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Bulletin of Model Analysis of Short-Term Forecasts of Socio-Economic Indicators in the Russian Federation

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Introduction to all issues

This bulletin provides estimates of values of different economic indicators in the Russian Federation in February through July 2008, which are based on time series models developed during the studies carried out by the IET over the last few years[1]. The forecasting method in use belongs to the group of *formal* or *statistic* methods. In other words, the obtained values represent estimates of prospective values of a particular economic indicator made on the basis of ARIMA (p, d, q) formal time series models by taking into account the existing trend and in some cases its significant variations, rather than reflect the view or expert assessment of a researcher. The forecasts herein under are of inertial nature, because the corresponding models take into account the data movement before the forecast was made and depend largely on the trends typical of time series in the period immediately preceding the time frame to be forecasted. These assessments of prospective values of economic indicators in the Russian Federation can be used to support decision-making on economic policy, provided that general trends that were observed prior to the forecast remain the same, i.e. neither serious shocks nor changes in the prevailing long-term trends will take place in the future.

In sprite of a considerable volume of data available on the pre-crisis period of 1998, the analysis and forecast models were made for the time frame following August 1998 only. This can be explained by the results of the previous studies[2] which led to a key conclusion that taking into account the data relating to the pre-crisis period impairs the forecast quality in most cases.

The models of the reviewed economic indicators were assessed with the help of the standard time series analysis techniques. The first stage included analysis of the correlograms of the series under study and first-order differences with a view to determine a maximum number of delayed values to be included into model specification. Then, all time series were tested for weak stationarity (or stationarity near determinate trend) by using the Dickey-Fuller test as based on the results of the analysis of correlograms. Time series were also tested for stationarity near segmented trend with the help of the Perron or Zivot-Andrews tests for endogenous structural brakes in several cases[3].

Upon breaking up the time series into weak stationary, stationary near determinate trend and stationary near segmented trend or stationary in differences groups, the models corresponding to each of these groups were assessed (in levels and, if appropriate, by including trend or segmented trend or in differences). The best model was selected on the basis of the Akaike and Schwarz information criteria, as well as characteristics of residuals of models (non-autocorrelation, homoscedasticity, normality) and quality of forecasts for these models. The predictive values were calculated on the basis of the best model constructed for each economic indicator.

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[1] See, for example, Entov R.M., Drobyshevsky V.P., Nosko S.M., Yudin A.D. *Econometric Analysis of Time Series of the Key Macroeconomic Indicators.* M., IET, 2001; P.M. Entov, Nosko S.M., Yudin A.D, P.A. Kadochnikov, S.S. Ponomarenko. *Challenges in Forecasting of Various Macroeconomic Indicators.* M., IET, 2002; Nosko S.M., A. Buzayev, P.A. Kadochnikov, S.S. Ponomarenko. *Making Analysis of Forecast Specifics of Structural Models and Models Including Results of the Polls at Enterprises.* M., IET, 2003.

[2] Ibidem

[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, *the Bulletin* provides calculations of the prospective values of monthly consumer price index indicators, import volumes from all countries and export volumes to all countries on the basis of structural models (SM) developed at the IET. The predictive values obtained on the basis of structural models can give better results in some cases as compared to ARIMA models, because additional information on the movement of exogenous variables are used in their construction. Besides, structural forecast that was included into the average forecast (i.e. forecasts obtained as an average for several models) can facilitate improvement of the predictive values.

The consumer price index movement was modeled with the help of theoretical hypotheses arising from the monetary theory. Supply of money, volume of issue and nominal RUR/USD exchange rate, which reflect movement in the alternative cost of money keeping, were used as explanatory variables. The consumer price index model also included the price index in electric power industry, because this indicator has a significant effect on manufacturers' costs.

The real exchange rate should be highlighted as a key indicator which may effect through its fluctuations a relative movement of prices of domestic and imported goods. However, the effect of this indicator is not significant in econometric models. It is the world prices of exported resources, in particular oil prices, that have a significant impact on export movement: any price growth results in growth of exports of goods. The household income level in the economy (value of labor power) is used as a characteristic of relative competitiveness of Russian goods. D12 and D01 dummy variables which are equal to one in February and March correspondingly and zero in other periods were introduced so that seasonal fluctuations of exports can be taken into account. Household and corporate incomes have an effect on imports movement, their growth leading to an increase in demand for all goods, including the imported ones. The real disposable cash income reflects the household income, while the industrial production index reflects the corporate income.

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

This paper also presents calculations of values of industrial production indices, producer price index, and total unemployment index, which were made on the basis of the results of conjuncture polls made by the IET. Empirical studies reveal[4] that the use of conjuncture polls series as explanatory variables[5] in prognostic models improves an average accuracy of the forecast. The prospective values of these indices were calculated on the basis of ADL models (by adding seasonal autoregressive delays).

All calculations were made with the use of the Eviews econometric package.

[4] See, for example: V. Nosko, A. Buzayev, P. Kadochnikov, S.S. Ponomarenko. *Analysis of Prognostic Features of Structural Models and Models Including the Results of the Polls Conducted at Enterprises.* M., IET, 2003.

5 The following conjuncture polls series were used as explanatory variables: current/expected changes in production, expected changes in purchasing power, current/expected changes in prices and expected changes in employment.

Industrial production and retail trade turnover

Industrial production

The forecast was made on the basis of ARIMA models with the use of the series of monthly data on basic industrial production indices for the period between October 1998 and December 2007 published by the Center for Economic Analysis (CEA) and State University Higher School of Economics (SU HSE) under the RF Government (the value of 1993 was taken as 100%). Furthermore, predictive values of the CEA's industrial production index, as well as the industrial production index[6] obtained from the Federal State Statistic Service (FSSS), were calculated by using the results of the conjuncture polls (CP)[7]. The final estimates are listed in Table 1.

Table 1

Predictive values of industrial production indices[8], (%)

Month	Industry total (CEA, ARIMA)	Industry total (CEA–SU HSE, CP)	Industry total (FSSS, CP)	Ferrous metallurgy	Metal fabricating industries	Chemical and petrochemical industries	Building materials producing industry	Fuel and energy industry	Non-ferrous metallurgy	Timber , paper-pulp and woodworking industry	Food processing industry	Light industry
Predictive growth rates against the corresponding month of the preceding year												
February 2008	5.6	6.4	5.2	2.3	13.7	5.5	7.3	2.2	3.2	-1.1	6.1	-6.7
March 2008	4.6	5.7	5.1	-0.4	10.2	3.8	6.6	2.0	0.9	-2.1	5.2	-9.1
April 2008	4.8	4.8	4.3	-0.4	3.7	3.3	6.6	2.4	3.5	0.3	5.9	-4.7
May 2008	5.0	5.9	5.5	-1.3	2.6	2.8	6.3	2.5	2.1	0.9	6.0	-4.1
June 2008	5.2	5.8	5.3	0.1	5.2	3.7	6.1	2.7	0.4	0.0	5.8	-5.0
July 2008	4.9	5.9	6.1	-0.3	5.6	3.9	5.8	2.5	0.6	0.4	5.8	-5.5
For reference: actual growth rates in 2006 against the corresponding month in 2006												
February 2007	7.9		9.3	10.1	14.3	12.9	24.7	3.2	3.6	6.3	10.2	-3.6
March 2007	5.7		1.9	6.4	13.2	5.5	15.9	2.4	1.8	2.6	5.8	-1.6
April 2007	6.4		4.6	8.4	18.3	8.3	15.6	0.5	0.0	1.4	6.5	-0.5
May 2007	5.1		6.5	5.6	12.2	5.6	12.6	2.2	-0.1	3.1	4.8	-4.5
June 2007	4.6		8.6	2.2	7.7	10.9	11.5	3.6	0.8	3.8	2.2	-5.2
July 2007	6.0		8.3	2.2	14.6	14.3	10.4	2.3	-0.8	5.4	5.6	-4.9

Note: the industrial production indices series in industry as a whole, metal working industries, chemical and petrochemical industries, building materials producing industry, non-ferrous metallurgy, timber and woodworking industry and food processing industry are trend stationary with a marked seasonal factor (except for the series of the industry as a whole) within the time frame between October 1998 and December 2007. The industrial production indices series of ferrous metallurgy, fuel and energy industry and light industry are identified as processes being stationary in first-order differences taking into account that the industrial production index of fuel and energy industry includes a seasonal component.

[6] The OKVED's industrial production index series is available for the period between January 1999 and November 2007.

[7] The models are constructed for the time frame between January 1999 and December 2007 for the CEC–SU HSE's industrial production index and between January 1999 and November 2007 for the FSSS's industrial production index.

[8] It should be noted that since the so-called "raw" indices (without regard to seasonal and calendar adjustments) were used for the forecast, most of the models take into account seasonal factors and, as a consequence, the final results reflect seasonal movement of the series.

As seen from *Table 1*, the average[9] industrial production growth in February – July 2008 in industry as a whole, by comparison with the same period of the previous year, amounts to 5.4 % (for the FSSS's industrial production index this indicator amounts to 5.3 %).

The CEC – SU-HSE's average monthly industrial production indices for nonferrous metallurgy amount to 1.8 %, respectively. A considerable average growth is forecasted for the food industry (5.8 % per month) and for the construction materials production industry (6.4 % per month).

The forecasted average rate of growth in the fuel and energy complex is 2.4 %, by comparison with the same period of the previous year. Growth is forecasted in the chemical and petrochemical industry: the average monthly growth rates in the branch will amount to 3.8 %.

A slight drop in industrial production (on the average – of 0.3 % per month) is forecasted in the timber, woodwork and pulp-and-paper industries. A production decline is forecasted in light industry, at an average monthly rate of 5.8 %. The rate of growth in machine building and metal working is forecasted to be at an average level of 6.8 %.

Retail trade turnover

This section (see Table 2) presents forecasts of monthly trade retail trade turnover volumes as based on the FSSS's monthly data in the period between January 1999 and November 2007.

From Table 2 it follows that the average forecasted rise in the monthly volumes of retail turnover in February – July 2008 will amount to approximately 39.5 %, as compared to the corresponding period of 2007.

The real average increase of the retail turnover index for the period under consideration will amount to 18.1 % against the corresponding period of the previous year.

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

Table 2

Predictive values of retail trade turnover volume

Predictive values according to ARIMA model (billion RUR)	
February 2008	1013.75
March 2008	1108.58
April 2008	1140.41
May 2008	1167.26
June 2008	1196.08
July 2008	1235.37
For reference: actual values over corresponding months in 2007 (billion RUR)	
February 2007	721.1
March 2007	793.5
April 2007	817.8
May 2007	838.3
June 2007	860.3
July 2007	890.3
Predictive growth rates against the corresponding month in 2007-2008 (in percentage terms)	
February 2008	40.6
March 2008	39.7
April 2008	39.4
May 2008	39.2
June 2008	39.0
July 2008	38.8

Note: retail trade turnover series is stationary within the time frame between January 1999 and November 2007.

Capital investments

Listed in Table 3 are predictive values of capital investments in February – July 2008. The forecast was made on the basis of time series according to the FSSS's data relating to the period between January 1998 and November 2007.

The results presented in *Table 3* demonstrate that the average forecasted growth rate of investments during the period between February and July 2008 amounts to approximately 39 %, by comparison with the corresponding period of last year.

In real terms, the average value of the annual increase in the index of investments in fixed capital amounts to 24.1 %.

Table 3

Predictive values of capital investment volumes

Predictive values on ARIMA model (billion RUR)	
February 2008	404.17
March 2008	483.21
April 2008	494.45
May 2008	641.82
June 2008	790.77
July 2008	727.53
For reference: actual values over corresponding months in 2006 (billion RUR)	
February 2007	283.9
March 2007	344.4
April 2007	353
May 2007	465.8
June 2007	579.8
July 2007	531.4
Forecasting nominal growth rates against the corresponding month of the previous year (%)	
February 2008	42.4
March 2008	40.3
April 2008	40.1
May 2008	37.8
June 2008	36.4
July 2008	36.9

Note: investment series within the time frame between January 1998 and November 2007 belong to the DS time series.

Foreign trade indicators

Model analysis of predictive values of export volumes, export to countries other than CIS member countries, import and import from countries other than CIS member countries was made by using time series models and structural models as assessed on the basis of monthly data within the time frame between September 1998 and November 2007 according to the RF Central Bank's data [10]. The final estimates of the forecast are listed in Table 4.

The average forecasted increase in the indices of exports, of export to countries outside the CIS, of imports, and of import from the countries outside the CIS will amount, in February – July 2008, as compared to the corresponding period of 2007, to 31 %, 31 %, 34 % and 38 %, respectively. The average forecasted decrease in the active balance of trade and balance of trade with all countries and with countries outside the CIS for the period from February through July 2008, by comparison with the corresponding period of 2007, amounts to 25 % and 20 %, respectively. The balance of trade in February – July 2008 will amount, on the average, to 77 billion USD.

[10] The data on foreign trade turnover were calculated by the RF Central Bank in accordance with the methodology of making up the foreign balance in exporting country's prices (FOB) in billion US dollars.

Table 4

Predictive values of foreign trade volumes

Month	Export total				Export to countries other than CIS member countries		Import total				Import from countries other than CIS member countries	
	predictive values (billion US dollars per month)		Growth year on year (in percentage terms)		predictive values (billion US dollars per month)	Growth year on year (in percentage terms)	predictive values (billion US dollars per month)		Growth year on year (in percentage terms)		predictive values (billion US dollars per month)	Growth year on year (in percentage terms)
	ARIMA	SM	ARIMA	SM	ARIMA		ARIMA	SM	ARIMA	SM	ARIMA	
February 2008	32.6	35.2	37	48	28.3	40	20.3	20.3	42	43	17.8	47
March 2008	35.2	37.3	32	39	29.9	32	22.7	24.1	33	41	19.8	35
April 2008	35.7	36.8	31	35	30.3	31	22.4	23.7	35	42	19.5	39
May 2008	37.8	38.6	27	30	31.7	26	23.2	24.5	34	41	20.3	38
June 2008	35.5	35.9	32	33	30.3	33	24.2	26.0	32	41	21.1	35
July 2008	38.1	37.9	27	26	32.0	26	25.2	27.5	30	42	22.1	33
For reference: actual values over corresponding months in 2007 (billion US dollars)												
February 2007	23.7				20.1		14.3				12.1	
March 2007	26.7				22.6		17.1				14.6	
April 2007	27.3				23.1		16.6				14.1	
May 2007	29.8				25.3		17.4				14.7	
June 2007	27.0				22.8		18.4				15.6	
July 2007	30.0				25.3		19.3				16.6	

Note: export and import series to countries other than CIS member countries are identified as stationary series with first-order differences, while export and import series to countries other than CIS member countries are identified as trend stationary time series within the time frame between September 1998 and November 2007. Seasonal components were taken into account in model specifications in all cases.

Price Movement

Consumer price indices and producer price indices

This section provides calculation of predictive values of consumer price index and producer price indices (both in industry as a whole and its branches according to the OKVED's classification) obtained on the basis of times series models which were assessed according to the FSSS's data for the time frame between January 1999 and November 2007 [11]*. Listed in Table 5 are model calculation data of predictive values in February – July 2008, according to the ARIMA models, structural models (SM) and models constructed with the use conjuncture polls (CP).*

[11] Structural models were assessed for the time frame since October 1998.

Table 5

Predictive values of price indices

Month	consumer price index (ARIMA)	consumer price index (SM)	Producer price indices:													
			Industrial product producer price index (ARIMA)	Industrial product producer price index (CP)	Mining operations	Manufacturing industries	Production of electric power energy, gas and water	Production of food products	Textile and garment manufacture	Wood fashioning and woodworking	Paper-pulp manufacturing	Production of coke and oil products	Chemical production	Metallurgy and production of finished metal products	Production of machinery and equipment	Production of transportation vehicles and equipment
Predictive values according to ARIMA models (in terms of percentage of the preceding month)																
February 2008	101.2	101.0	100.7	99.3	95.8	101.4	102.6	101.3	100.8	101.2	100.7	102.0	101.4	100.7	100.6	101.0
March 2008	100.7	100.5	101.8	100.2	106.2	101.2	101.2	101.2	100.7	101.1	100.8	101.7	100.7	100.2	100.9	100.5
April 2008	100.8	101.0	103.1	103.0	111.9	100.9	100.1	101.6	100.7	100.4	100.9	101.9	100.5	100.0	101.0	100.8
May 2008	100.7	101.9	102.4	101.2	107.2	101.1	100.8	101.5	100.7	100.9	100.6	101.7	100.5	100.1	100.5	100.7
June 2008	101.0	100.5	101.5	100.9	100.3	101.5	100.6	102.0	100.9	100.8	100.6	102.0	101.5	100.1	100.8	100.7
July 2008	100.9	101.2	101.3	101.6	102.1	101.6	100.2	101.9	100.8	101.3	100.1	101.9	101.3	100.4	100.9	100.7
Predictive values according to ARIMA models (in terms of percentage of December 2007)																
February 2008	102.9	100.9	101.5	100.2	90.8	103.1	104.0	102.4	101.4	103.0	102.6	104.2	102.5	101.8	101.0	101.0
March 2008	103.6	101.4	103.3	100.3	96.4	104.3	105.2	103.6	102.1	104.1	103.3	106.0	103.3	102.0	102.0	101.5
April 2008	104.4	102.5	106.4	103.3	107.8	105.3	105.3	105.3	102.8	104.5	104.2	108.0	103.8	102.0	103.0	102.3
May 2008	105.2	104.4	109.0	104.5	115.5	106.5	106.2	106.8	103.5	105.5	104.8	109.9	104.4	102.1	103.5	103.0
June 2008	106.2	104.9	110.6	105.4	115.9	108.1	106.8	108.9	104.5	106.3	105.4	112.1	105.9	102.2	104.3	103.8
July 2008	107.2	106.2	112.0	107.1	118.4	109.8	107.1	111.0	105.3	107.8	105.5	114.2	107.3	102.6	105.3	104.5
For reference: actual value over the corresponding periods 2007 (in terms of percentage of December 2006)																
February 2008	102.8		101.7	101.8	99.7	112.5	101.1	102.4	105.3	103.6	89.9	101.3	101.2	102.8	101.7	
March 2008	103.4		101.7	97.2	100.9	114.2	101.6	102.6	106.3	104.0	93.0	101.9	102.2	103.6	102.1	
April 2008	104.1		106.1	107.6	104.2	113.0	102.0	103.5	107.9	105.0	105.3	102.7	105.3	104.6	102.8	
May 2008	104.7		111.8	124.5	106.8	114.7	102.6	104.0	109.3	105.6	112.1	103.2	109.1	105.8	103.4	
June 2008	105.7		114.6	133.0	108.2	114.6	103.4	104.4	111.5	110.5	111.3	103.7	112.6	107.1	104.8	
July 2008	106.7		115.4	132.9	109.4	115.0	105.9	104.9	113.5	110.8	114.7	104.1	111.5	108.2	105.4	

Note: all producer price index series belong to the trend stationary time series in the time frame between January 1999 and November 2007. The consumer price index is difference stationary time series within the time frame between November 1998 and December 2007.

The forecasted average monthly growth rate of the consumer price index (CPI) for February – July 2008 will amount to 1 %. For that period, the growth rate of industrial goods' manufacturing prices is forecasted, on the average, at the level of 1.4 % per month.

As regards the OKVED's indices of manufacturing prices, the following monthly rates of growth are forecasted for the period of February – July 2008: 3.9 % in the extraction of mineral resources, 1.3 % in manufacturing industries, 0.9 % in the production and distribution of electric energy, gas and water, 1.6 % in the production of foodstuffs, 0.8 % in textile and clothing manufacture, 1.0 % in the processing of timber and the production of millwork, 0.6 % in pulp and paper production, 1.9 % in the production of coke and petroleum products, 1.0 % in chemical production, 0.2 % in metallurgical production and the production of finished metal products, 0.8 % in the production of machinery and equipment, and 0.7 % in the production of transport facilities and equipment.

Cost movement of the minimum set of food products

This section presents predictive values of the cost of the minimum set of food products for the period of February through July 2008. The forecasts were made on the basis of time series according to the FSSS's data in the period between January 2000 and November 2007. The estimates are listed in Table 6.

Table 6

Forecast of the cost of the minimum set of food products (per capita per month)

ARIMA model predictive values (RUR)	
February 2008	1820.48
March 2008	1834.66
April 2008	1844.84
May 2008	1871.69
June 2008	1931.12
July 2008	1977.80
For reference: actual values over corresponding months in 2007 (RUR)	
February 2007	1524.3
March 2007	1542.5
April 2007	1555.4
May 2007	1589.8
June 2007	1666.3
July 2007	1726.5
Predictive growth rates against the corresponding month in 2007 (in percentage terms)	
February 2008	19.4
March 2008	18.9
April 2008	18.6
May 2008	17.7
June 2008	15.9
July 2008	14.6

Note: the minimum set of food products series was used in relation to the corresponding period of the previous year. This series belongs to the DS time series within the time frame between January 2000 and November 2007.

According to the results shown in *Table 6*, it is forecasted that the price of the minimum set of food products will 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 1,880 rubles. The forecasted rise in the cost of the minimum set of food products amounts, on the average, to approximately 17.5 %, by comparison with the level of the corresponding period of last year.

Cargo transportation rate indices

This section provides the predictive values of price indices of cargo transportation rates[12] obtained on the basis of times series models which were assessed according to the FSSS's data for the time frame between September 1998 and November 2007. Listed in Table 7 are model estimates of predictive values in February through July of 2008. It should be noted that some of the indicators under review (for example, the pipeline transportation rate index) are regulable, which makes them difficult to be described by time series models. As a result, the obtained prospective values may differ largely from real ones in cases of centralized growth of rates within the forecasted time frame or in absence of such within the forecasted period, if increased recently.

[12] The Bulletin considers the cargo transportation rate composite index and the motor vehicle cargo transportation rate index, as well as the pipeline transportation rate index. The cargo transportation rate composite index is calculated on the basis of cargo transportation indices for various means of transportation: railway, pipeline, sea, domestic water, motor and air transportation (for more details refer to, for example: *Prices in Russia*. Official publication of the Russian State Statistic Committee (Goskomstat), 1998).

Table 7

Predictive values of transportation rates

Period	Cargo transportation rate composite index	Motor vehicle cargo transportation rate index	Pipeline transportation rate index
Predictive values according to ARIMA models (in terms of percentage of the preceding month)			
February 2008	100,8	100,2	101,9
March 2008	100,8	100,2	102,0
April 2008	102,8	100,2	105,0
May 2008	100,8	100,1	102,0
June 2008	100,7	100,1	102,0
July 2008	100,7	100,1	102,0
Predictive values according to ARIMA models (in terms of percentage of December 2007)			
February 2008	106,3	102,2	104,0
March 2008	107,1	102,4	106,1
April 2008	110,1	102,6	111,4
May 2008	110,9	102,7	113,6
June 2008	111,8	102,8	115,9
July 2008	112,6	102,9	118,2
For reference: actual value over the corresponding periods 2007 (in terms of percentage of the preceding month)			
February 2007	100	100.9	100
March 2007	100	100.7	100
April 2007	104.3	100.3	109
May 2007	100.1	100.3	100
June 2007	100	100.3	100
July 2007	100.9	100.2	101.9

Note: the motor vehicle cargo transportation rate index series was identified as a trend stationary time series within the time frame between October 1998 and November 2007; various dummy variables were used for taking into account special bursts for all series.

According to the results of the forecast for the first half-year 2008, the behavior of the cargo transportation rate composite index will be relatively stable. During the next six months, the average monthly increase of this indicator will amount to 1 %. In April, a seasonal growth of this index by 2.8 % is forecasted.

The motor vehicle cargo transportation rate index will also remain stable in the following six months. Its average monthly growth rate during the period under consideration of the year 2008 will be approximately 1 %.

Movement of prices of various types of raw materials in the world market

This section provides the estimates of the average monthly values of Brent oil prices (US dollars per barrel), aluminum (US dollars per ton), gold (US dollars per ounce), copper (US dollars per ton) and nickel (US dollars per ton) in February – July 2008 *obtained on the basis of times series models assessed according to the IMF's data for the time frame between January 1993 and October 2007.*

Table 8

Predictive values of prices of natural resources

Month	Brent oil (US dollars per barrel)	Aluminum (US dollars per ton)	Gold (US dollars per ounce)	Copper (US dollars per ton)	Nickel (US dollars per ton)
Predictive values according to ARIMA models					
February 2008	98.16	2474	778.1	6975	27455
March 2008	98.34	2436	772.7	7381	24433
April 2008	96.30	2422	781.5	7637	22631
May 2008	98.53	2395	777.1	7218	22111
June 2008	102.23	2383	785.5	7289	27568
July 2008	101.56	2372	789.6	7447	31739
Growth rates a against the corresponding month in 2007 (%)					
February 2008	69.9	-12.9	5.3	22.0	-33.2
March 2008	58.3	-11.7	3.0	14.2	-47.0
April 2008	42.9	-14.0	3.8	-1.5	-54.7
May 2008	46.0	-14.6	1.3	-6.0	-57.3
June 2008	43.3	-11.1	2.3	-3.0	-33.7
July 2008	31.6	-13.4	5.5	-6.7	-5.0
For reference: actual values in the corresponding period of 2007					
February 2007	57.76	2839	664.7	5718	41078
March 2007	62.14	2757	654.9	6465	46125
April 2007	67.4	2817	679.4	7753	49957
May 2007	67.48	2805	667.3	7678	51783
June 2007	71.32	2681	655.7	7514	41552
July 2007	77.2	2738	665.4	7981	33400

Note: price series of oil, nickel, gold, copper and aluminum belong to the DS time series in the time frame between January 1993 and October 2007.

The average forecasted level of oil prices amounts to approximately 99 USD per barrel, which exceeds last year's corresponding indicators by 49 % on the average. Prices of aluminum are forecasted at the level of approximately 2,400 USD per ton, and their average forecasted growth amounts to approximately -13 % against the corresponding level of last year. Prices of gold are forecasted at approximately 780 USD per ounce. The average forecasted prices of copper amount to approximately 7,300 USD per ton, while those of nickel – to approximately 26,000 USD per ton. The average forecasted growth of prices of gold amounts to approximately 17.5 %, while that of prices of copper – to approximately 3 %. The average forecasted fall in prices of nickel amounts to approximately 38 % by comparison with the corresponding level of last year.

Monetary indicators

Prospective values of the monetary base (cash in circulation and credit organizations' required reserve balances with the RF Central Bank) and M_2 in February – July 2008 were calculated on the basis of times series models of the corresponding indicators calculated by the RF Central Bank[13] for the time frame between October 1998 and November 2007. Listed in Table 9 are predictive values and actual values of these indicators over the corresponding period in the previous year. It should be noted that by virtue of that the monetary base is a tool

[13] The data on a particular month are listed in accordance with the RF Central Bank's methodology as of the beginning of the next month.

used by the RF Central Bank to pursue its policy, its forecast relying upon the times series models is to a certain extent conditional, because prospective values of this indicator are determined on the basis of the decisions made by the RF Central Bank rather than the internal peculiarities of the series.

Table 9

M_2 and monetary base forecast

Period	Monetary base		M_2	
	billion RUR	growth against the preceding month, %	billion RUR	growth against the preceding month, %
February 2008	4322,1	3,8	13404,3	3,2
March 2008	4418,7	2,2	13830,3	3,2
April 2008	4544,5	2,8	14269,8	3,2
May 2008	4662,7	2,6	14723,3	3,2
June 2008	4788,7	2,7	15191,3	3,2
July 2008	4916,1	2,7	15674,1	3,2
For reference: actual values in the corresponding period of 2007 (growth against the preceding month, %)				
February 2007	0.5		0.2	
March 2007	0.6		4.2	
April 2007	5.2		6.3	
May 2007	4.2		6.9	
June 2007	5.4		1.5	
July 2007	2.9		0.6	

Note: all time series of monetary indicators were classified as stationary in first-order differences with a market seasonal factor for the time frame between October 1998 and November 2007.

The average forecasted increase of the monetary base in the period from February through July 2008 is forecasted to be at the level of 2.8 % per month. The forecasted annual increase of M_2 is forecasted at the level of 3.2 %.

RF gold and foreign exchange reserves

This section provides statistical assessment data on prospective values of the RF gold and foreign exchange reserves[14], obtained on the basis of assessment of the time series model of the RF gold and foreign exchange reserves according to the RF Central Bank's data for the time frame between October 1998 and December 2007. This indicator is forecasted without taking into account reduction in the RF gold and foreign exchange reserves due to the repayment of Russia's foreign debt, which may lead to the fact that the volume of the RF gold and foreign exchange reserves may be overvalued with regard to the months of the foreign debt repayment (or undervalued otherwise) as compared to the actual values.

[14] The data on the volume of the RF gold and foreign exchange reserves are listed as of the first date of the next month.

Table 10

RF gold and foreign exchange reserves forecast

Period	Predictive values according to ARIMA models	
	billion US dollars	Growth in comparison with the figures registered in the preceding month, %
February 2008	486,5	5,5
March 2008	500,5	4,8
April 2008	508,6	3,8
May 2008	518,0	2,8
June 2008	529,1	3,0
July 2008	538,8	2,9
For reference: actual values for the corresponding months in 2006		
	billion US dollars	**Growth in comparison with the figures registered in the preceding month, %**
February 2007	314.5	3.5
March 2007	338.8	7.7
April 2007	369.1	8.9
May 2007	403.2	9.2
June 2007	405.8	0.6
July 2007	416.2	2.5

Note: the RF gold and foreign exchange reserves series was identified as difference time stationary for the time frame between October 1998 and December 2007.

According to the results of the forecast, in the first half-year 2008 the gold and foreign exchange reserves will be growing, on the average, by 3.8 % per month.

Foreign exchange rates

Model calculations of prospective values of the foreign exchange rate (RUR per US dollar) were made on the basis of assessment of the time series models of the corresponding indicators quoted by the RF Central Bank on the last date of the month over the period between October 1998 and January 2008. The predictive values of the USD/EURO exchange rate were calculated on the basis of the IMF's data as of the last date of the month in the period between January 1999 and January 2008[15].

According to the forecast for January - June 2008, the USD – ruble exchange rate will, on the average, amount to 24.38 rubles per one USD.

The average euro – USD exchange rate will be 1.46 USD per 1 euro.

[15] The Bulletin includes the IMF's data for the period between January 1999 and November 2007. The data on December 2007 and January 2008 were obtained from the foreign exchange rate statistics website www.oanda.com.

Table 11

RUR/USD and USD/EUR exchange rates forecast

Period	Predictive values of RUR/USD exchange rate (RUR per US dollar) according to ARIMA models	Predictive values of USD/EUR exchange rate (US dollar per Euro) according to ARIMA models
February 2008	24,32	1,46
March 2008	24,41	1,46
April 2008	24,32	1,47
May 2008	24,42	1,46
June 2008	24,39	1,47
July 2008	24,42	1,46
For reference: actual values in the corresponding months 2007		
February 2007	26.16	1.32
March 2007	26.02	1.33
April 2007	25.69	1.36
May 2007	25.9	1.34
June 2007	25.79	1.35
July 2007	25.60	1.37

Note: the series under review were identified as the first-order integrated time series with a seasonal factor within the corresponding time frames.

Living standard indicators

This section (see Table 12) presents predictive values of the real wages and real disposable cash income and real cash incomesв[16], obtained on the basis of times series models of the corresponding indicators calculated by the FSSS for the time frame between January 1999 and November2007. These indicators depends to a certain degree upon centralized decisions on wage increase for budget-funded workers, as well as decisions on increase of pensions, scholarships and benefits, which involves certain adjustments to the movement of the indicators under review. Consequently, the prospective values of real wages and real disposable cash income indicators calculated on the basis of the series, the latest of which are considerably higher or lower because of such an increase, may differ largely from those realized in practice.

The results presented in *Table 12* demonstrate that the indices of the population's living standards will be rising on the corresponding period of last year. The average forecasted increase of real disposable income amounts to approximately 15 % by comparison with the same period of last year. The average growth of real money income is forecasted, by comparison with the corresponding level of last year, at approximately 13 %, that of real wages – at 14 %.

[16] *Real cash income* is a relative indicator calculated by dividing the index of nominal volume (i.e. actually prevailing in the period under review) of cash income by the consumer price index. *Disposable cash income* means cash income less mandatory payments and contributions. (See: "Russian Statistics Yearbook", Moscow, Rosstat, 2004, p. 212.)

Table 12

Living standard indicators forecast

Period	Real disposable cash incomes	Real monetary incomes	Real wages
Predictive values according to ARIMA models (in terms of percentage of the corresponding period in 2007)			
February 2008	115.1	112.9	113.4
March 2008	114.7	113.6	114.5
April 2008	115.0	113.4	114.1
May 2008	114.8	113.6	114.0
June 2008	115.0	113.6	114.7
July 2008	114.9	113.7	115.7
For reference: actual values in the corresponding period in 2007 (in terms of percentage of the corresponding month in 2006)			
February 2007	116.5	112.8	120.3
March 2007	113.8	110.7	119.4
April 2007	113.7	111.3	120.3
May 2007	114.9	111.6	118.1
June 2007	111.5	109.2	116.2
July 2007	117.8	112.4	116.4

Note: The disposable cash income and real wage series in the base form (January of 1999 was used as the base period) were used for the calculation. As concerns the time frame under review (in January of 1999 through November of 2007), both series were found out to be a part of the class of difference stationary processes with a clearly pronounced seasonal component. The disposable cash income series was studied as a relationship to the respective period of the preceding year in the time frame from January of 1998 through November of 2007. This series is a series of the DS type.

Economically active population and total unemployment indicators

Prospective values of the economically active population and total unemployment indicators were calculated with the help of the time series models assessed for the time frame between October 1998 and November 2007 on the basis of the FSSS's monthly data[17]*. The total unemployment indicator was also calculated on the basis of the models using the results of the conjuncture polls*[18]*.*

It should be noted that logical discrepancies[19] *that may be found in the forecasts of total employment and total unemployment which are supposed to be equal in total to the value of the economically active population indicator, may be caused by the fact that every series is forecasted separately rather than as the difference between the predictive values of economically active population and other indicator.*

[17] The indicator was calculated as of the end of the month, in accordance with the methodology of The International Labor Organization (ILO).

[18] The model was assessed for the time frame between January 1999 and November 2007.

[19] For example, simultaneous reduction of both economically active population and total unemployment can be considered such a discrepancy. It should be noted, however, that such a situation is possible in principle, provided that the number of economically active population is reduced in strength.

Table 13

Predictive values of total economically active population and total unemployment

Month	Total economically active population (ARIMA)		Total unemployment (ARIMA)			Total unemployment (CP)		
	million persons	growth rates against the corresponding period in 2006 (%)	million persons	growth rates against the corresponding period in 2007 (%)	in terms of percentage of the indicator relating to the number of economically active population	million persons	growth rates against the corresponding period in 2007 (%)	in terms of percentage of the indicator relating to the number of economically active population
February 2008	70.8	2.4	4.6	-14.1	6.5	4.5	16.7	6.4
March 2008	71.1	2.0	4.5	-11.4	6.4	4.4	13.7	6.2
April 2008	71.4	1.6	4.4	-8.2	6.2	4.4	8.3	6.2
May 2008	71.6	1.3	4.3	-5.0	6.0	4.2	6.7	5.9
June 2008	71.7	1.0	4.2	-4.0	5.9	4.2	6.7	5.9
July 2008	71.9	0.8	4.2	-2.5	5.8	4.2	6.7	5.8
For reference: actual value over the corresponding periods in 2007 (million persons)								
February 2007	69.2		5.4					
March 2007	69.7		5.1					
April 2007	70.2		4.8					
May 2007	70.7		4.5					
June 2007	71.0		4.4					
July 2007	71.3		4.3					

Note: the economically active population indicator series is a trend stationary time series within the time frame between October 1998 and November 2007 The total unemployment indicator series is a first-order integrated time series. Both indicators includes a seasonal component.

According to the forecasts based on the ARIMA models (see *Table 13*), the average monthly growth of employment across the national economy during the period of February through July 2008 will amount to 1.5 % against that of the previous year's corresponding period.

The average fall in the overall number of unemployed will be declining (on the average, by two models) is forecasted to be at the level of 8.7 % per month against the index registered in the corresponding period of last year.

Appendix. Diagrams of time series of economic indicators in the Russian Federation: Actual and forecast values.

Fig. 1. Basic industrial production index for the industry as a whole
(January 1993 = 100%)

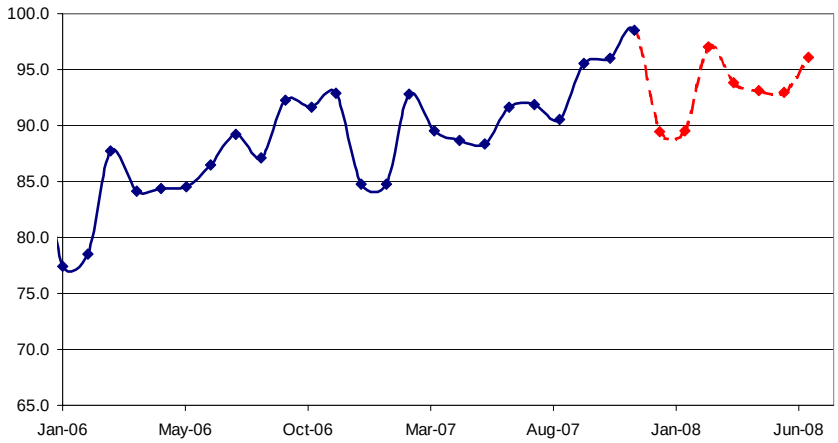

Fig. 2. Basic industrial production index for ferrous metallurgy
(January 1993 = 100%)

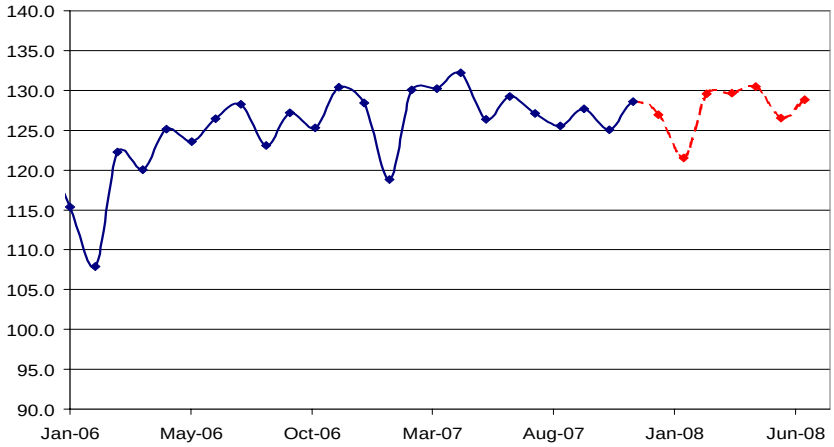

Fig. 3. Basic industrial production index for mechanical engineering and metal working industry
(January 1993 = 100%)

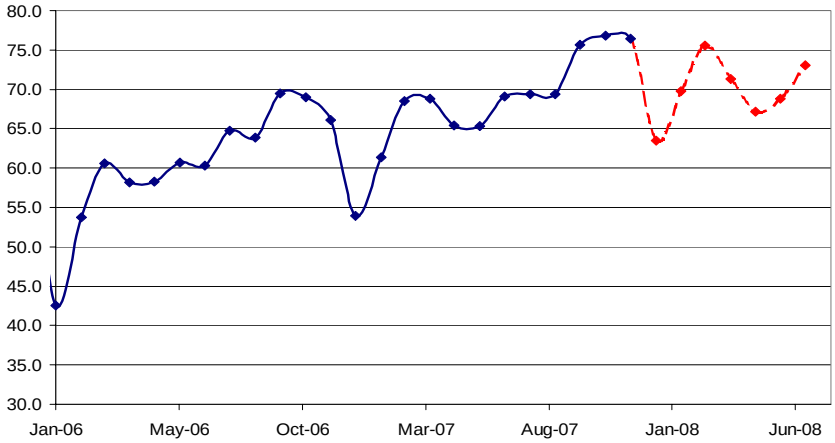

Fig. 4. Basic industrial production index for chemical and petrochemical industry (January 1993 = 100%)

Fig. 5. Basic industrial production index for building materials producing industry (January 1993 = 100%)

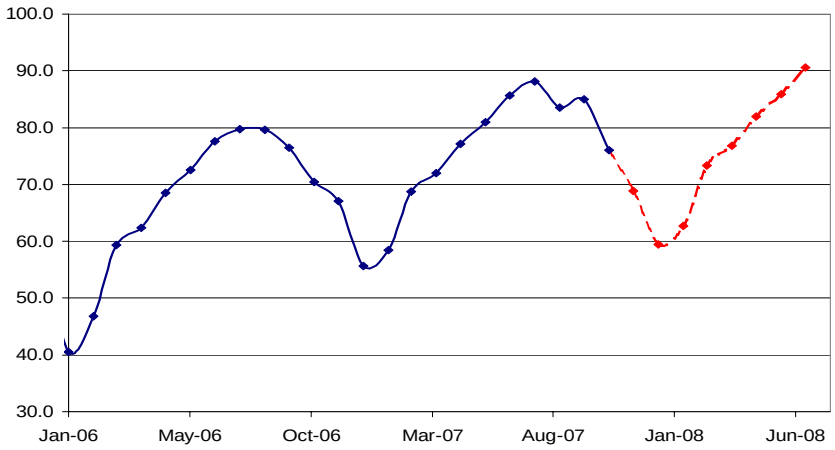

Fig. 6. Basic industrial production index for fuel and energy industry (January 1993 = 100%)

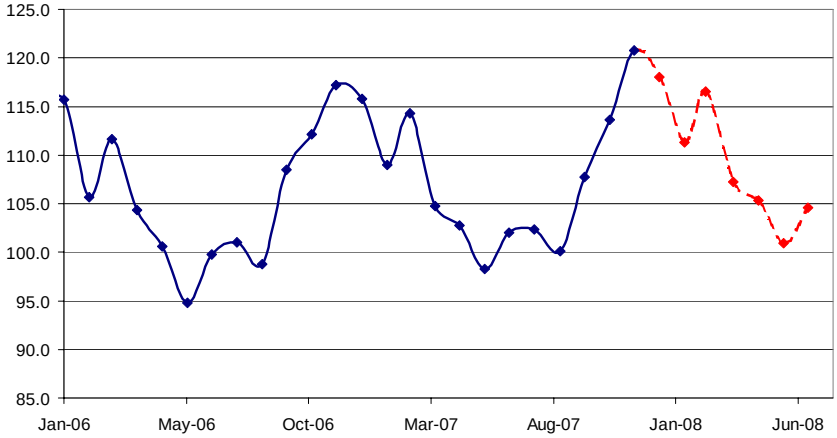

Fig. 7. Basic industrial production index for non-ferrous metallurgy (January 1993 = 100%)

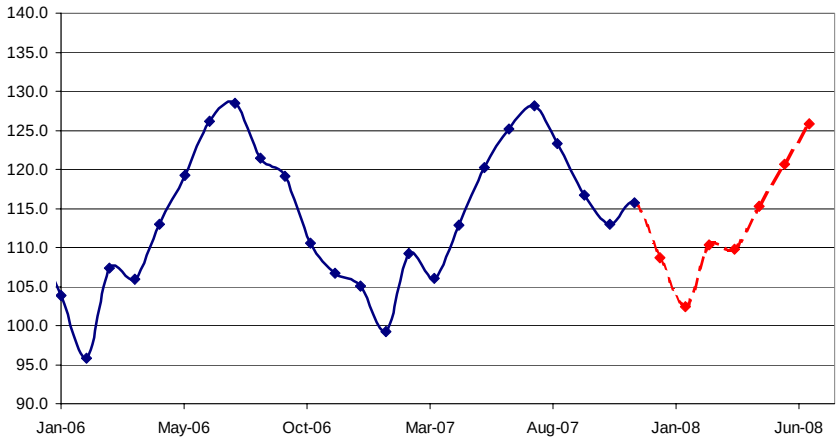

Fig. 8. Basic industrial production index for timber, woodworking and paper-pulp industry (January 1993 = 100%)

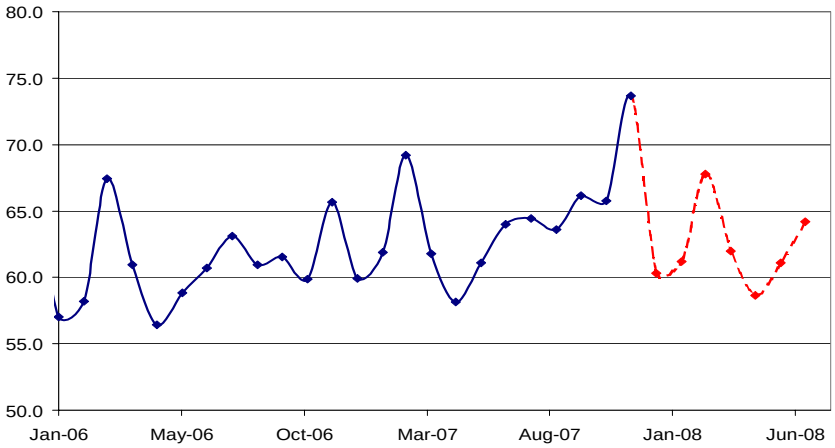

Fig. 9. Basic industrial production index for food processing industry (January 1993=100%)

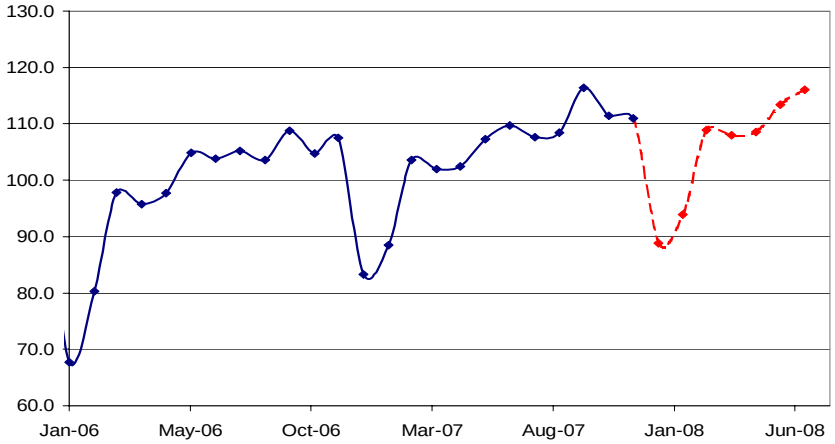

Fig. 10. Basic industrial production index for light industry (January 1993=100%)

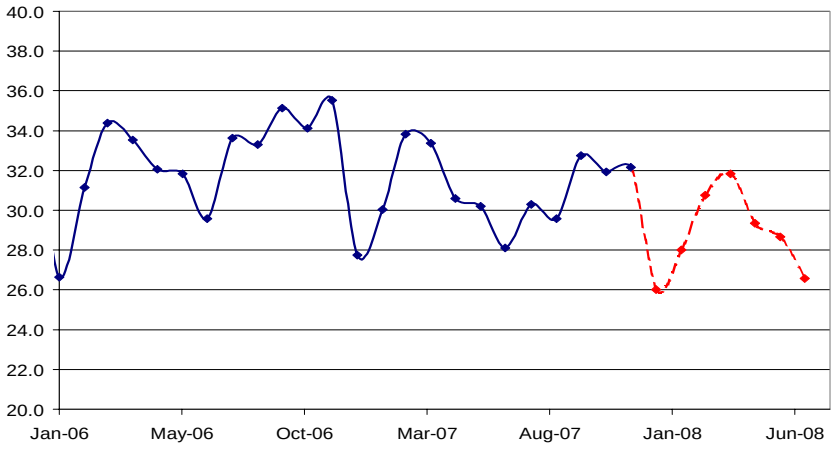

Fig. 11. Retail trade turnover (RUR billion)

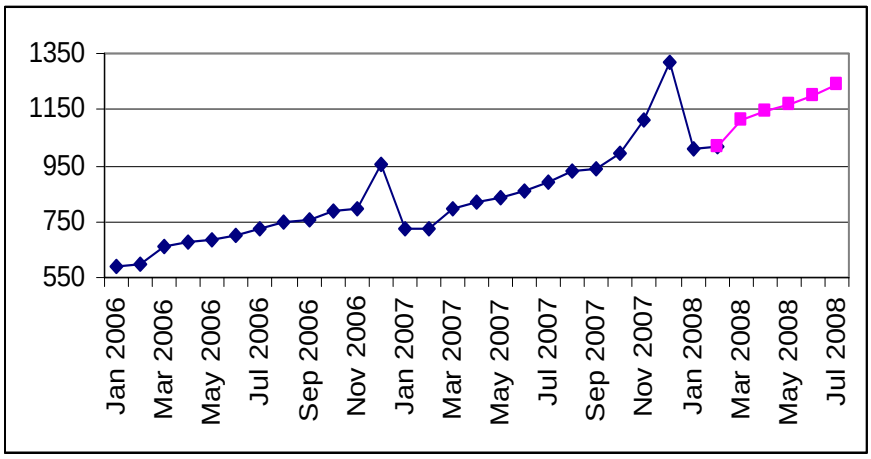

Fig. 12. Capital investments (RUR billion)

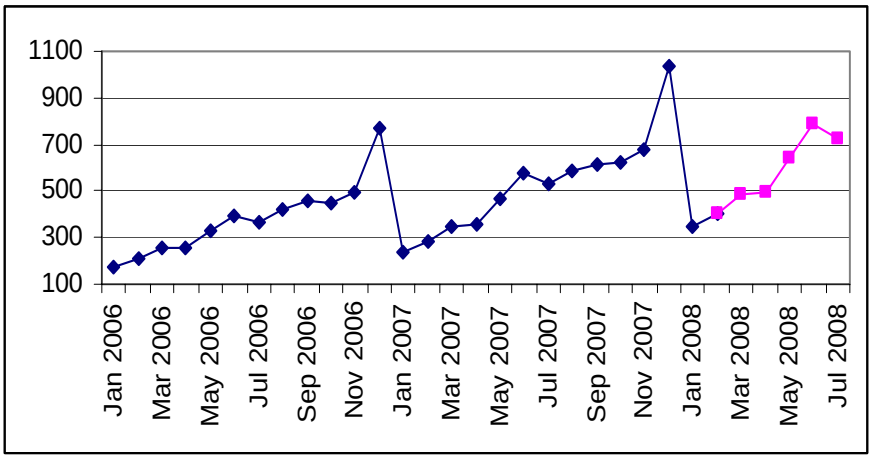

Fig. 13. Export to all countries (USD billion)

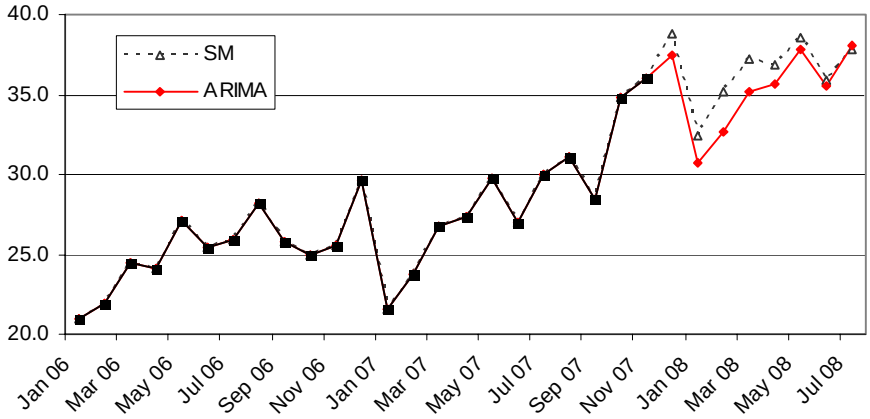

Fig. 14. Export to countries other than CIS member countries (USD billion)

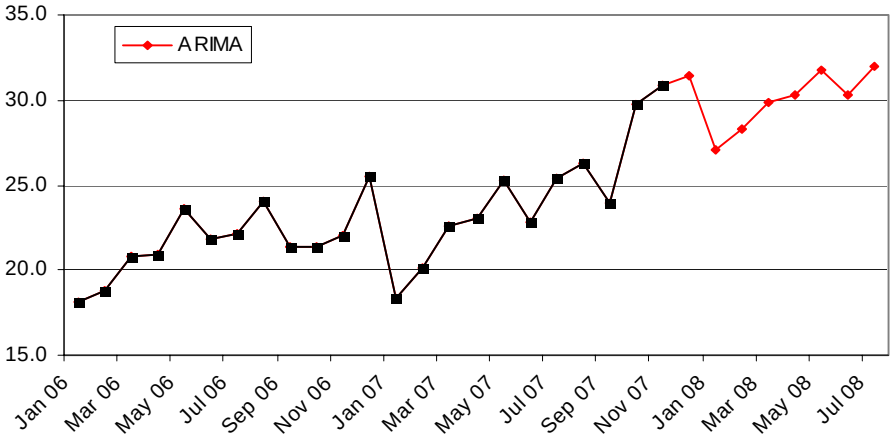

Fig. 15. Import from all countries (USD billion)

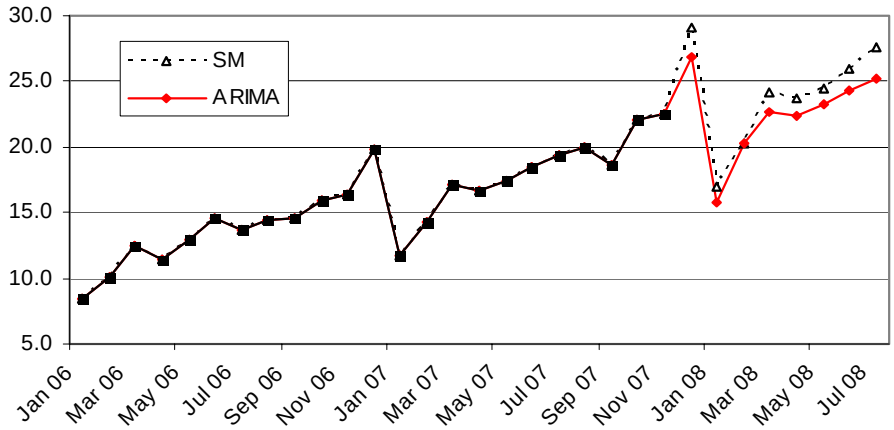

Fig. 16. Import from countries other than CIS member countries (USD billion)

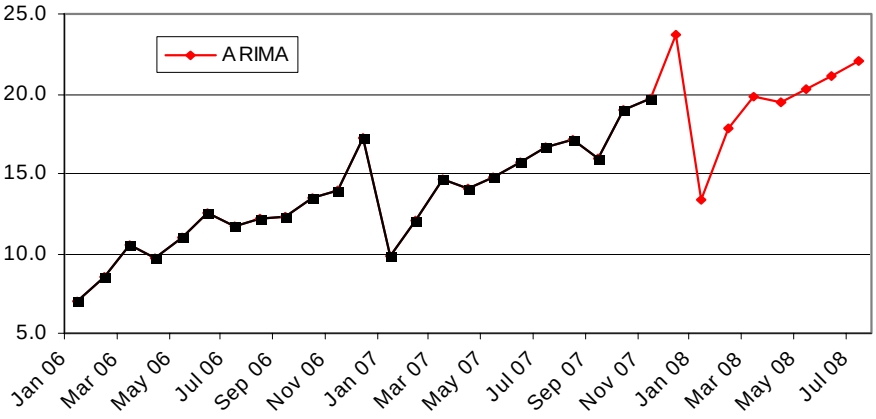

Fig. 17. Basic consumer price index in percentage terms against December of the previous year

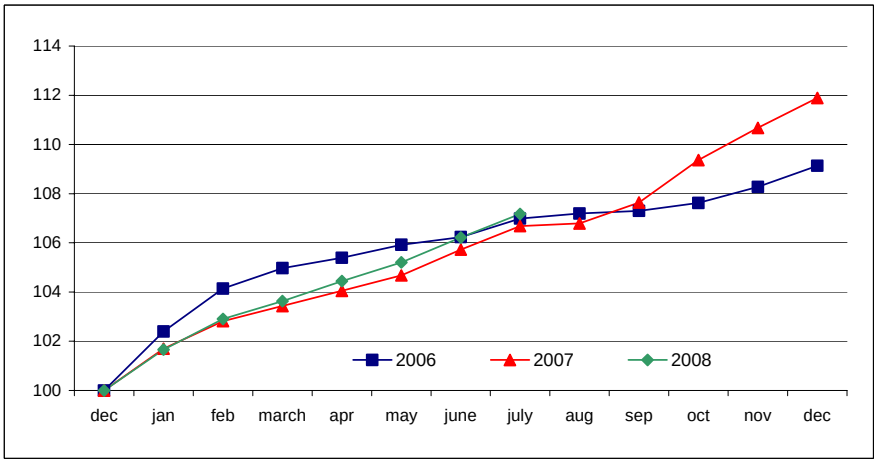

Fig. 17a. Basic consumer price index in percentage terms against December of the previous year (SM)

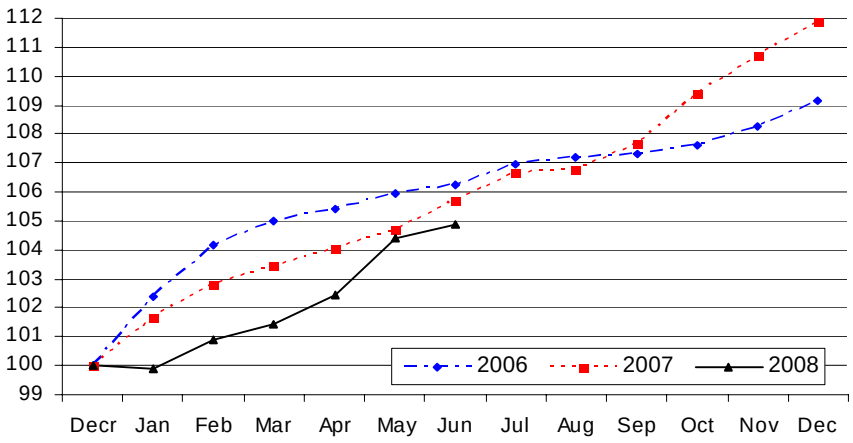

Fig.18. Basic price index for industrial product producers in percentage terms against December of the previous year

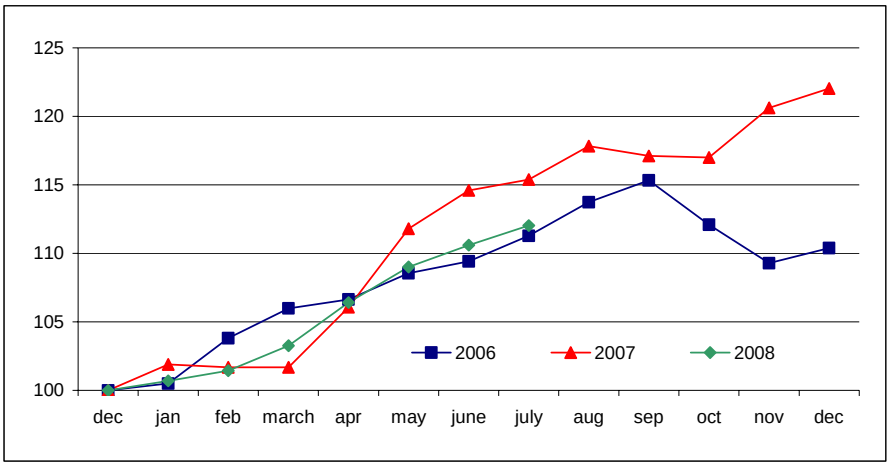

Fig. 19. Basic price index for mining operations in percentage terms against December of the previous year

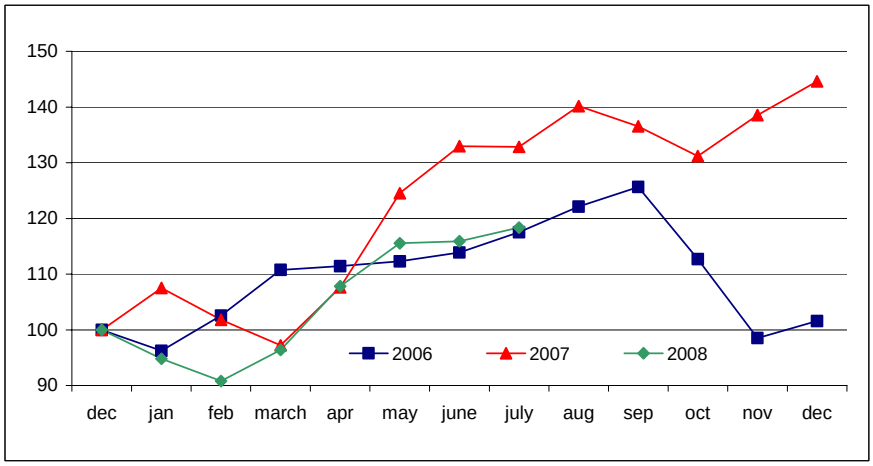

Fig. 20. Basic price index for manufacturing industries in percentage terms against December of the previous year

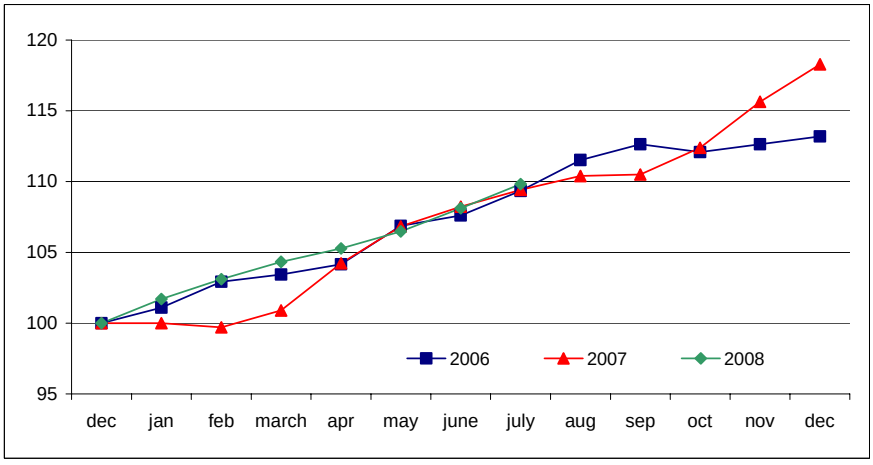

Fig. 21. Basic price index for production and distribution of electric power energy, gas and water in percentage terms against December of the previous year

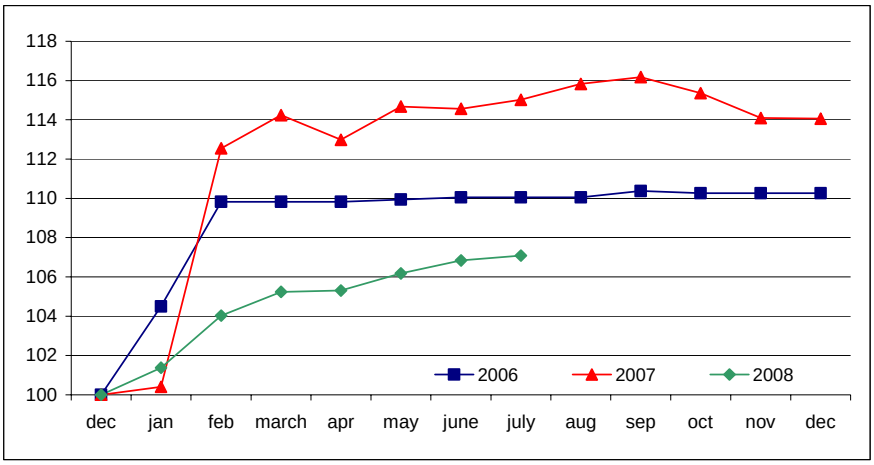

Fig. 22. Basic price index for production of food products in percentage terms against December of the previous year

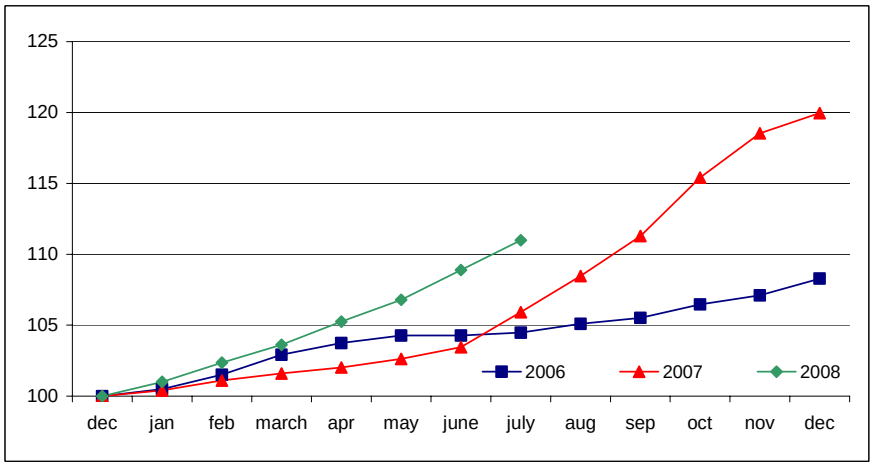

Fig. 23. Basic price index for textile and garment manufacture in percentage terms against December of the previous year

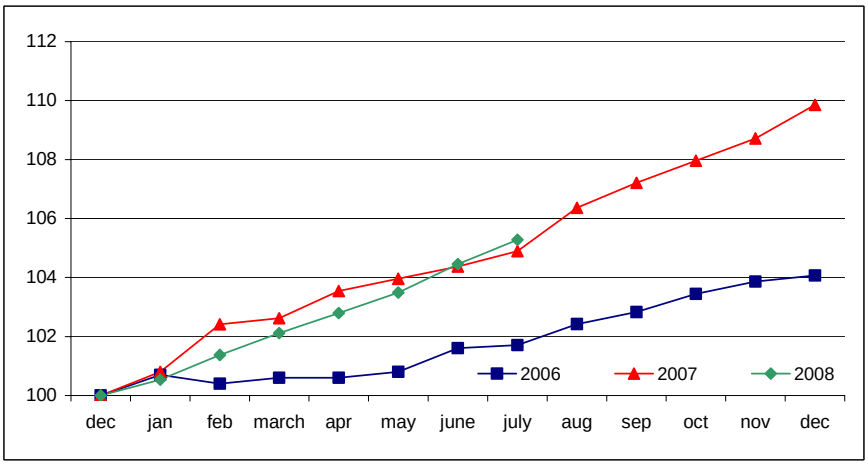

Fig. 24. Basic price index for wood fashioning and woodworking in percentage terms against December of the previous year

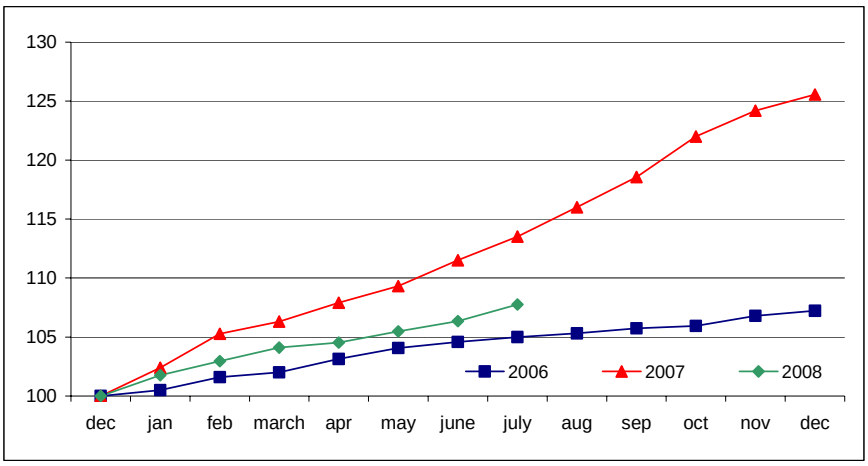

Fig. 25. Basic price index for paper-pulp manufacturing in percentage terms against December of the previous year

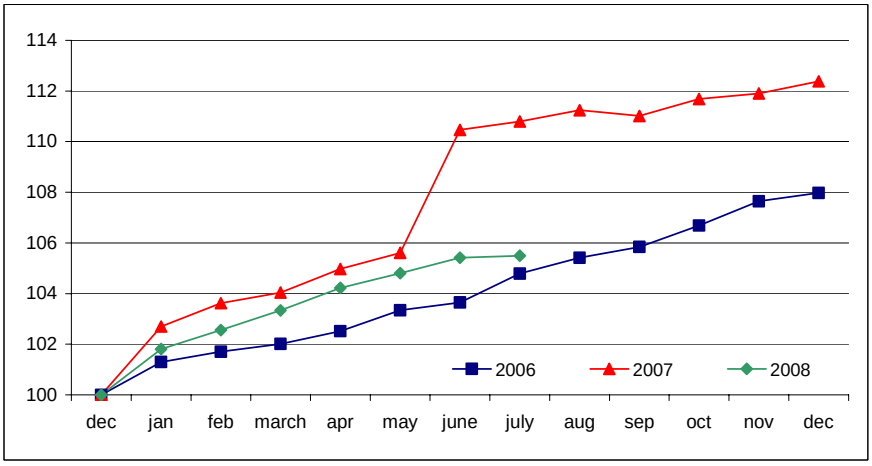

Fig. 26. Basic price index for production of coke and oil products in percentage terms against December of the previous year

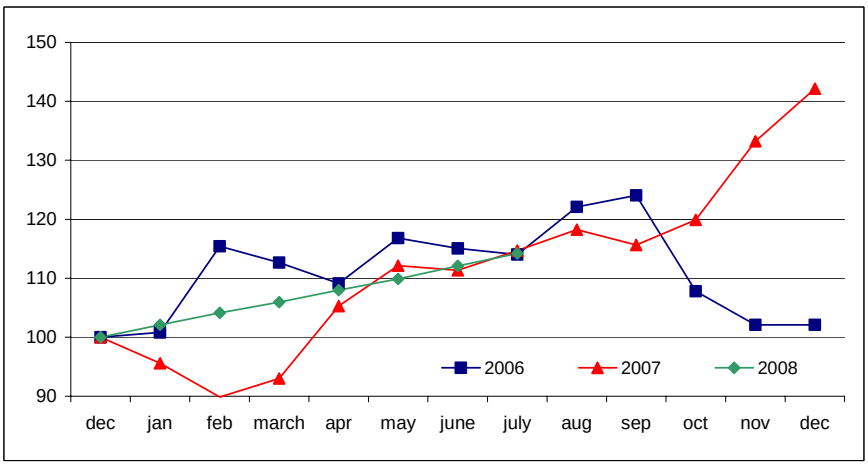

Fig. 27. Basic price index for chemical production in percentage terms against December of the previous year

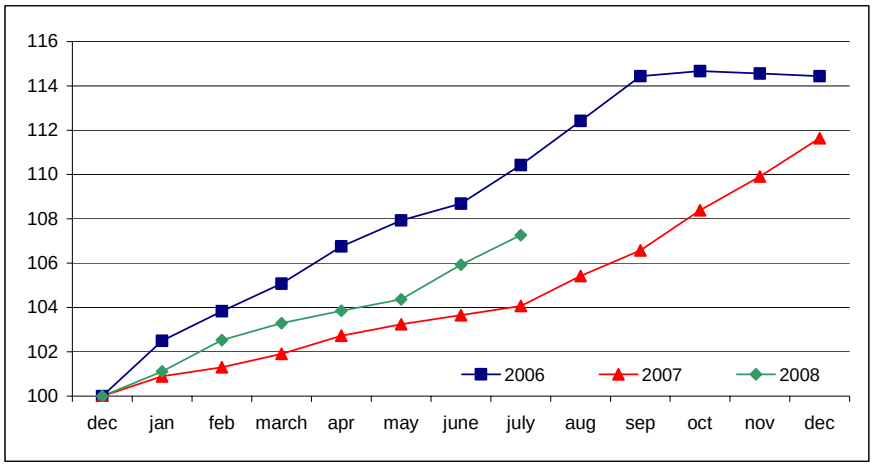

Fig.28. Basic price index for metallurgy and production of finished metal products in percentage terms against December of the previous year

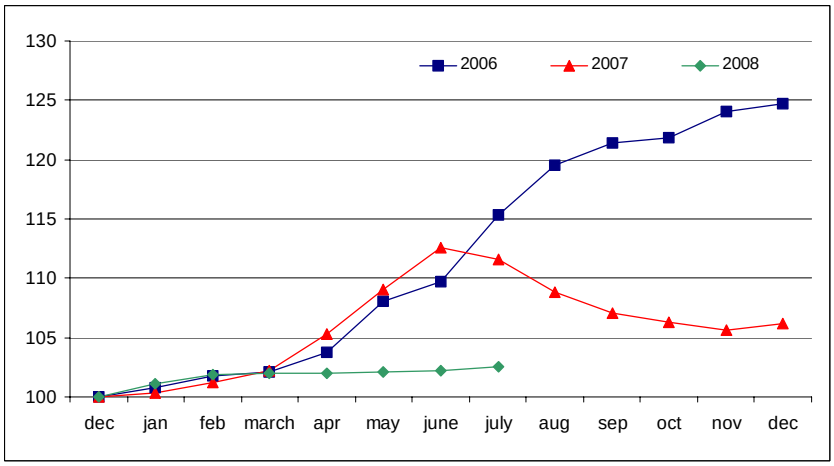

Fig.29. Basic price index for production of machinery and equipment in percentage terms against December of the previous year

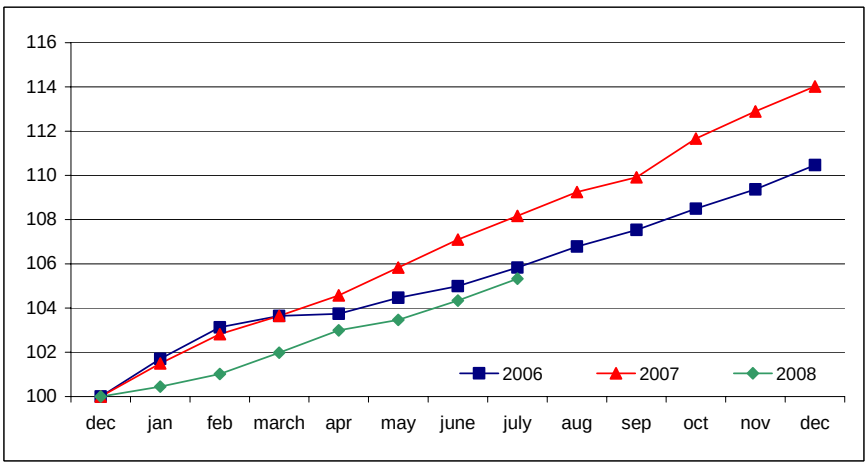

Fig.30. Basic price index for production of transportation vehicles and equipment in percentage terms against December of the previous year

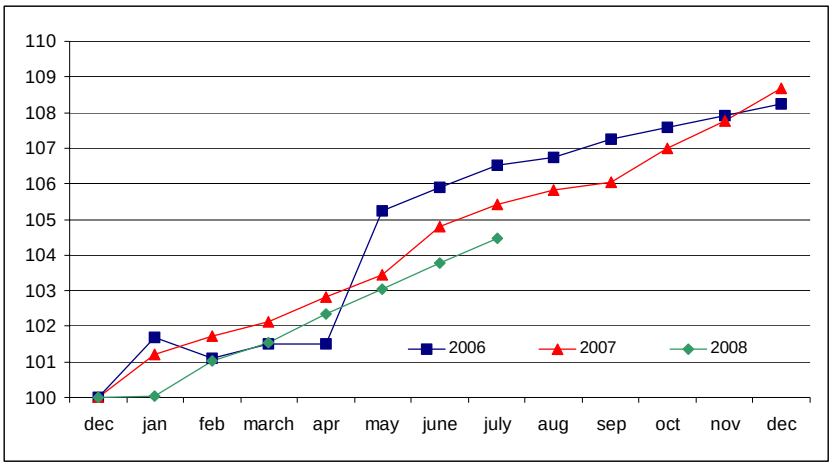

Fig. 31. Cost of the minimum set of food products per person per month (RUR)

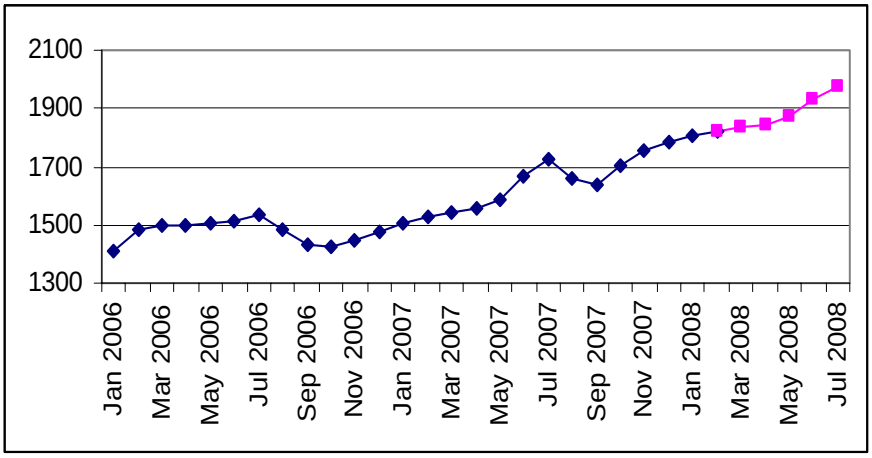

Fig. 32. Basic index for transportation rates (per each year in percentage terms against the previous year)

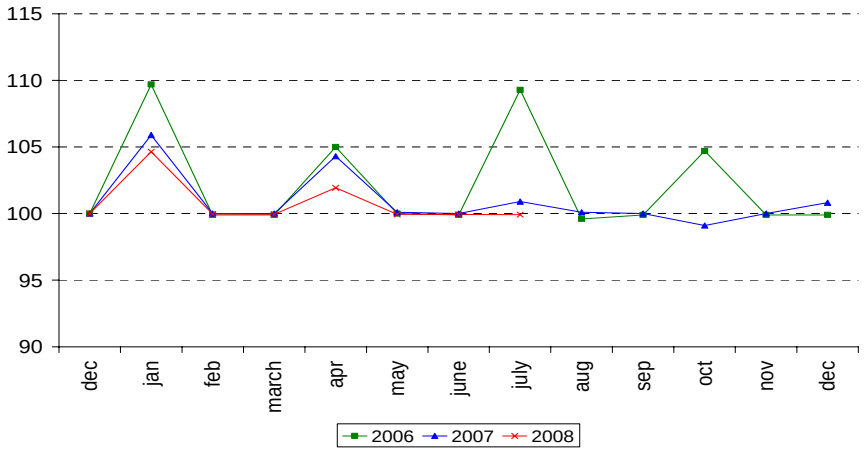

Fig. 33. Basic index for motor vehicle cargo transportation rates (per each year in percentage terms against the previous year)

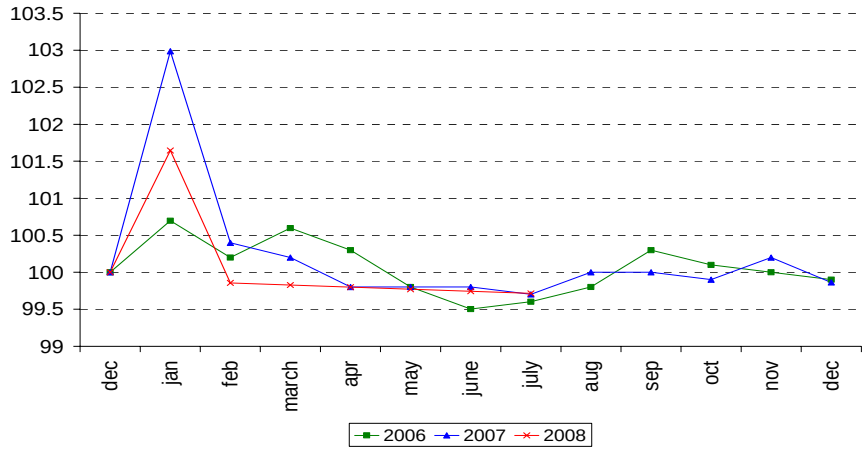

Fig. 34. Basic index for pipeline transportation rates (per each year in percentage terms against the previous year)

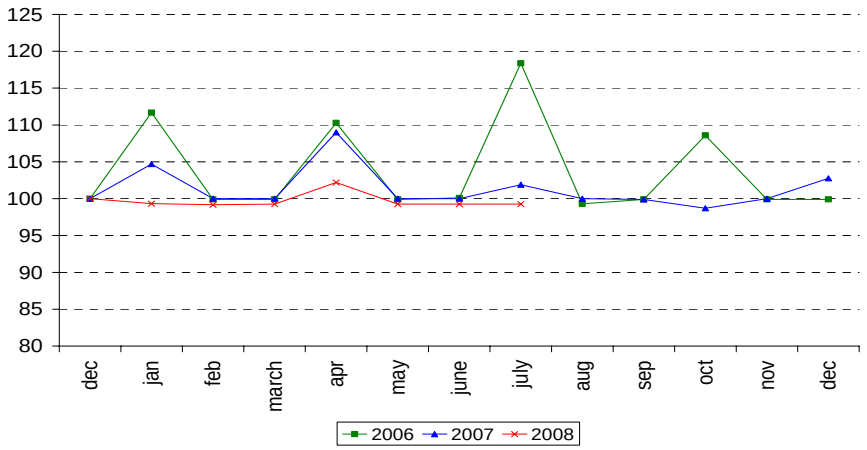

Fig. 35. Brent oil prices (US dollars per barrel)

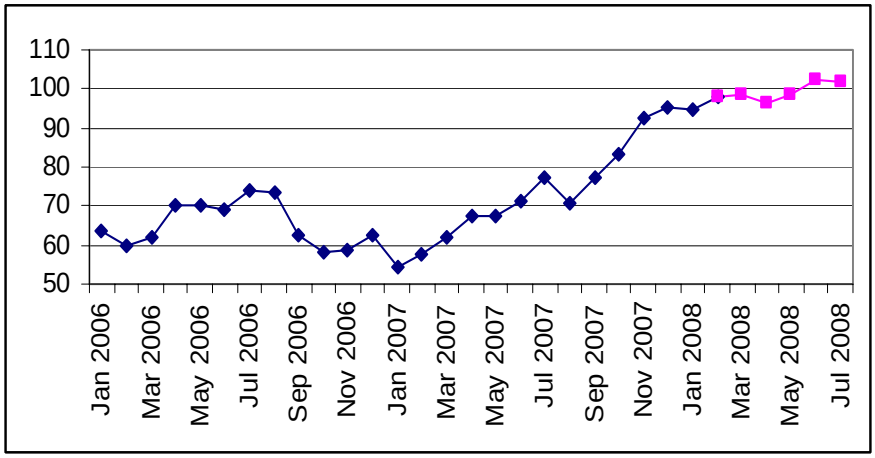

Fig. 36. Aluminum prices (US dollars per ton)

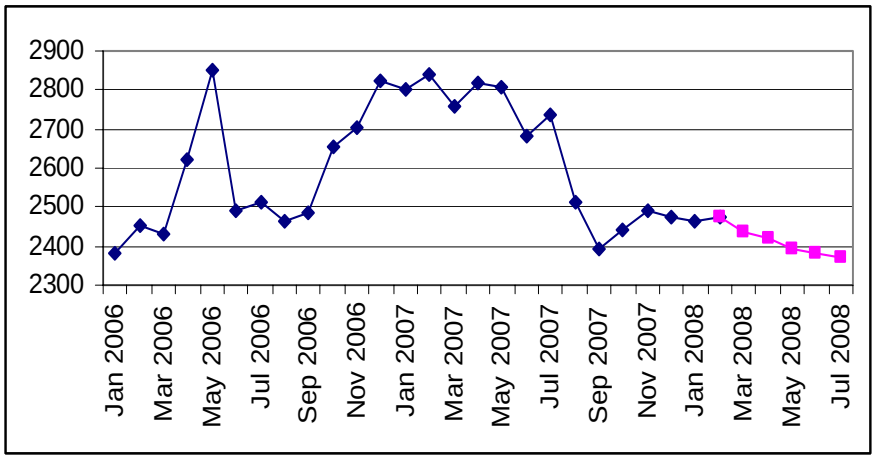

Fig. 37. Gold prices (US dollars per ounce)

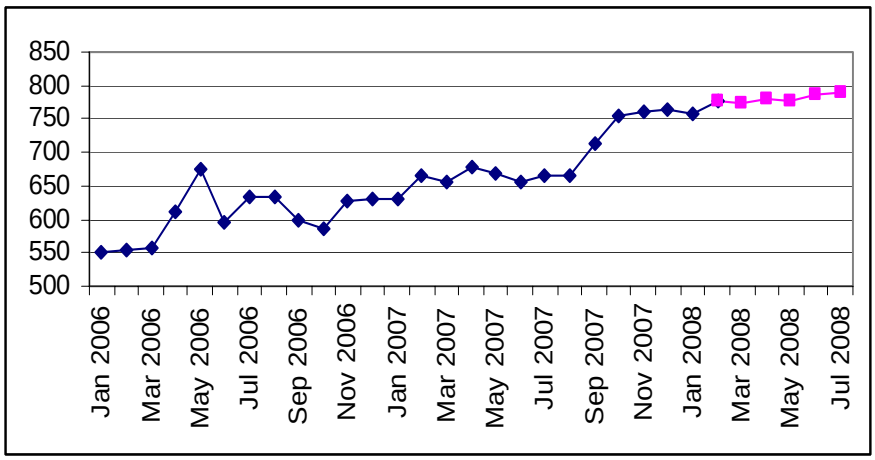

Fig. 38. Nickel prices (US dollars per ton)

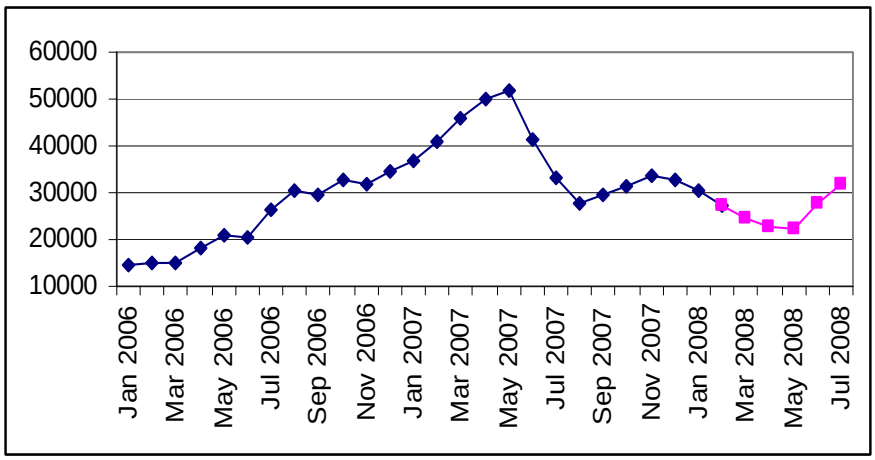

Fig. 39. Copper prices (US dollars per ton)

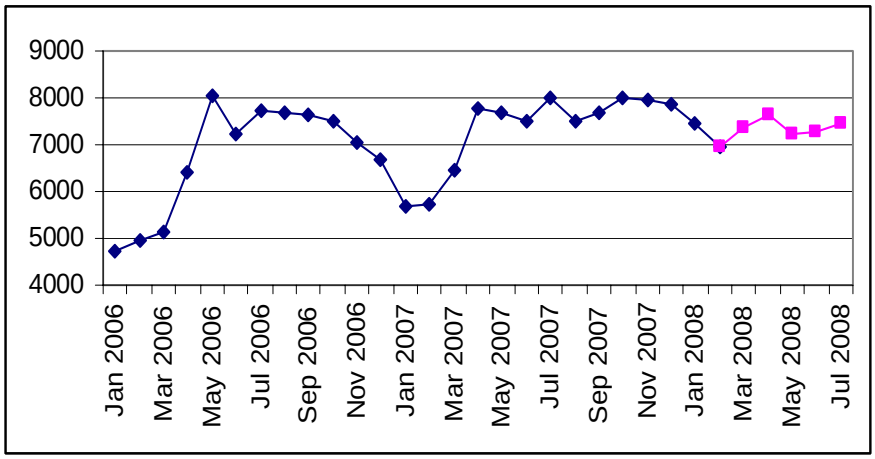

Fig. 40. Monetary base, RUR billion

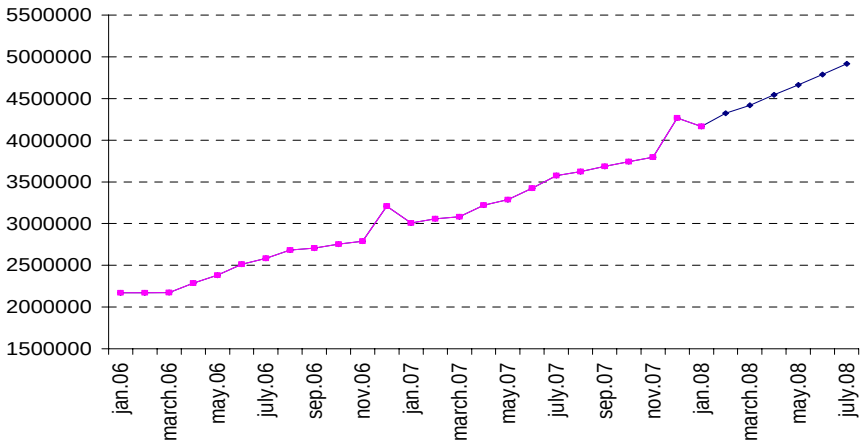

Fig. 41. M_2, RUR billion

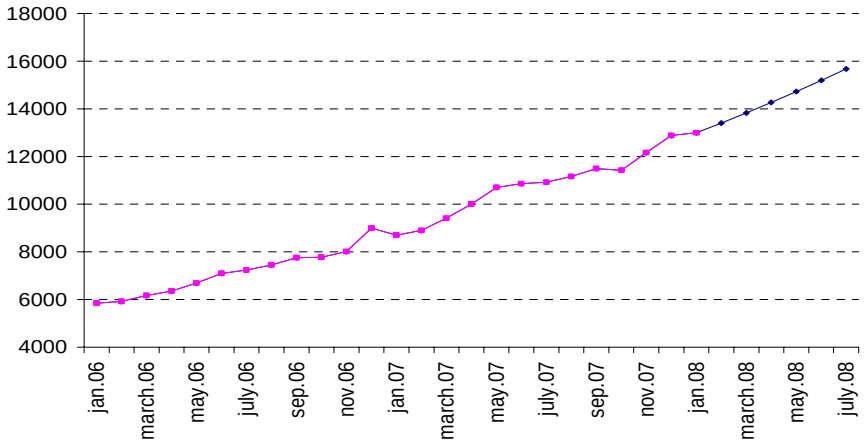

Fig. 42. The RF gold and foreign exchange reserves, USD million

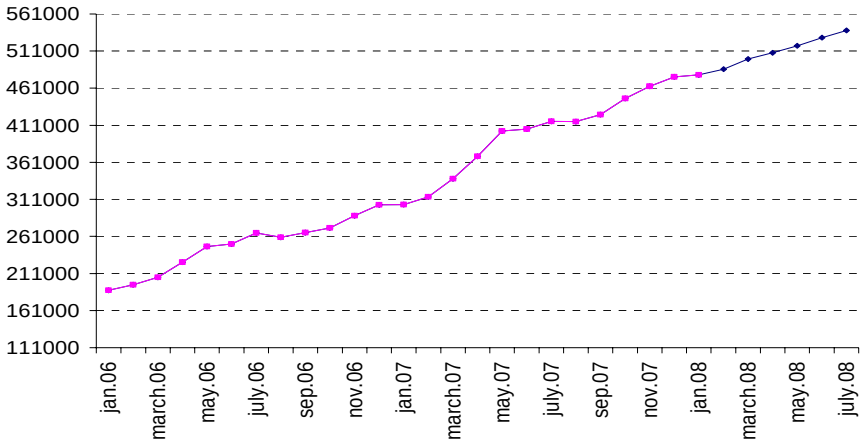

Fig. 43. RUR/USD exchange rate

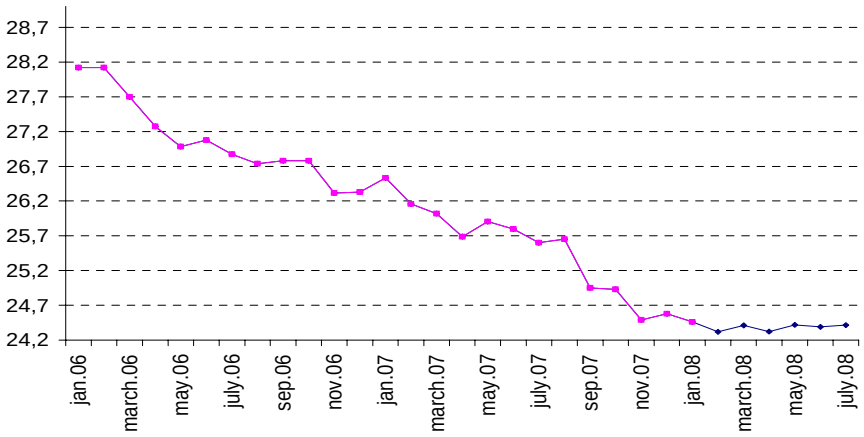

Fig. 44. USD/EUR exchange rate

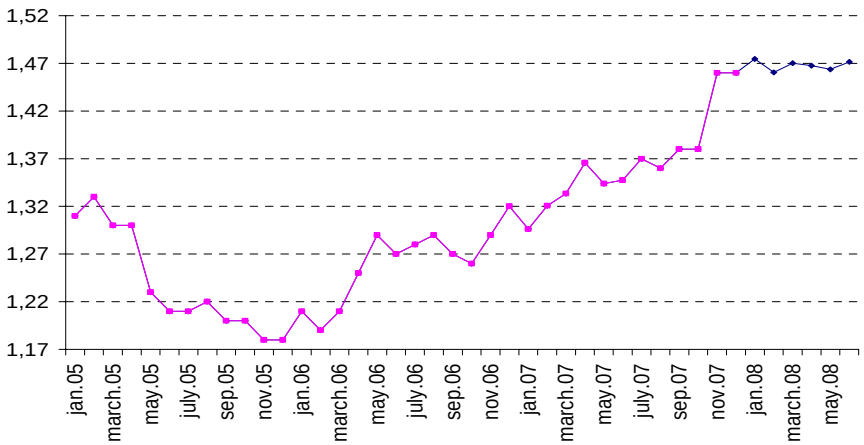

Fig. 45. Real disposable cash income (in percentage terms of the level in January 1999)

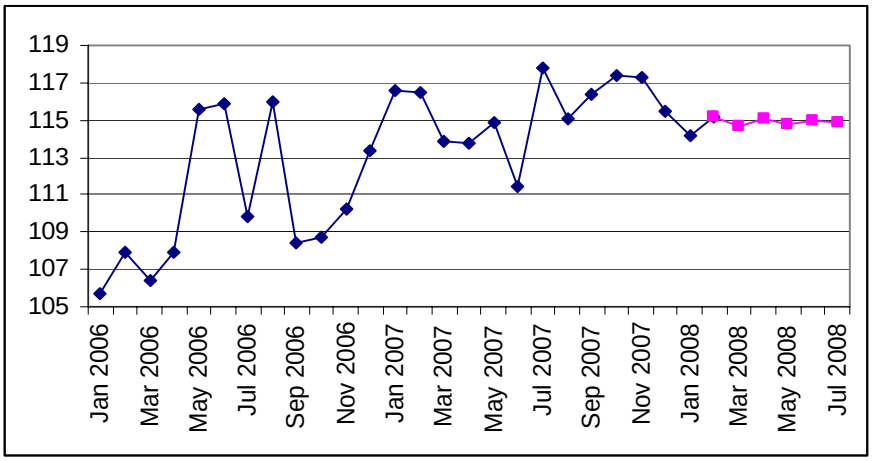

Fig. 46. Real monetary income (in percentage terms of the level in January 1999)

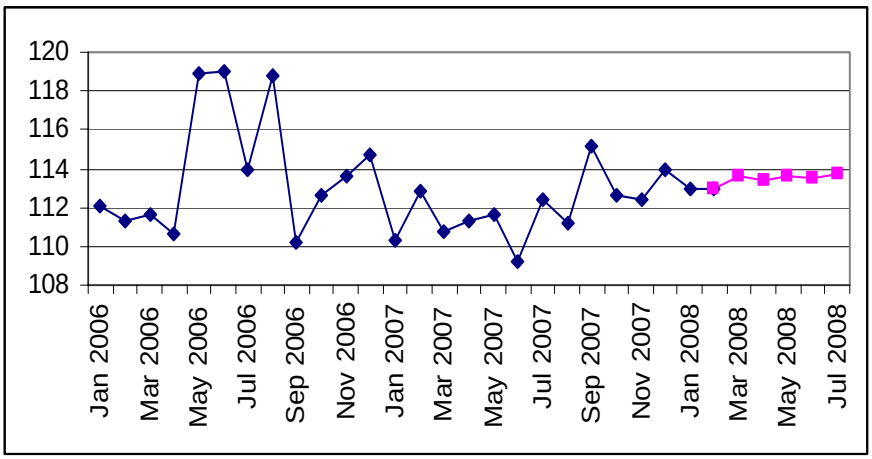

Fig. 47. Real wages (in percentage terms of the level in January 1999)

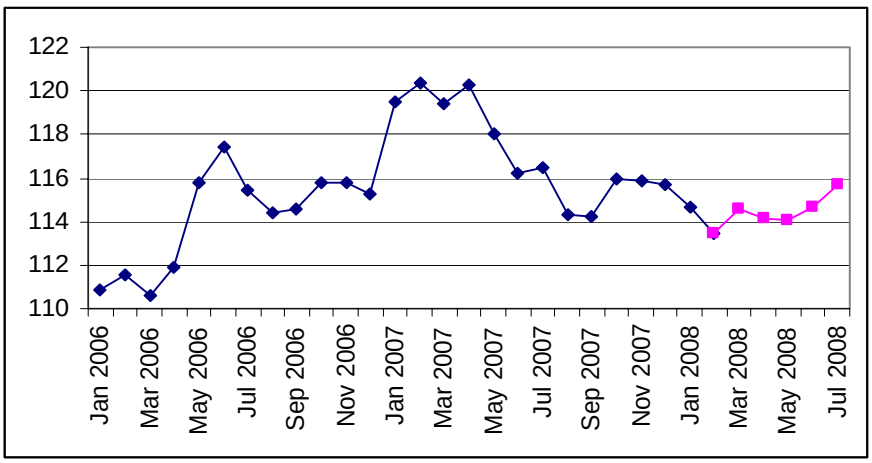

Fig. 48. Total economically active population (million persons)

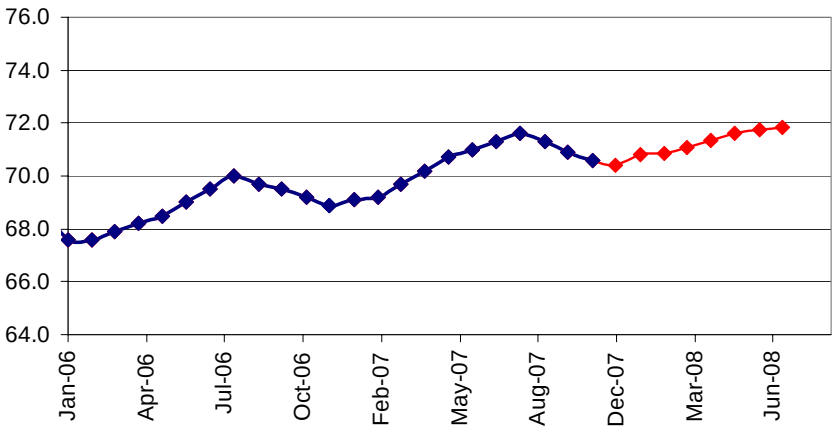

Fig. 49. Total unemployment (million persons)