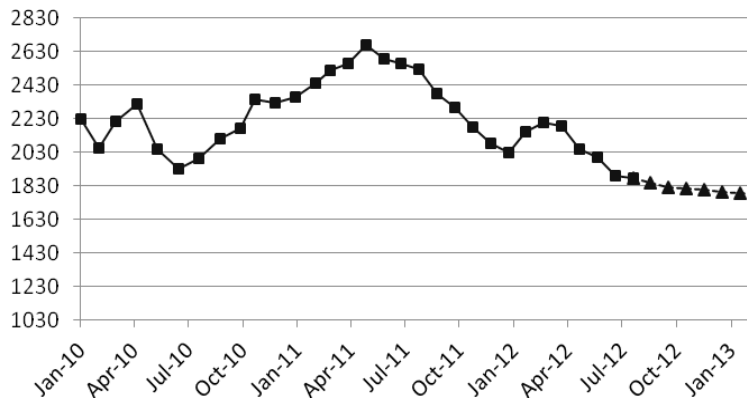
Fig. 35. Prices on gold ($ per ounce)
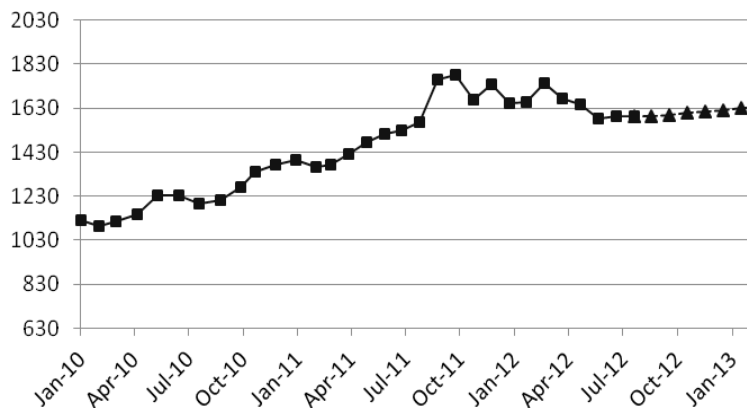
Fig. 36. Price on nickel ($ per ton)
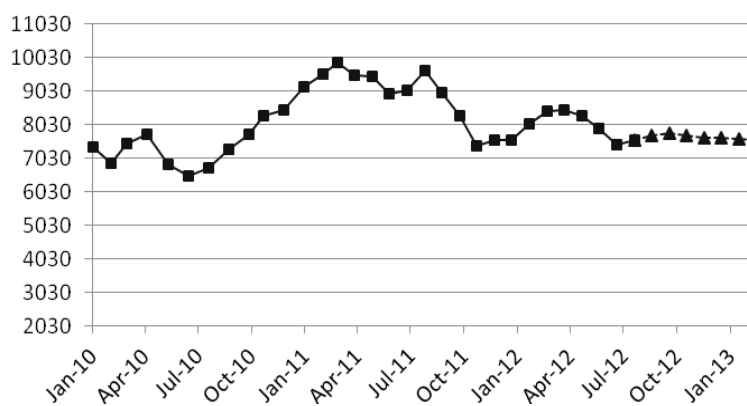
Fig. 37. Prices on copper ($ per ton)
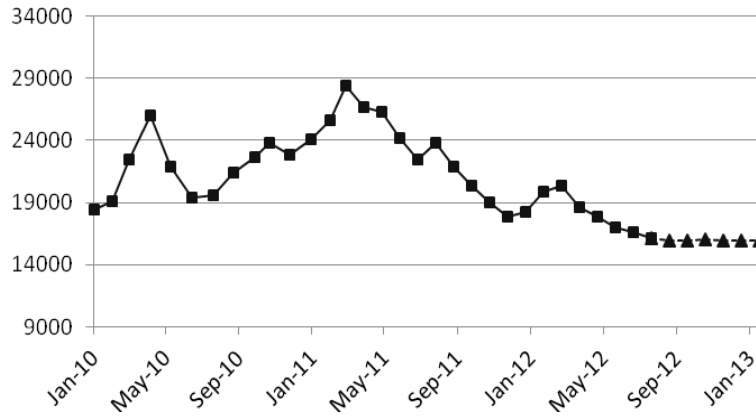
Fig. 38. Monetary base, million Rb
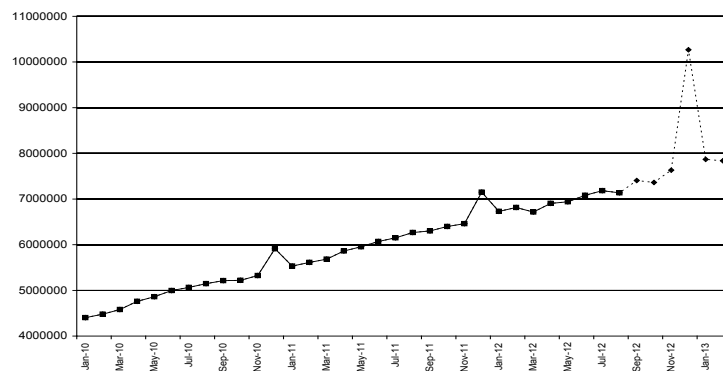
Fig. 39. M2, billion Rb
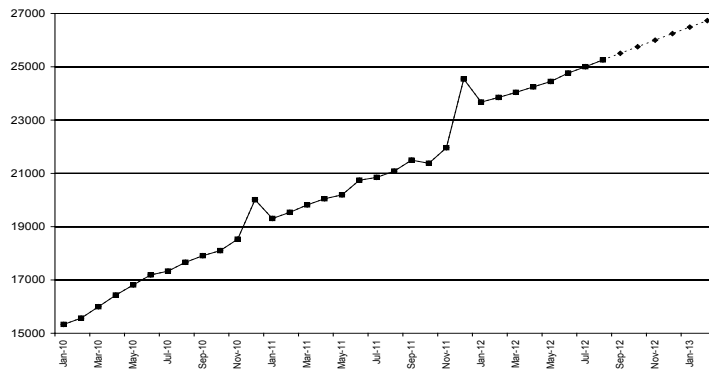
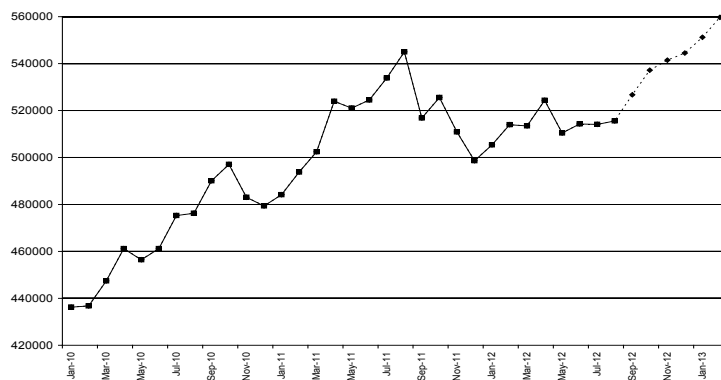Fig. 40. Gold and foreign exchange reserves of the Russian Federation, million USD
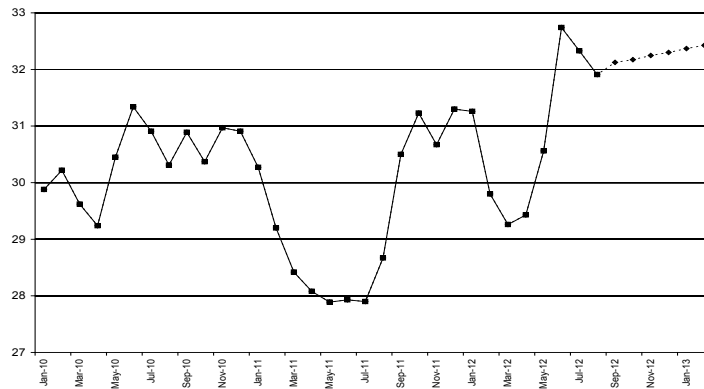
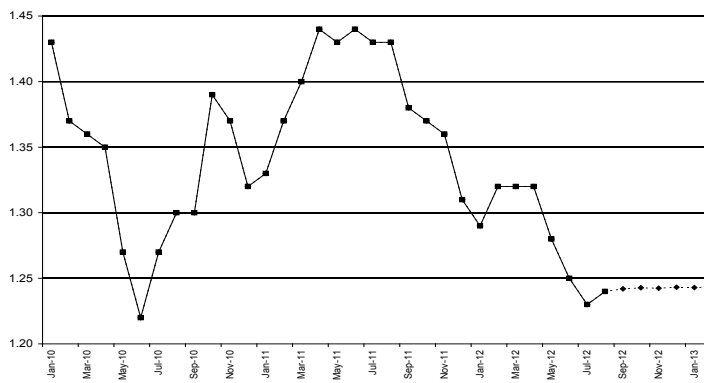*Fig. 41. The RUR/USD exchange rate*

Fig. 42. The USD/EUR exchange rate

Fig. 43. Real disposable cash income
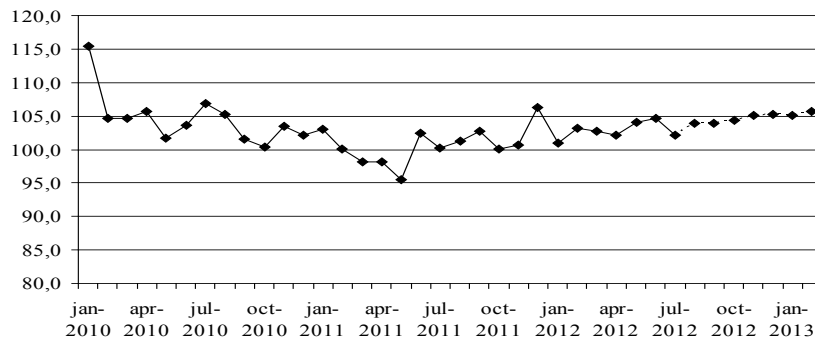*(% of the respective period of the previous year)*

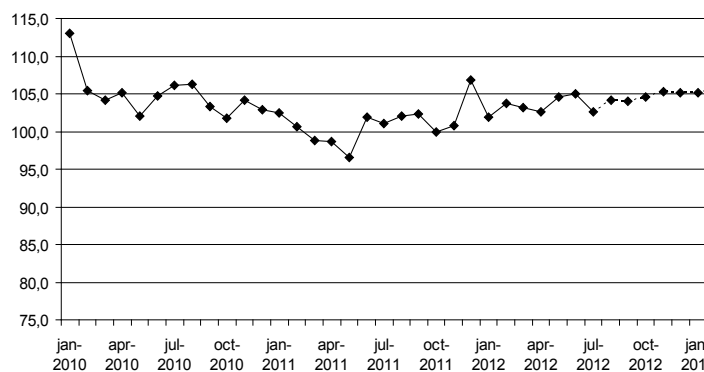*Fig. 44. Real cash income (% of the level of January 1999)*

Fig. 45. Real accrued wages and salaries (% of the respective period of the previous year)
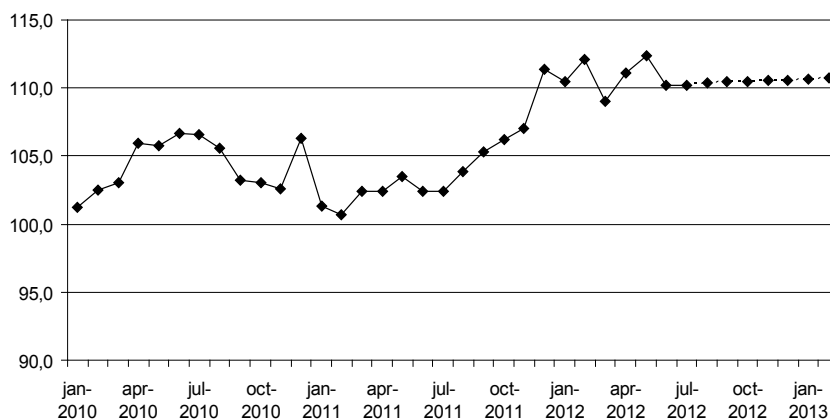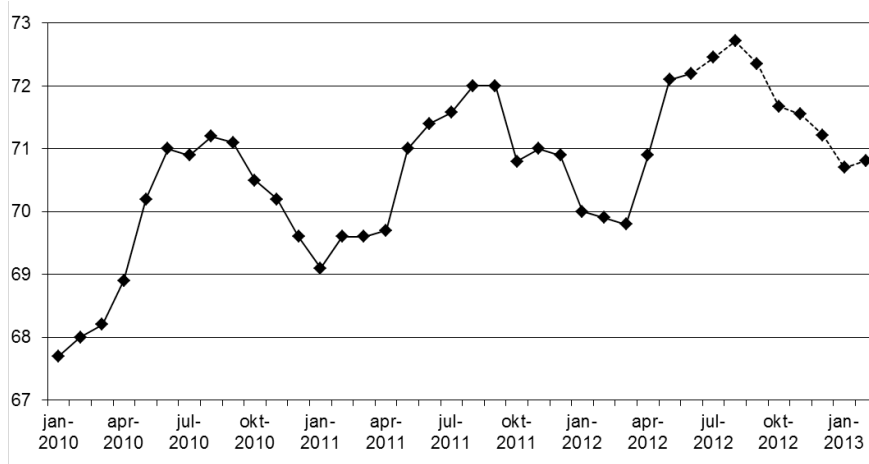

Fig. 46. Employment (million people)

Fig. 47. Unemployment (million people)