



GAIDAR  
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FOR ECONOMIC  
POLICY

# MODEL CALCULATIONS OF SHORT-TERM FORECASTS OF RUSSIAN ECONOMIC TIME SERIES

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## INTRODUCTION TO ALL THE ISSUES

This paper presents calculations of various economic indicators for the Russian Federation in *December* of 2018 to *May* of 2019, which were performed using time series models developed as a result of research conducted by the Gaidar Institute over the past few years.<sup>1</sup> A method of forecasting falls within the group of *formal* or *statistical* methods. In other words, the calculated values neither express the *opinion* or *expert evaluation* of the researcher, rather they are calculations of future values for a specific economic indicator, which were performed using formal ARIMA models  $(p, d, q)$  given a prevailing trend and its, in some cases, significant changes. The presented forecasts are of inertial nature, because respective models rely upon the dynamics of the data registered prior to the moment of forecasting and depend too heavily on the trends, which are typical of the time series in the period immediately preceding the time horizon to be forecast. The foregoing calculations of future values of economic indicators for the Russian Federation can be used in making decisions on economic policy, provided that the general trends, which were seen prior to forecasting for each specific indicator, remain the same, i.e. prevailing long-term trends will see no serious shocks or changes in the future.

Despite that there is a great deal of data available on the period preceding the crisis of 1998, models of forecasting were analyzed and constructed using only the time horizon which followed August 1998. This can be explained by the findings of previous studies<sup>2</sup>, which concluded, among other key inferences, that the quality of forecasts was deteriorated in most of the cases when the data on the pre-crisis period was used. Additionally, it currently seems incorrect to use even shorter series (following the crisis of 2008), because statistical characteristics of models based on such a short time horizon are very poor.

Models for the economic indicators in question were evaluated using standard methods of time series analysis. Initially, the correlograms of the studied series and their first differences were analyzed in order to determine the maximum number of delayed values to be included into the specifications of a model. Then, the results of analyzed correlograms served as the basis for testing all the series for weak stationarity (or stationarity around the trend) using the Dickey–Fuller test. In some cases, the series were tested for stationarity around the segmented trend using Perron and Zivot–Andrews tests for endogenous structural changes.<sup>3</sup>

The series were broken down into weak stationary, stationary near the trend, stationary near the trend with structural change or difference stationary, and then models, which corresponded to each type (regarding the levels and including, if necessary, the trend or segmented trend or differences), were evaluated. The Akaike and Schwartz information criteria, the properties of models' residuals (lack of autocorrelation, homoscedasticity and normality) and the quality of the in-sample-forecasts based on these models were used to choose the best model. Forecast values were calculated for the best of the models constructed for each economic indicator.

Additionally, the Bulletin presents future monthly values of the CPI, which were calculated using models developed at the Gaidar Institute, and volumes of imports/exports from/to all countries, which were calculated using structural models (SM). The forecast values based on the structural models may, in some cases, produce better results than ARIMA-models do, because structural models are constructed by adding information of the dynamics of exogenous variables. Besides, the use of structural forecasts in making aggregated forecasts (i.e. forecasts obtained as average value from several models) may help make forecast values more accurate.

<sup>1</sup> 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*. Moscow, IET, 2001; R.M. Entov, V.P. Nosko, A.D. Yudin, P.A. Kadochnikov, S.S. Ponomarenko. *Problems of Forecasting of Some Macroeconomic Indices*. Moscow, IET, 2002; V. Nosko, A. Buzaev, P. Kadochnikov, S. Ponomarenko. *Analysis of the Forecasting Parameters of Structural Models and Models with the Outputs of the Polls of Industries*. Moscow, IET, 2003; M.Yu. Turuntseva and T.R. Kiblitckaya, *Qualitative Properties of Different Approaches to Forecasting of Social and Economic Indices of the Russian Federation*. Moscow, IET, 2010.

<sup>2</sup> Ibid.

<sup>3</sup> 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.

The dynamics of the Consumer Price Index was modeled using theoretical assumptions arising from the monetary theory. The following was used as explanatory variables: money supply, output volume, the dynamics of the ruble-dollar exchange rate, which reflects the dynamics of alternative cost of money-keeping. The model for the Consumer Price Index also included the price index in the electric power industry, because the dynamics of manufacturers' costs relies heavily on this indicator.

The baseline indicator to be noted is the real exchange rate, which can influence the value of exports and imports, and its fluctuations can result in changes to the relative value of domestically-produced and imported goods, though the influence of this indicator turns out to be insignificant in econometric models. Global prices of exported resources, particularly crude oil prices, are most significant factors, which determine the dynamics of exports: a higher price leads to greater exports of goods. The level of personal income in the economy (labor costs) was used to describe the relative competitive power of Russian goods. Fictitious variables D12 and D01 – equal to one in December and January and zero in other periods – were added so that seasonal fluctuations were factored in. The dynamics of imports is effected by personal and corporate incomes whose increase triggers higher demand for all goods including imported ones. The real disposable cash income reflects the personal income; the Industrial Production Index reflects the corporate income.

The forecast values of foreign exchange rates were also calculated using structural models of their dependence on global crude oil prices.

The forecast values of explanatory variables, which are required for forecasting on the basis of structural models, were calculated using ARIMA models ( $p, d, q$ ).

The paper also presents calculations of the values of the Industrial Production Index, the Producer Price Index and the Total Unemployment Index, which were calculated using the results of business surveys conducted by the Gaidar Institute. Empirical studies show<sup>1</sup> that the use of series of business surveys as explanatory variables<sup>2</sup> in forecasting models can make forecasting more accurate on the average. Future values of these indicators were calculated using ADL-models (seasonal autoregressive delays were added).

The Consumer Price Index and the Producer Price Index are also forecast using large datasets (factor models – FM). The construction of factor models relies basically on the evaluation of the principal components of a large dataset of socio-economic indicators (112 indicators in this case). The lags of these principal components and the lags of the explanatory variable are used as explanatory variables in these models. A quality analysis of the forecasts obtained for different configurations of the factor models was used to chose a model for the CPI, which included 9<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> lags of the four principal components, as well as 1<sup>st</sup> and 12<sup>th</sup> lags of the variable itself, and a model for the PPI, which included 8<sup>th</sup>, 9<sup>th</sup> and 12<sup>th</sup> lags of the four principal components, as well as 1<sup>st</sup>, 3<sup>rd</sup> and 12<sup>th</sup> lags of the variable itself.

All calculations were performed using the Eviews econometric package.

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<sup>1</sup> See, for example: V. Nosko, A. Buzaev, P. Kadochnikov, S. Ponomarenko. *The Analysis of Forecasting Parameters of Structural Models and Models with Business Surveys' Findings*. Moscow, IEP, 2003.

<sup>2</sup> Used as explanatory variables were the following series of the business surveys: 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

Calculations of forecast values of indices of industrial production<sup>1</sup> (%)

	Index of industrial production				IIP for mining		IIP for manufacturing		IIP for utilities (electricity, water, and gas)		IIP for food products		IIP for coke and petroleum		IIP for primary metals and fabricated metal products		IIP for machinery	
	Rosstat		NRU HSE		Rosstat		NRU HSE		Rosstat		NRU HSE		Rosstat		NRU HSE		Rosstat	
	ARIMA	BS	ARIMA	BS														
Dec 18	3.3	3.0	3.0	3.4	7.0	5.2	2.8	3.6	0.4	0.3	3.4	2.7	1.2	-1.8	-1.7	5.1	6.9	-13.2
Jan 19	1.8	3.2	2.2	3.3	5.5	5.2	3.1	0.5	0.9	-2.0	2.8	2.3	0.5	0.1	-8.3	4.2	-5.1	-9.8
Feb 19	2.7	4.0	3.5	4.1	5.4	6.0	3.0	3.3	-1.5	-3.3	4.5	4.7	2.6	2.2	-3.6	6.6	-0.2	-7.7
Mar 19	2.8	3.2	1.4	3.5	3.9	4.5	1.4	2.9	-5.4	-5.8	2.8	2.3	2.1	0.7	-0.6	4.9	6.3	-6.7
Apr 19	2.1	4.1	1.2	4.3	3.4	4.0	1.1	1.9	-0.7	-0.9	3.3	3.5	1.1	1.6	-0.5	1.6	-5.8	-8.3
May 19	2.2	1.5	0.3	1.9	3.4	4.4	-0.3	0.7	0.4	1.0	3.5	3.5	0.1	-0.3	-8.2	3.3	-3.3	7.9
Expected growth on the respective month of the previous year																		
For reference: actual growth in 2017–2018 on the respective month of 2016–2017																		
Dec 17	-1.7		0.2		-0.4	-1.9	-1.6	2.9	-6.6	-7.1	-0.5	1.0	0.0	-1.0	-1.6	2.9	3.1	18.8
Jan 18	2.4		1.9		0.8	-0.7	4.3	4.6	-0.7	-0.8	2.2	3.7	2.7	0.5	5.3	5.6	-14.8	-6.9
Feb 18	3.2		2.0		1.2	-0.1	4.7	3.3	1.4	2.4	1.9	3.1	2.2	0.7	2.3	4.5	2.9	-4.9
Mar 18	2.8		1.9		2.4	1.1	2.2	0.7	8.8	10.6	2.8	2.3	1.7	1.4	8.6	0.3	-1.2	-8.5
Apr 18	3.9		2.1		2.5	1.5	5.3	2.9	0.5	-0.3	5.2	3.5	-0.2	-3.7	2.4	7.7	-5.6	-3.8
May 18	3.7		2.1		1.3	0.3	5.4	3.6	-0.7	-1.7	3.9	3.2	5.4	3.1	11.7	4.4	-6.2	-13.0

Note: in the time spans under review, the series of the Rosstat and the NRU HSE chain indices of IIP, as well as the NRU HSE chain IIP for manufacturing are identified as stationary processes around the trend with an endogenous structural change; the series of the Rosstat and the NRU HSE chain IIPs for manufacturing, for primary metals and fabricated metal products, as well as the NRU HSE chain IIP for mining and Rosstat chain IIP for machinery 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.

<sup>1</sup> 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 making forecast for December of 2018 to May 2019, the series of monthly data of the indices of industrial production released by the Federal State Statistics Service (Rosstat) from January 2002 September 2018, as well as the series of the base indices of industrial production released by the National Research University Higher School of Economics (NRU HSE<sup>1</sup>) over the period from January 2010 to October 2018 were used (the corrected value of January 2010 was equal to 100%). The forecast values of the series were calculated on the basis of ARIMA-class models. The forecast values of the Rosstat and the NRU HSE indices of industrial production are calculated using business surveys (BS) as well. The obtained results are shown in Table 1.

As seen from Table 1, the Rosstat average<sup>2</sup> growth of the industrial production index posted 2.8% in December 2018 – May 2019 against the same period of the previous year for the industry as a whole. As for the NRU HSE industrial production index, the indicator constitutes 2.7%. At 2018-end, the forecast annual growth of the Rosstat and the NRU HSE industrial production index will amount to 3.2%.

The average monthly increase of the Rosstat industrial production index and for the NRU HSE industrial production index for mining for December 2018 – May 2019 comes to 4.7% and 4.9%, respectively.

In December 2018 – May 2019 in comparison with the same period of last year, the average growth of the Rosstat industrial production index for manufacturing comes to 1.9% and the NRU HSE industrial production index to 2.1%. The average monthly growth of the Rosstat industrial production index and the NRU HSE industrial production index for food products constitute 3.4% and 3.2%, respectively. The production of coke and petroleum products is forecast to grow 1.3% and 0.4% for the Rosstat and NRU HSE indexes, respectively. The average monthly change of the industrial production index for primary metals and fabricated metal products for December 2018 – May 2019 computed by Rosstat and the NRU HSE constitute -3.8% and 4.3%, respectively. Manufacturing of machinery and equipment is forecast to increase by -0.2% and -6.3% for the Rosstat and the NRU HSE indexes, respectively.

The average increment of the industrial production index for electricity, gas, and steam supply; for air conditioning computed by Rosstat for December 2018 – May 2019 in comparison with the same period of the previous year constitutes (-1.0%); the same indicator for the NRU HSE industrial production index comes to (-1.8%).

On average (by type of economic activity) the Rosstat indexes of industrial production will constitute 2.9% in 2018, the NRU HSE industrial production indexes will grow by 0.2%.

**Retail Sales**

This section (Table 2) presents forecasts of monthly retail sales made on the basis of monthly Rosstat data over January 1999 – October 2018.

As seen from Table 2, the average forecast increment of the monthly trade turnover in December 2018 – May 2019 against the corresponding period of 2017–2018 will amount to around 5.2%. The average monthly real trade turnover is forecast to grow at around 1.3% for December 2018 – May 2019 against the same period of 2017–2018.

Table 2  
Calculations of forecast values of the retail sales and the real retail sales

Forecast value according to ARIMA-model		
	Retail sales, billion RUB (in brackets – growth on the respective month of the previous year,%)	Real retail sales (as% of the respec- tive period of the previous year)
Dec 18	3258.7 (5.6)	102.0
Jan 19	2443.3 (4.9)	101.5
Feb 19	2380.2 (4.9)	101.3
Mar 19	2596.2 (5.3)	101.2
Apr 19	2588.9 (5.2)	101.2
May 19	2643.4 (5.2)	100.9
For reference: actual values in the same months of 2017–2018		
Dec 17	3085.7	103.3
Jan 18	2328.2	102.9
Feb 18	2268.1	102.0
Mar 18	2466.5	102.2
Apr 18	2460.7	102.9
May 18	2512.6	102.6

Note: the series of retail sales and real retail sales over January 1999 – October 2018.

<sup>1</sup> The indices in question are calculated by E.A. Baranov and V.A. Bessonov.

<sup>2</sup> Average growth of industrial production indexes is the average value of these indexes for six months under review.

Table 3

## Calculations of forecast values of foreign trade turnover with countries outside the CIS

	Exports to all countries			Imports from all countries			Exports to countries outside the CIS			Imports from countries outside the CIS						
	Forecast values (billion USD a month)		%age of actual data in the respective month of the previous year	Forecast values (billion USD a month)		%age of actual data in the respective month of the previous year	Forecast values (billion USD a month)		%age of actual data in the respective month of the previous year	Forecast values (billion USD a month)		%age of actual data in the respective month of the previous year				
	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM				
Dec 18	45.9	46.5	122	124	25.0	26.3	104	109	37.8	39.2	118	122	23.6	22.5	108	103
Jan 19	37.4	39.2	111	117	22.2	21.0	133	126	32.5	34.3	110	116	18.1	19.3	123	131
Feb 19	41.9	44.9	134	144	23.9	23.2	125	121	35.4	36.5	132	136	19.9	21.4	116	125
Mar 19	42.6	43.5	116	119	24.2	24.4	112	113	35.6	36.2	112	114	22.2	22.1	115	114
Apr 19	40.8	44.3	113	123	23.8	23.4	114	112	35.1	36.8	112	118	20.4	21.8	110	118
May 19	41.0	44.7	112	122	24.0	23.7	112	111	34.3	37.1	107	116	21.6	21.4	113	112
For reference: actual values in respective months of 2017–2018 (billion USD)																
Dec 17	37.5		24.1		32.1		21.8		21.8		21.8		21.8		21.8	
Jan 18	33.6		16.7		29.7		14.8		14.8		14.8		14.8		14.8	
Feb 18	31.3		19.1		26.9		17.1		17.1		17.1		17.1		17.1	
Mar 18	36.6		21.6		31.8		19.3		19.3		19.3		19.3		19.3	
Apr 18	36.0		20.8		31.3		18.5		18.5		18.5		18.5		18.5	
May 18	36.6		21.4		31.9		19.1		19.1		19.1		19.1		19.1	

Note: over the period from January 1999 to October 2018, the series of exports, imports, exports to the countries outside the CIS and imports 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.

Table 4  
Calculations of forecast values of price indices

	Producer price indexes:										for transport equipment							
	The consumer price index (ARIMA)	The consumer price index (SM)	The consumer price index (FM)	for industrial goods (ARIMA)	for industrial goods (BS)	for industrial goods (FM)	for mining and quarrying	for manufacturing (electricity, water, and gas)	for food products	for textile and sewing industry		for wood products	for pulp and paper industry	for coke and refined petroleum	for chemical industry	for basic metals and fabricated metal	for machinery and equipment	
	Forecast values (% of the previous month)																	
Dec 18	100.2	100.6	100.4	100.8	100.3	100.8	105.8	101.5	100.0	101.4	100.2	100.7	101.0	97.9	100.1	101.5	100.5	100.3
Jan 19	101.1	100.5	100.5	100.9	99.7	100.4	98.2	101.5	100.0	100.8	100.5	100.6	101.8	96.6	100.4	102.0	101.7	101.0
Feb 19	100.4	100.4	100.4	100.6	100.6	100.6	99.3	101.7	101.5	100.5	100.7	101.1	100.9	101.6	100.7	101.5	101.0	99.9
Mar 19	100.3	100.3	100.5	100.9	100.0	100.8	104.3	100.8	100.5	100.7	100.8	100.7	100.9	101.4	101.1	100.5	100.7	100.6
Apr 19	100.2	100.3	100.5	101.8	100.3	100.7	104.7	101.1	99.4	100.9	100.7	100.6	102.0	101.6	101.2	100.5	100.8	100.5
May 19	100.3	100.4	100.5	102.0	100.2	100.6	101.0	101.6	100.3	100.9	100.5	100.5	100.9	101.5	101.5	102.1	100.7	100.5
	Forecast values (% of December 2017/2018)																	
Dec 18	103.6	104.2	103.6	114.1	115.4	113.6	133.0	114.4	102.1	107.2	107.4	111.3	117.3	129.3	115.6	115.6	110.4	104.8
Jan 19	101.1	100.5	100.5	100.9	99.7	100.4	98.2	101.5	100.0	100.8	100.5	100.6	101.8	96.6	100.4	102.0	101.7	101.0
Feb 19	101.5	100.9	100.9	101.5	100.3	101.0	97.5	103.2	101.5	101.3	101.3	101.6	102.7	98.1	101.1	103.5	102.8	100.9
Mar 19	101.8	101.2	101.4	102.4	100.3	101.8	101.7	104.1	102.0	102.0	102.1	102.3	103.6	99.5	102.2	104.0	103.4	101.6
Apr 19	102.0	101.5	101.9	104.3	100.6	102.5	106.5	105.3	101.4	102.9	102.7	102.9	105.7	101.0	103.5	104.5	104.2	102.1
May 19	102.3	101.9	102.4	106.3	100.8	103.1	107.6	107.0	101.7	103.8	103.2	103.4	106.7	102.6	105.0	106.6	104.9	102.6
	For reference: actual values in the same periods of 2017/2018 (% of December 2016/2017)																	
Dec 17		102.5		108.4			124.1	104.2	106.1	95.2	100.7	102.7	101.0	117.3	105.6	105.5	104.0	103.8
Jan 18		100.3		100.1			101.1	100.1	98.5	100.4	101.0	100.9	100.8	97.4	101.6	100.5	102.1	100.5
Feb 18		100.5		101.1			103.2	100.9	98.9	100.1	101.5	102.3	100.7	98.0	102.1	102.1	102.3	100.9
Mar 18		100.8		100.2			98.9	101.0	99.4	99.4	100.9	103.4	102.3	96.7	102.5	103.8	103.3	101.2
Apr 18		101.2		101.4			99.7	102.8	98.2	99.7	102.4	104.2	103.3	103.1	103.2	105.4	105.6	101.6
May 18		101.6		105.3			107.0	106.2	99.6	100.7	103.9	105.4	105.0	116.3	104.4	109.1	106.4	100.7

Note: over the period from January 1999 to September 2018, the series of the chain producer price index for machinery are identified as a stationary process around the trend with two endogenous structural changes. The series of other chain price indices are stationary at levels.

## MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

At 2018-end, the forecast increase of the nominal index of retail turnover will constitute 5.6% in nominal terms and by 2.6% in real terms.

### 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 over the period from September 1998 to October 2018 on the basis of the data released by the Central Bank of Russia<sup>1</sup>. The results of calculations are shown in Table 3.*

Export, import, export outside the CIS and import from the countries outside the CIS are forecast to grow on average at 21.2%, 15.2%, 17.3%, and 15.0%, respectively in December 2018 – May 2019 against the same period of 2017-2018. The average forecast surplus volume of the trade balance with all countries for December 2018 – May 2019 will amount to \$ 113.8bn, which reflects an increase of 29.7% on the same period of 2017–2018. The average forecast surplus volume of the trade balance with all countries for 2018 will amount to \$ 195.3bn which reflects growth by 69.2% on the same period of 2017.

### DYNAMICS OF PRICES

#### The Consumer Price Index and Producer Price Index

*This section presents calculations of forecast values of the consumer price index and producer price index (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 data released by Rosstat over the period from January 1999 to September 2018<sup>2</sup>. Table 4 presents the results of model calculations of forecast values over December of 2018 and May of 2019 in accordance with ARIMA models, structural models (SM) and models computed with the help of business surveys (BS).*

The consumer price index is forecast to grow at an average monthly rate of 0.4% in December 2018 – May 2019. The producer price index (PPI) for the same period is also forecast to average 0.7% per month. Annual growth of the consumer price index by three models will come on average at 3.8%. The same indicator for the producer price index is forecast at 14.4%.

The producer price indexes computed by Rosstat are forecast to grow at average monthly rates in December 2018 – May 2019: for mining and quarrying 2.2%, manufacturing 1.4%, utilities (electricity, gas, and steam) 0.3%, food products 0.9%, textile and sewing industry 0.6%, wood products 0.7%, pulp and paper industry 1.3%, coke and refined petroleum 0.1%, for chemical industry 0.8%, for basic metals and fabricated metal 1.3%, for machinery and equipment 0.9%, and for motor vehicles manufacture 0.5%.

Annual growth of the producer price indexes by types of economic activity will average 14.0%. At 2018-end, the maximum annual growth is forecast in mining and quarrying at 33.0%, minimum – utilities (electricity, gas, and steam) 2.1%.

#### The Cost of the Monthly per Capita Minimum Food Basket

*This section presents calculations of forecast values of the cost of the monthly per capita minimum food basket over December of 2018 and May of 2019. The forecasts were made on the basis of time series with use the Rosstat data over the period from January 2000 to October 2018. The results are shown in Table 5.*

<sup>1</sup> 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.

<sup>2</sup> Structural models were evaluated in the period from October 1998.



As can be seen from Table 5, the minimum set of food products' cost is forecast to grow compared to the corresponding period of the previous year. At the same time, the minimum set of food products is forecast to average RUB 3,964.6. The minimum set of food products cost is forecast to grow on average at around 2.7% against the same period of the previous year. The annual growth of the minimum set of food products will average around 4.0% in 2018.

**Indices of Freight Rates**

This section presents calculations of forecast values of freight rate indices on cargo carriage<sup>1</sup>, made on the basis of time-series models evaluated on the Rosstat data over the period from September 1998 to September 2018. Table 6 shows the results of model calculations of forecast values in December of 2018 – May of 2019. It should be noted that some of the indices under review (for instance, the pipeline rate index) 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 rates 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 5  
The forecast of the cost of the monthly per capita minimum food basket

Forecast values according to ARIMA-model (RUB)	
Dec 18	3900.1
Jan 19	3927.4
Feb 19	3949.7
Mar 19	3981.4
Apr 19	4003.2
May 19	4025.6
For reference: actual values in the same months of 2017–2018 (billion RUB)	
Dec 17	3749.6
Jan 18	3787.8
Feb 18	3826.3
Mar 18	3895.1
Apr 18	3947.8
May 18	3969.9
Expected growth on the respective month of the previous year (%)	
Dec 18	4.0
Jan 19	3.7
Feb 19	3.2
Mar 19	2.2
Apr 19	1.4
May 19	1.4

Note: the series of the cost of the monthly per capita minimum food basket over the period from January 2000 October 2018 are stationary in the first-order differences.

Table 6  
Calculations of forecast values of indices of freight rates

	The composite freight rate index	The index of motor load freight rate	The index of pipeline rate
Forecast values according to ARIMA-models (% of the previous month)			
Dec 18	100.1	99.8	104.0
Jan 19	100.1	101.5	97.7
Feb 19	100.1	99.8	96.3
Mar 19	100.0	99.8	102.5
Apr 19	103.8	99.8	107.3
May 19	100.0	99.7	101.2
Forecast values according to ARIMA-models (% of December of the previous year)			
Dec 18	101.2	100.0	109.1
Jan 19	100.1	101.5	97.7
Feb 19	100.1	101.2	94.1
Mar 19	100.2	101.0	96.5
Apr 19	104.0	100.7	103.5
May 19	104.0	100.5	104.8
For reference: actual values in the same period of 2017–2018 (% of the previous month)			
Dec 17	100.5	100.0	100.9
Jan 18	94.4	100.1	86.8
Feb 18	101.5	100.1	100.0
Mar 18	100.1	100.1	100.1
Apr 18	105.5	100.1	113.5
May 18	100.2	100.0	100.1

Note: over the period from September 1998 to September 2018, the series of the freight rates index were identified as stationary ones; the other series were identified as stationary ones over the period from September 1998 to September 2018, too; fictitious variables for taking into account particularly dramatic fluctuations were used in respect of all the series.

<sup>1</sup> The paper presents a review of the composite freight rate index on freight transport and the motor load freight rate index, as well as the pipeline rate index. The composite freight rate index is computed on the basis of the freight rate indices by individual types of transport: rail, pipeline, shipping, domestic water-borne, and motor load freight and air service (for more detailed information, pls. refer, for instance, to: *Prices in Russia*. The Official Publication of Goskomstat of RF, 1998).

## MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

According to the forecast results for December 2018 – May 2019, the composite index of transport tariffs will be growing during six months under review with average monthly rate 0.7%. Herewith, in January 2018, the seasonal decrease of the index occurred by -5.6 p.p., and in October 2018 – it is expected at -4.3 p.p. As a result, its annual increment in 2018 will amount to 1.2%. In April 2019, the seasonal growth of this index is projected at 3.8 p.p.

The index of motor freight tariffs will grow in the course of given six months at an average monthly rate of 0.1%. Its annual increment in 2018 is forecast at 0.0%.

The index of pipeline tariffs will be growing at an average monthly rate of 1.5% in the course of the next six months. As a result, its annual growth in 2018 will constitute 9.1%. In April 2019, the seasonal growth of the index is expected at 7.3 p.p.

### World Prices of Natural Resources

*This section presents calculations of such average monthly values of Brent crude prices (US\$ per barrel), the aluminum prices (US\$ per ton), the gold prices (\$ per ounce), the copper prices (US\$ per ton), and the nickel prices (US\$ per ton) over December of 2018 to May of 2019 as were received on the basis of nonlinear models of time series evaluated on the basis of the IMF data over the period from January 1980 to October 2018.*

The crude oil price is forecast to average around \$72.1 per barrel, which is above its corresponding year-earlier indexes on average by 2.4%. The aluminum prices are forecast to average around \$1,888 per ton and their average forecast slide constitutes around 13.0% compared to the same level of last year. The gold price is forecast to average \$1,219.0 per ounce. The copper price is forecast to average \$5,841 per ton, and prices for nickel – around \$10,617 per ton. The average forecast price decrease for gold constitutes around 7.0%, the average decrease of copper prices – around 16.0%, and average increase of nickel prices – 22.0% against the corresponding level of last year.

At 2018-end, the forecast decrease of oil, aluminum, gold, copper, and nickel prices compared to late 2017 will come to -12.2%, -18.7%, -6.3%, -15.0%, and -31.3%, respectively.

*Table 7*  
Calculations of forecast values of world prices on natural resources

	Brent oil (\$ per barrel)	Aluminum (\$ per ton)	Gold (\$ per ounce)	Copper (\$ per ton)	Nickel (\$ per ton)
Forecast values					
Dec 18	75.04	1932	1211	5860	10867
Jan 19	74.68	1890	1211	5867	10741
Feb 19	72.98	1879	1221	5853	10587
Mar 19	71.58	1888	1226	5845	10560
Apr 19	70.33	1873	1222	5821	10473
May 19	68.15	1864	1221	5801	10477
Expected growth on the respective month of the previous year (%)					
Dec 18	12.2	-15.1	-4.0	-19.2	-14.1
Jan 19	8.2	-14.6	-9.1	-17.4	-20.4
Feb 19	10.9	-11.9	-8.3	-15.6	-22.9
Mar 19	1.9	-5.8	-7.4	-13.3	-21.1
Apr 19	-6.4	-16.7	-8.4	-14.7	-23.4
May 19	-12.2	-18.7	-6.3	-15.0	-31.5
For reference: actual values in the same period of 2017–2018					
Dec 17	66.87	2276	1261	7252	12653
Jan 18	69.05	2214	1332	7101	13488
Feb 18	65.78	2134	1332	6934	13738
Mar 18	70.27	2005	1325	6739	13380
Apr 18	75.17	2249	1335	6821	13675
May 18	77.59	2292	1303	6828	15293

*Note:* over the period from January 1980 to October 2018, the series of prices of crude oil, nickel, gold, copper, and aluminum are series of DS type.

## 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 over the period from December of 2018 to May of 2019 were received on the basis of models of time-series of respective indices calculated by the CBR<sup>1</sup> over the period from October 1998 to November 2018 for the Monetary base (from October 1998 to October 2018 for the  $M_2$ ). Table 8 presents the results of calculations of forecast values and actual values of those indices in the same period of previous year. It is to be noted that due to the fact that the monetary base is an instrument of the CBR policy, forecasts of the*

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

## INTERNATIONAL RESERVES

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.

In December 2018 – May 2019, the monetary base will be growing at an average monthly rate of 0.8% in the course of the timeline under review. The annual growth of the monetary base in 2018 will amount to 11.8% according to forecasts. In January 2019, seasonal growth of the monetary base is planned at 4.8%.

In the forecast period, the monetary index M2 will be growing at an average rate of 0.5%. The annual increment of the monetary index M2 in 2018 is forecast at 10.3%. In January 2019, seasonal increment of index M<sub>2</sub> is planned at 2.7%.

## INTERNATIONAL RESERVES

This section presents the outputs of the statistical estimation of such future values of the international reserves of the Russian Federation<sup>1</sup> 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 released by the CBR over the period from October 1998 to October 2018. That index is forecast without taking into account a decrease in the amount of reserves due to foreign debt payment 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.

Subsequent to the forecast results for December 2018 – May 2019, the international reserves will be growing at an average monthly rate of 0.4%. The forecast increment of the international reserves in 2018 will come to 6.7%.

## FOREIGN EXCHANGE RATES

The model calculations of prospective values of the foreign exchange rates (RUB per USD and USD per euro) were made on the basis of assessment of the time series models (ARIMA) and structural models (SM) of the relevant indicators released by the Central Bank of Russia as of the last date of each month over the periods from October 1998 to November 2018 and from February 1999 to November 2018<sup>2</sup>, respectively.

Table 8  
The forecast of M<sub>2</sub> and the monetary base

	The Monetary base		M <sub>2</sub>	
	Billion RUB	Growth on the previous month, %	Billion RUB	Growth on the previous month, %
Dec 18	10260	0.5	44546	0.4
Jan 19	10756	4.8	45727	2.7
Feb 19	10405	-3.3	45598	-0.3
Mar 19	10543	1.3	45727	0.3
Apr 19	10556	0.1	45599	-0.3
May 19	10694	1.3	45726	0.3
For reference: actual value in the respective months of 2017–2018 (growth on the previous month, %)				
Dec 17		-0.1		1.1
Jan 18		7.4		5.8
Feb 18		-6.0		-2.0
Mar 18		1.8		1.1
Apr 18		1.2		0.8
May 18		4.0		1.8

Note: over the period from October 1998 to November of 2018 (for M2 – October of 2018), 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.

Table 9  
The forecast of the international reserves of the Russian Federation

	Forecast values according to ARIMA-model	
	Billion USD	Growth on the previous month, %
Dec 18	460.5	0.1
Jan 19	461.7	0.3
Feb 19	464.2	0.5
Mar 19	466.5	0.5
Apr 19	468.7	0.5
May 19	470.9	0.5
For reference: actual values in the same period of 2017–2018		
Dec 17	431.6	1.6
Jan 18	432.7	0.3
Feb 18	447.7	3.5
Mar 18	453.6	1.3
Apr 18	458.0	1.0
May 18	459.9	0.4

Note: over the period from October 1998 to October 2018, the series of the gold and foreign exchange reserves of the Russian Federation were identified as stationary series in difference.

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

<sup>2</sup> The authors use the IMF data over the period from January 1999 to October 2018. The data for November 2018 was obtained from the foreign exchange rate statistics website: [www.oanda.com](http://www.oanda.com)

## MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

In December 2018 – May 2019, USD/RUB average exchange rate is forecast in the amount of RUB 68.64 for USD by two models. The forecast value of the index will average RUB 67.59 for USD by two models at 2018-end.

Over the period under review, Euro/USD exchange rate is forecast during the forecast period at USD 1.13 per 1 euro. The forecast value of the index will average USD1.13 per 1 euro at 2018-end by two models.

### THE LIVING STANDARD INDEXES

*This section (Table 12) presents calculations of forecast values of indices of real wages, real disposable income and real income<sup>1</sup> as were received on the basis of the model of time series of respective indices computed by Rosstat and taken over the period from January 1999 to October 2018. 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 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.*

According to the results presented in Table 11, the average monthly slide of the real disposable cash income is forecast at the rate of 1,6% compared to the previous year; the real cash income – 0.6%. Forecast average monthly increase of the real wages will amount to 0.4%.

At 2018-end, the forecast increment of the real disposable cash income will come to 0.8%, the real cash income – by 1.5%, and increment of the real wages – by 7.7%.

### 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 the time series evaluated*

*Table 10*  
Forecasts of the USD/RUB and EUR/USD exchange rates

	The USD/RUB exchange rate (RUB per USD)		The EUR/USD exchange rate (USD per EUR)	
	ARIMA	SM	ARIMA	SM
Dec 18	67.56	67.62	1.14	1.13
Jan 19	68.05	67.99	1.13	1.14
Feb 19	68.26	68.60	1.13	1.13
Mar 19	68.54	69.16	1.13	1.13
Apr 19	68.81	69.69	1.13	1.13
May 19	69.08	70.37	1.13	1.13
For reference: actual values in the similar period of 2017–2018				
Dec 17	57.60		1.20	
Jan 18	56.29		1.25	
Feb 18	55.67		1.22	
Mar 18	57.26		1.23	
Apr 18	62.00		1.21	
May 18	62.59		1.18	

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

*Table 11*  
The forecast of the living standard indexes

	Real disposable cash income	Real cash income	Real accrued wages
Forecast values according to ARIMA-models (% of the respective month of 2017–2018)			
Dec 18	99.2	100.5	103.1
Jan 19	98.5	99.4	100.1
Feb 19	97.2	98.3	98.9
Mar 19	96.8	98.2	100.0
Apr 19	98.8	99.6	100.2
May 19	99.8	100.1	100.2
For reference: actual values in the respective period of 2017–2018 (% of the same period of 2016–2017)			
Dec 17	98.8	99.3	106.2
Jan 18	100.1	100.5	111.0
Feb 18	104.2	104.5	110.5
Mar 18	104.6	104.8	108.7
Apr 18	105.6	105.9	107.6
May 18	100.2	101.7	107.6

*Note:* for calculating purposes the series of the real disposable cash income, real cash income and real accrued wages in the base form were used (January 1999 was adopted as a base period). Over the period from January 1999 to October 2018, those series were attributed to the class of processes, which are stationary in differences and have an explicit seasonal component.

<sup>1</sup> *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).

## EMPLOYMENT AND UNEMPLOYMENT

over the period from October 1998 to September 2018 on the basis of the monthly data released by Rosstat<sup>1</sup> were used. The unemployment was calculated on the basis of the models with results of the findings from business surveys<sup>2</sup> too.

It is to be noted that feasible logical inconsistencies<sup>3</sup> in forecasts of employment and unemployment which totals should be equal to the index of economically active population may arise due to the fact that each series is forecast individually and not as a difference between the forecast values of the economically active population and another index.

Table 12

### Calculation of forecast values of the indices the employment and the unemployment

	Employment (ARIMA)		Unemployment (ARIMA)			Unemployment (BS)		
	Million people	Growth on the respective month of previous year (%)	Million people	Growth on the respective month of previous year (%)	% of the index of the number of the gainfully employed population	Million people	Growth on the respective month of previous year (%)	% of the index of the number of the gainfully employed population
Dec 18	72.8	0.3	3.6	-6.8	5.0	3.6	-7.2	4.9
Jan 19	72.1	0.2	3.8	-3.4	5.2	3.7	-5.9	5.1
Feb 19	72.0	0.0	3.7	-2.1	5.2	3.6	-4.1	5.0
Mar 19	72.5	0.3	3.7	-2.6	5.1	3.6	-4.4	5.0
Apr 19	72.7	0.5	3.6	-1.7	5.0	3.6	-2.0	5.0
May 19	72.4	-0.1	3.5	-2.5	4.8	3.6	0.8	5.0
For reference: actual values in the same periods of 2017–2018 (million people)								
Dec 17	72.6					3.9		
Jan 18	71.9					3.9		
Feb 18	72					3.8		
Mar 18	72.3					3.8		
Apr 18	72.3					3.7		
May 18	72.5					3.6		

Note: over the period from October 1998 to September 2018, the series of employment is a stochastic process which is stationary around the trend. The series of unemployment is a stochastic process with the first order integration. Both indices include seasonal component.

According to ARIMA-model forecast (*Table 12*), in December 2018 – May 2019, the increase of the number of employed in the economy will average 0.3% per month against the corresponding period of the previous year. The forecast index of the number of employed in the economy constitutes 72.8 million persons at 2018-end.

The decrease of the total number of jobless is forecast to average 3.5% per month against the same period of last year. The average number of jobless at 2018-end is forecast at 3.6 million persons.

<sup>1</sup> The index is computed in accordance with the methods of the International Labor Organization (ILO) and is given as of the month-end.

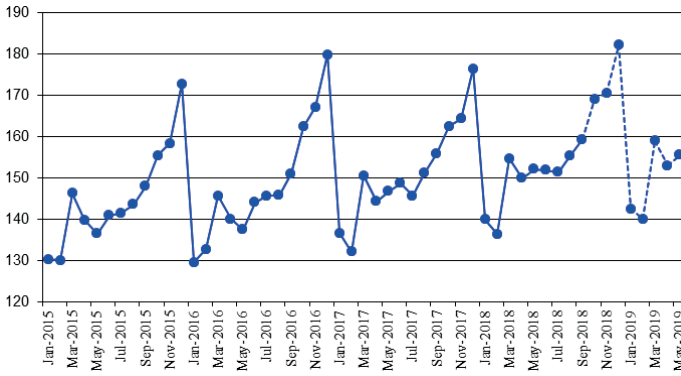
<sup>2</sup> The model is evaluated over the period from January 1999 to September 2018.

<sup>3</sup> For example, deemed as such a difference may be a simultaneous decrease both in the employment and the unemployment. 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.

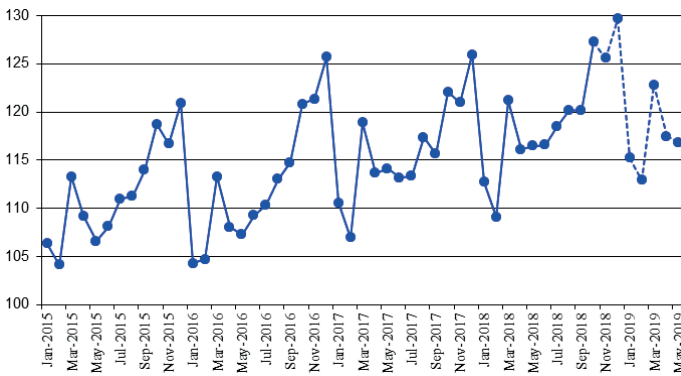
**ANNEX**

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

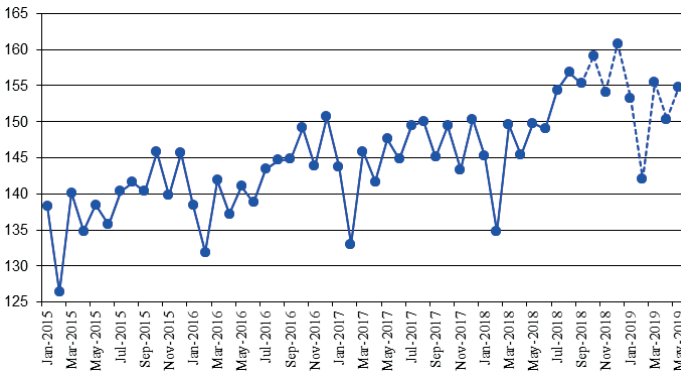
*Fig. 1a. The Rosstat industrial production index (ARIMA-model) (% of December 2001)*



*Fig. 1b. The NRU HSE industrial production index (ARIMA-model) (% of January 2010)*



*Fig. 2a. The Rosstat industrial production index for mining (% of December 2001)*



*Fig. 2b. The NRU HSE industrial production index for mining (% of January 2010)*

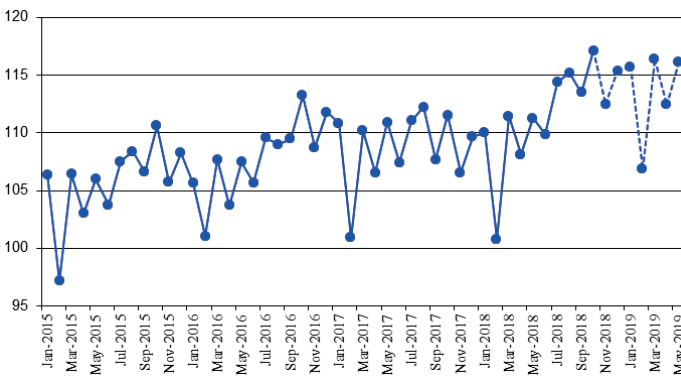


Fig. 3a. The Rosstat industrial production index for manufacturing (% of December 2001)

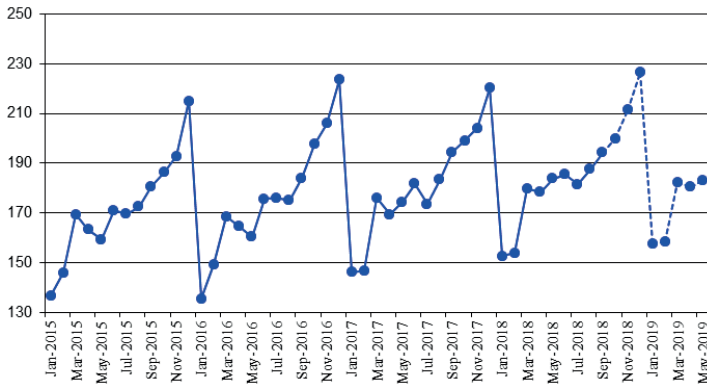


Fig. 3b. The NRU HSE industrial production index for manufacturing (% of January 2010)

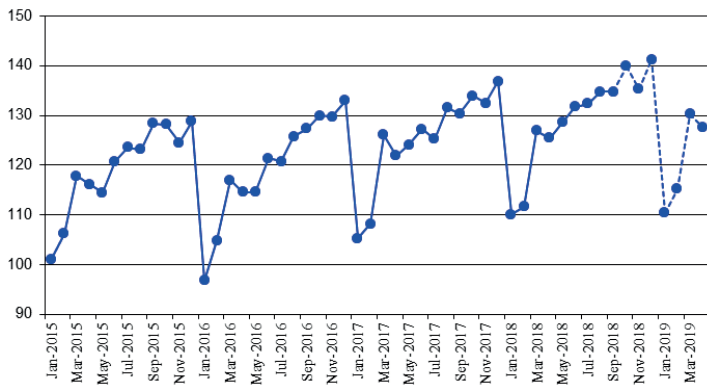


Fig. 4a. The Rosstat industrial production index for utilities (electricity, water, and gas) (as a percentage of that in December 2001)

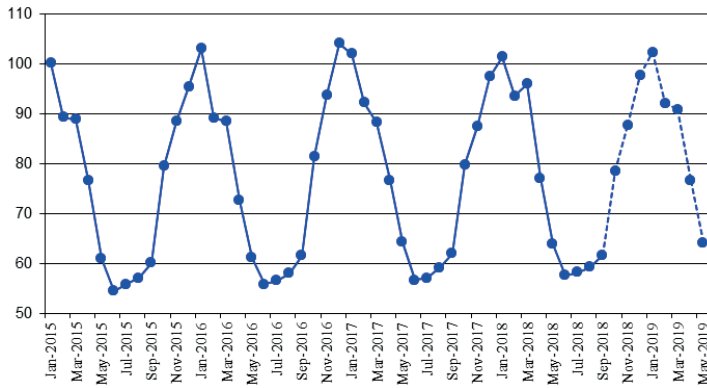
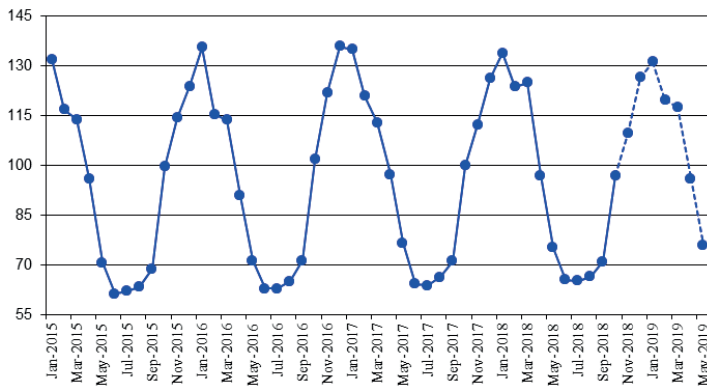


Fig. 4b. The NRU HSE industrial production index for utilities (electricity, water, and gas) (as a percentage of that in January 2010)



MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Fig. 5a. The Rosstat industrial production index for food products (as a percentage of that in December 2001)

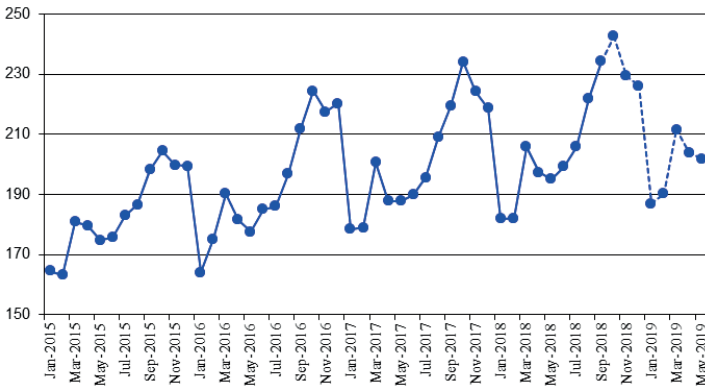


Fig. 5b. The NRU HSE industrial production index for food products (as a percentage of that in January 2010)

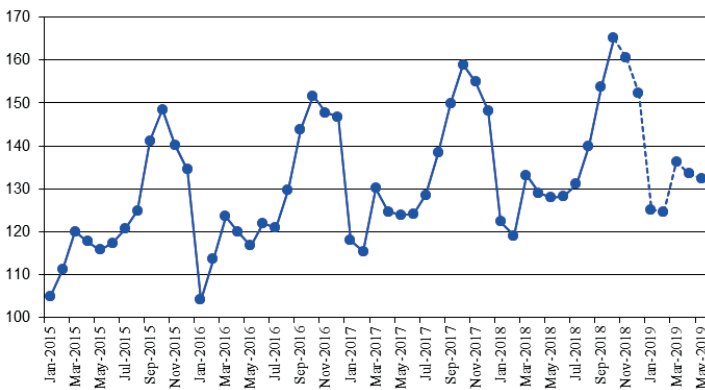


Fig. 6a. The Rosstat industrial production index for coke and petroleum (as a percentage of that in December 2001)

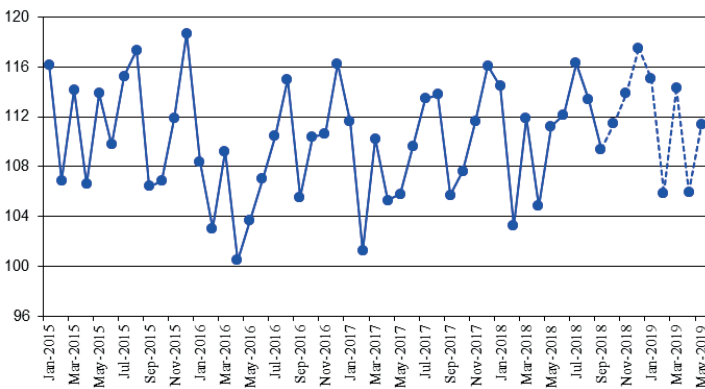


Fig. 6b. The NRU HSE industrial production index for petroleum and coke (as a percentage of that in January 2010)

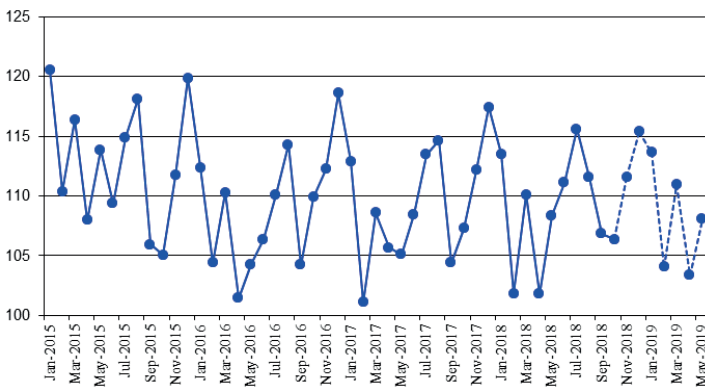




Fig. 7a. The Rosstat industrial production index for primary metals and fabricated metal products (as a percentage of that in December 2001)

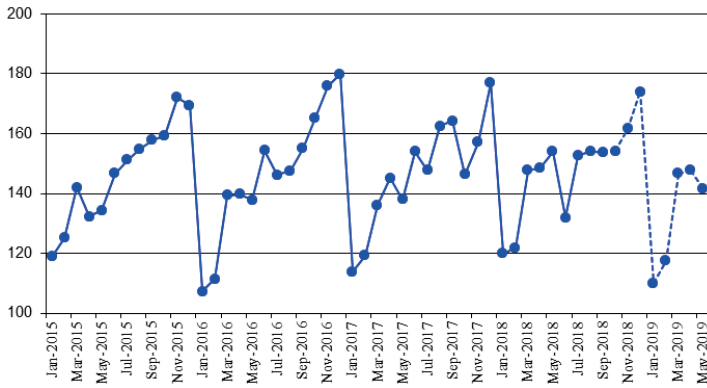


Fig. 7b. The NRU HSE industrial production index for primary metals and fabricated metal products (as a percentage of that in January 2010)

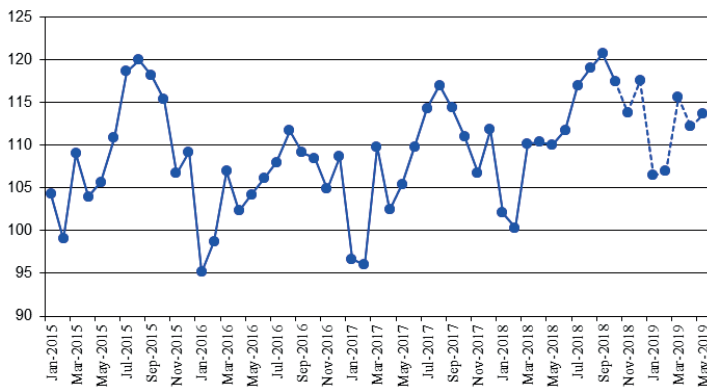


Fig. 8a. The Rosstat industrial production index for machinery (as a percentage of that in December 2001)

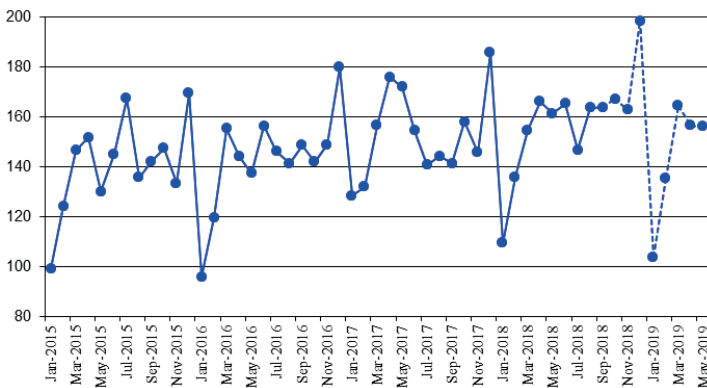
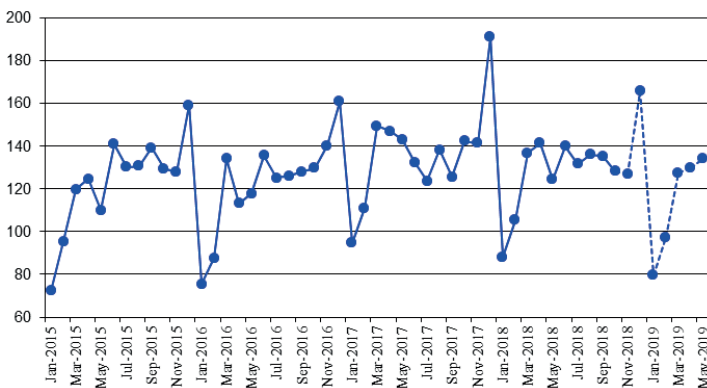


Fig. 8b. The NRU HSE industrial production index for machinery (as a percentage of that in January 2010)



MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Fig. 9. The volume of retail sales (billion RUB)

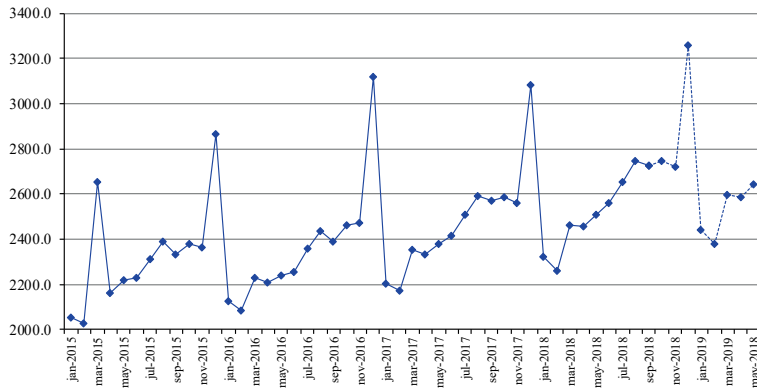


Fig. 9a. The real volume of retail sales (as a percentage of that in the same period of the previous year)

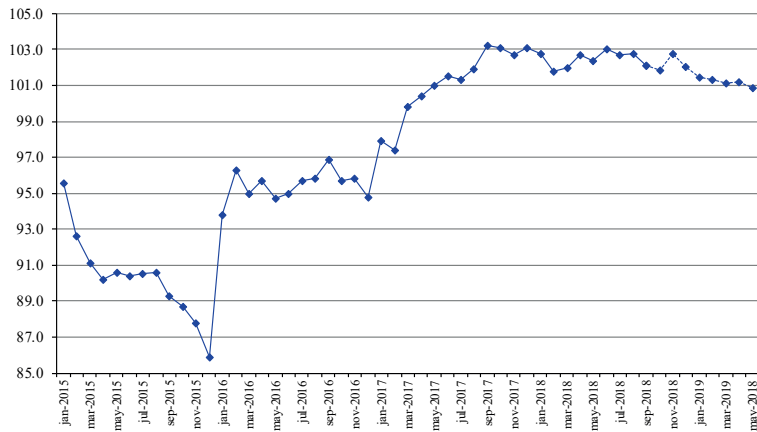


Fig. 10. Export to all countries (billion USD)

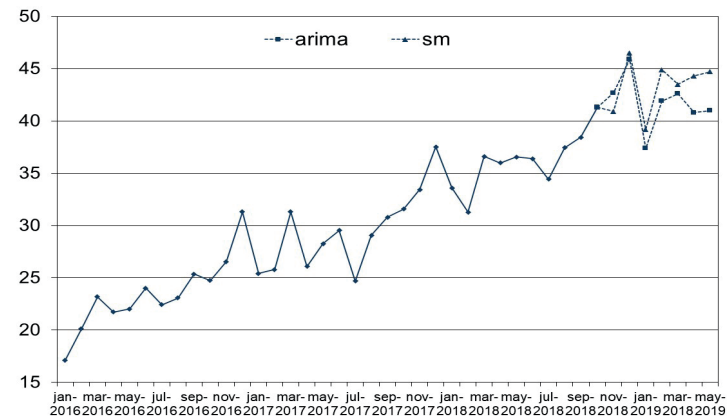


Fig. 11. Export to countries outside the CIS (billion USD)

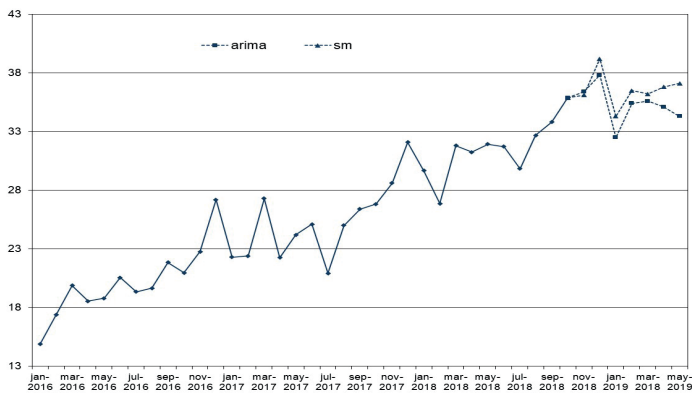


Fig. 12. Import from all countries (billion USD)

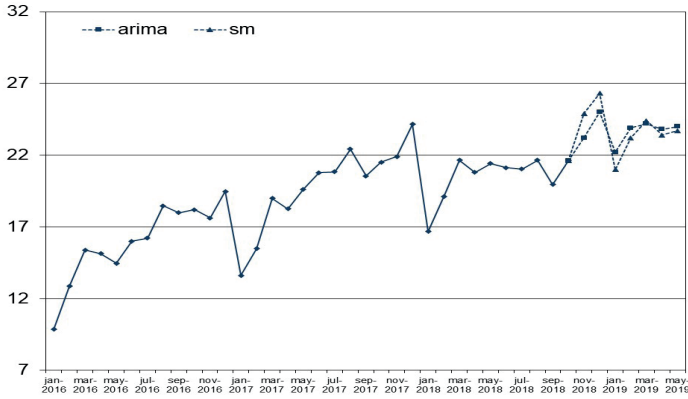


Fig. 13. Import from countries outside the CIS (billion USD)

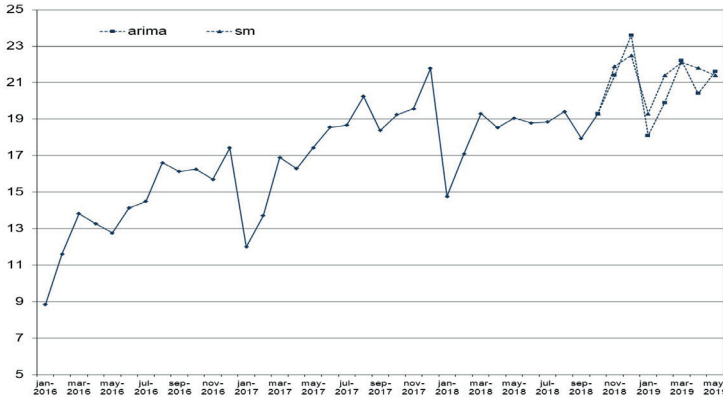


Fig. 14. The consumer price index (as a percentage of that in December of the previous year)

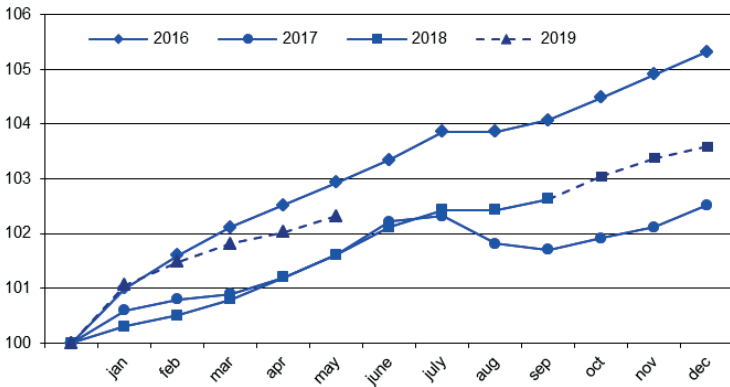
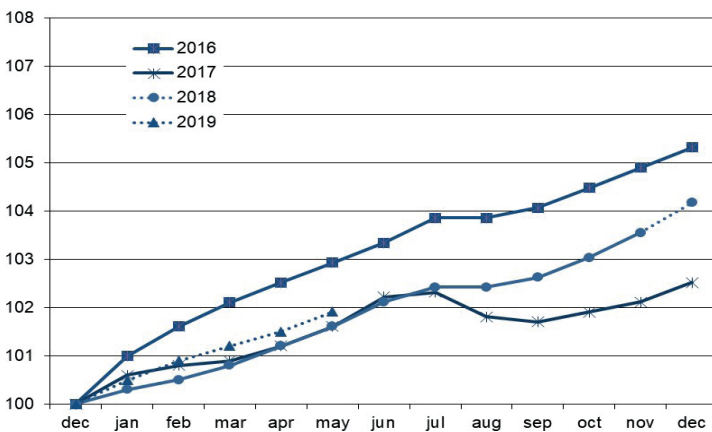


Fig. 14a. The consumer price index (as a percentage of that in December of the previous year) (SM)



MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Fig. 15. The producer price index for industrial goods (as a percentage of that in December of the previous year)

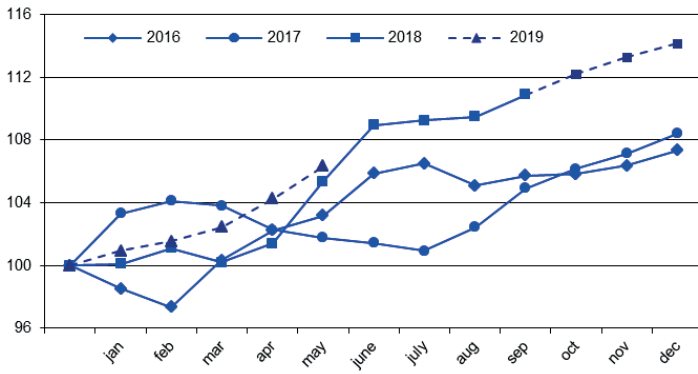


Fig. 16. The price index for mining (as a percentage of that in December of the previous year)

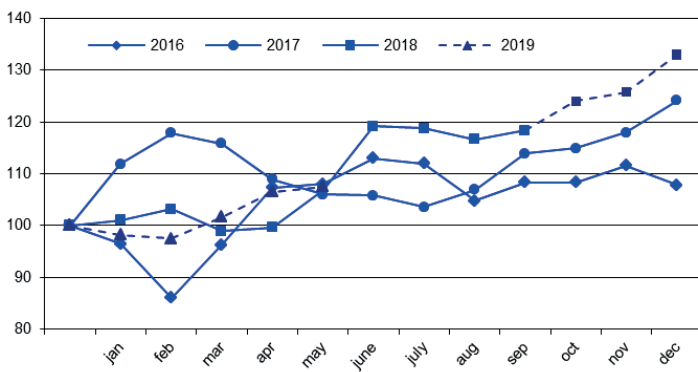


Fig. 17. The price index for manufacturing (as a percentage of that in December of the previous year)

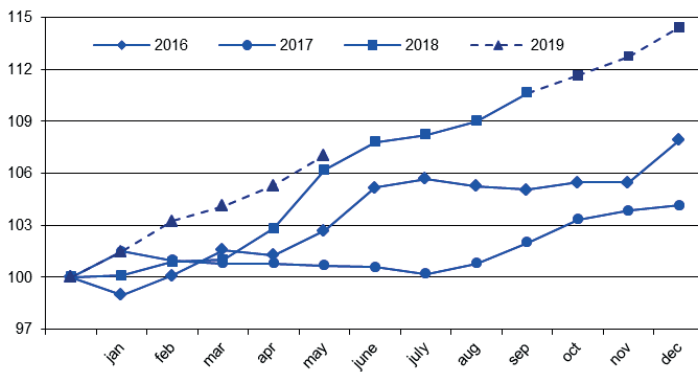


Fig. 18. The price index for utilities (electricity, water, and gas) (as a percentage of that in December of the previous year)

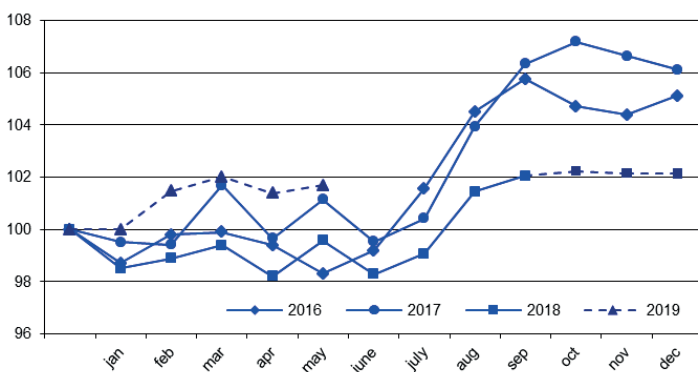


Fig. 19. The price index for food products (as a percentage of that in December of the previous year)

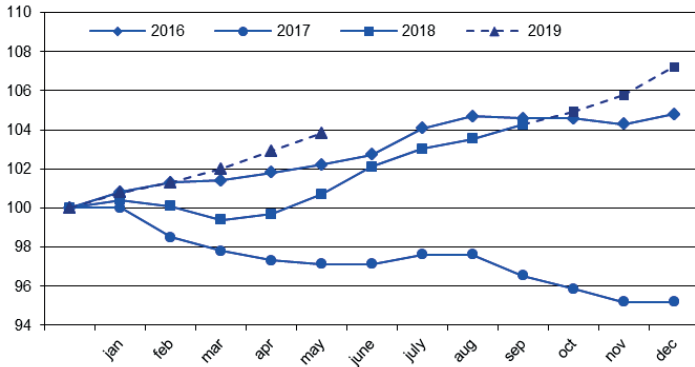


Fig. 20. The price index for the textile and sewing industry (as a percentage of that in December of the previous year)

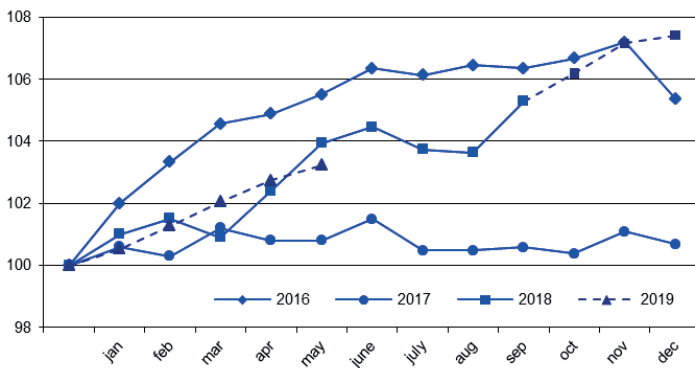


Fig. 21. The price index for wood products (as a percentage of that in December of the previous year)

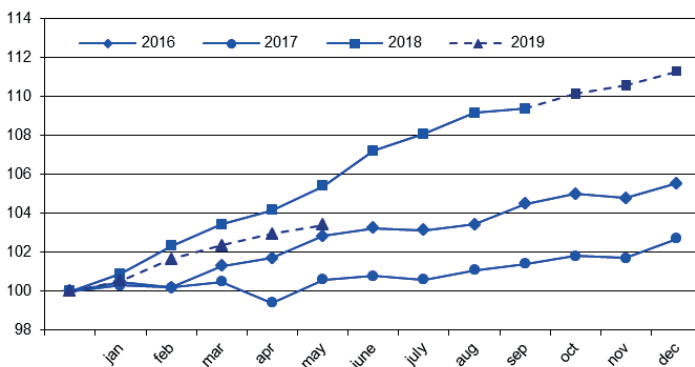
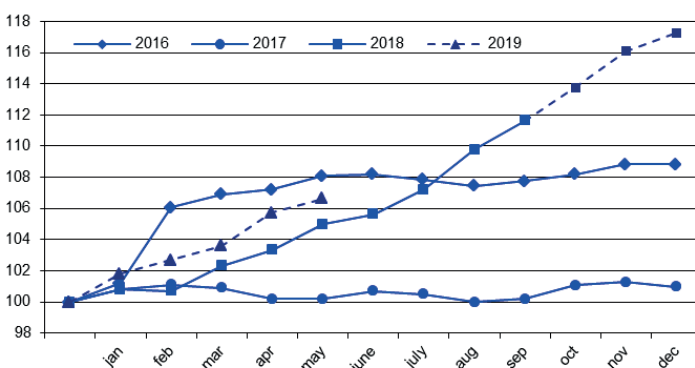


Fig. 22. The price index for the pulp and paper industry (as a percentage of that in December of the previous year)



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Fig. 23. The price index for coke and petroleum (as a percentage of that in December of the previous year)

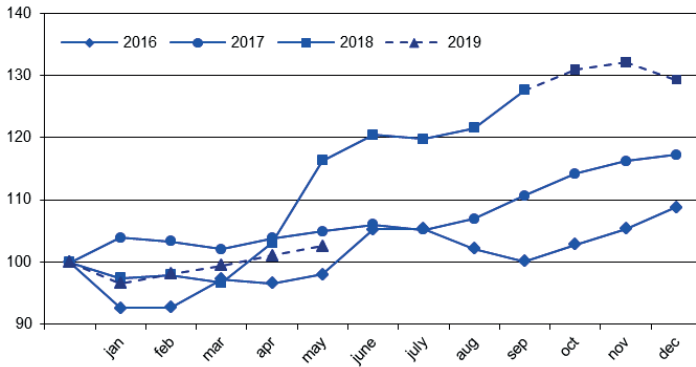


Fig. 24. The price index for the chemical industry (as a percentage of that in December of the previous year)

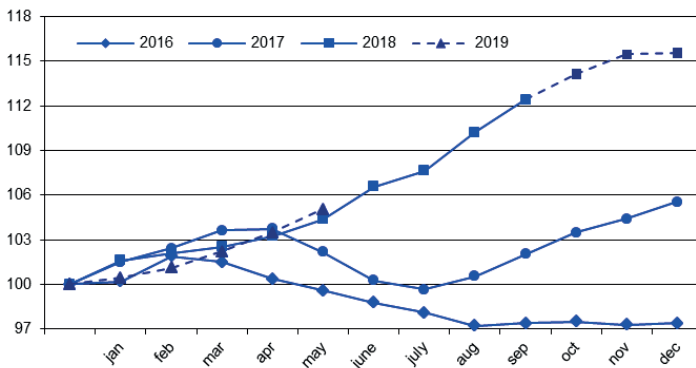


Fig. 25. The price index for primary metals and fabricated metal products (as a percentage of that in December of the previous year)

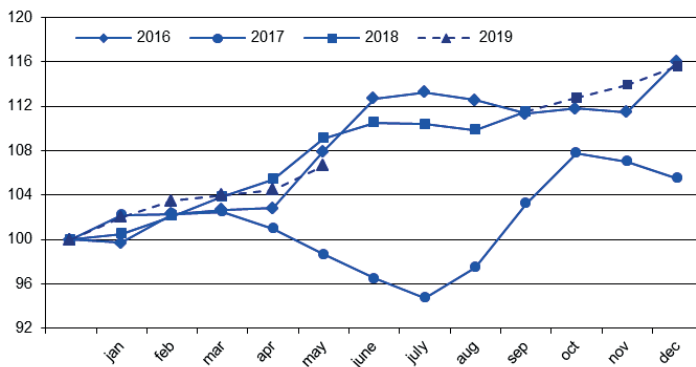


Fig. 26. The price index for machinery (as a percentage of that in December of the previous year)

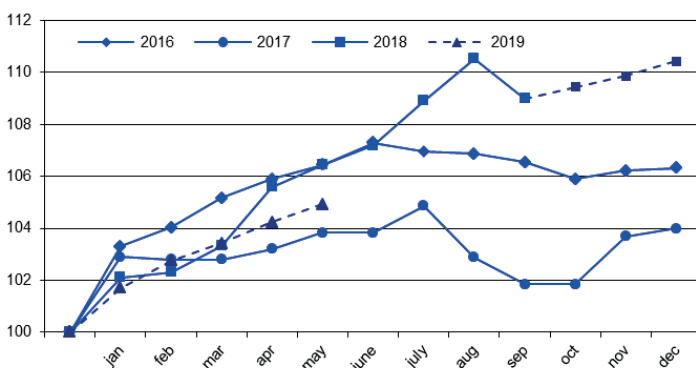


Fig. 27. The price index for transport equipment manufacturing (as a percentage of that in December of the previous year)

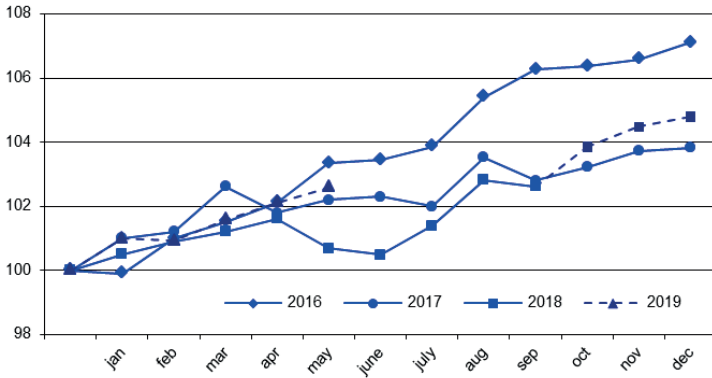


Fig. 28. The cost of the monthly per capita minimum food basket (RUB)

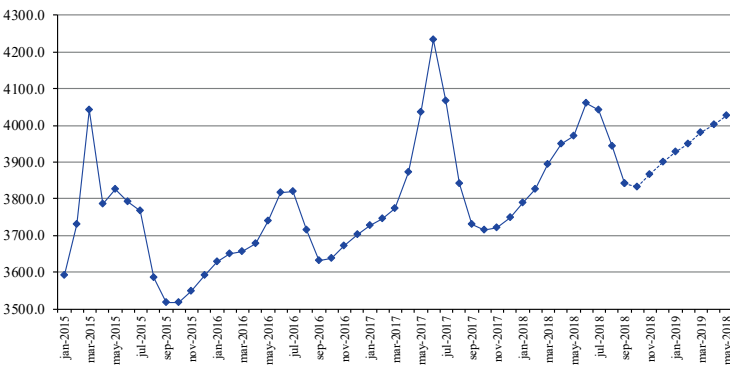


Fig. 29. The composite index of transport tariffs (for each year, as a percentage of that in the previous month)

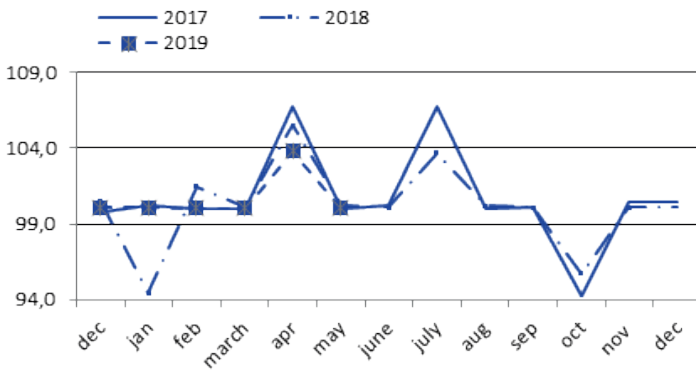
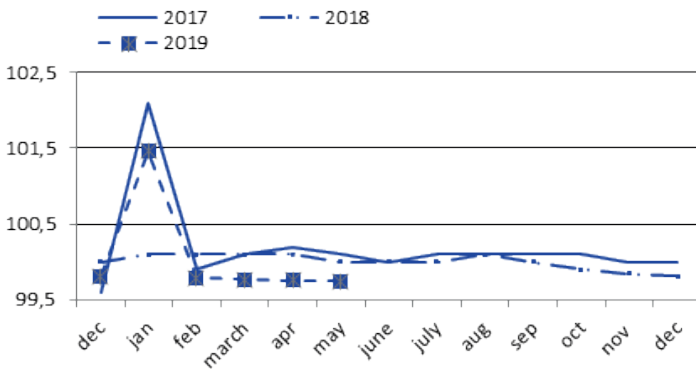


Fig. 30. The index of motor freight tariffs (for each year, as a percentage of that in the previous month)



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Fig. 31. The index of pipeline tariffs (for each year, as a percentage of that in the previous month)

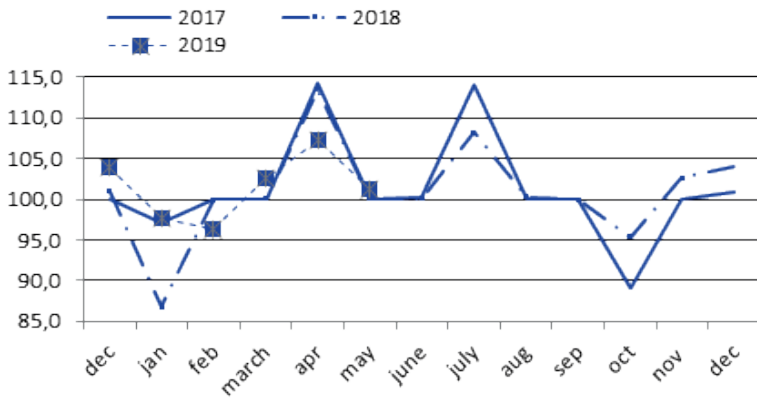


Fig. 32. The Brent oil price (\$ per barrel)

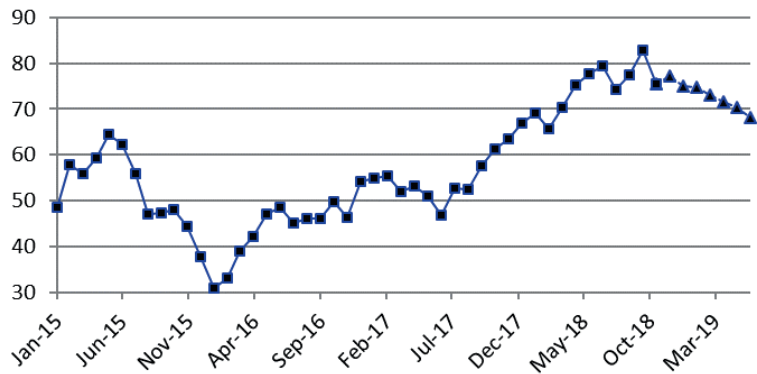


Fig. 33. The aluminum price (\$ per ton)

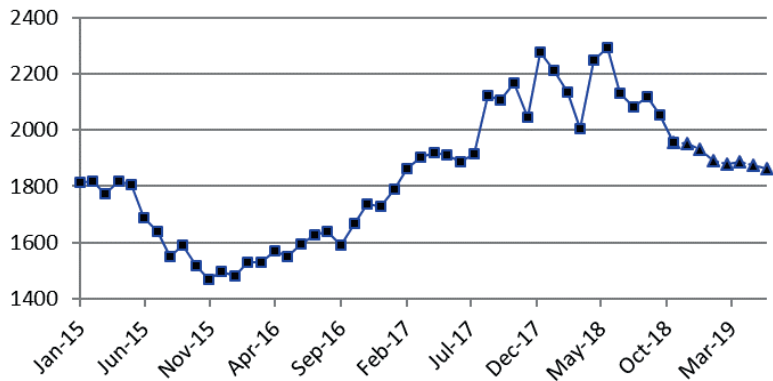


Fig. 34. The gold price (\$ per ounce)

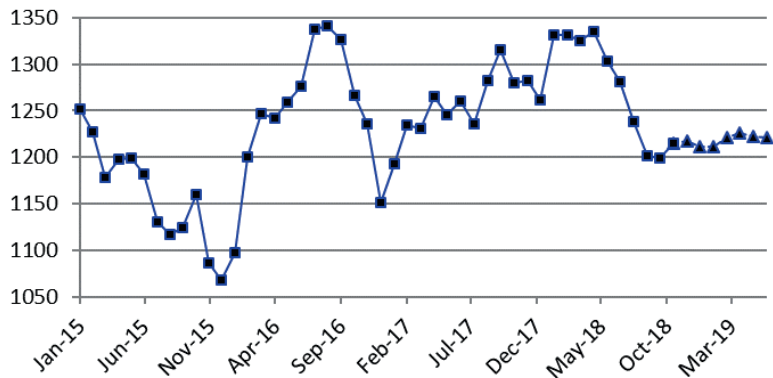




Fig. 35. The nickel price (\$ per ton)

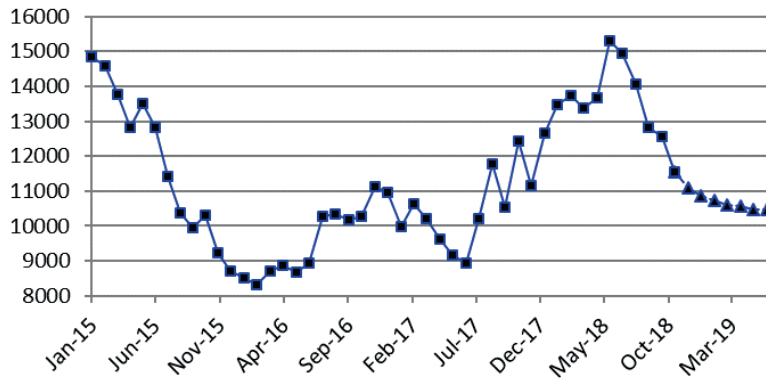


Fig. 36. The copper price (\$ per ton)

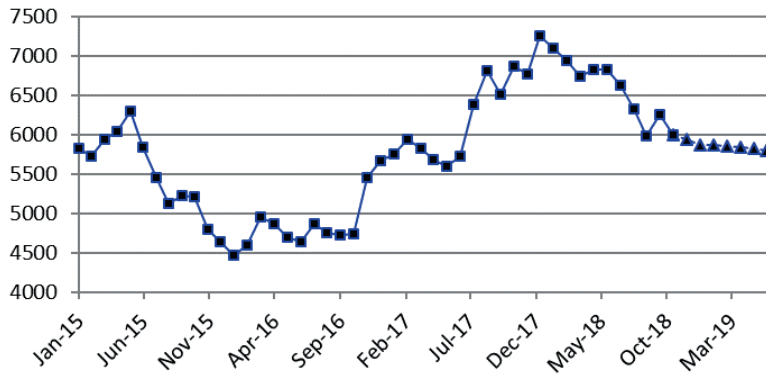


Fig. 37. The monetary base, billion RUB

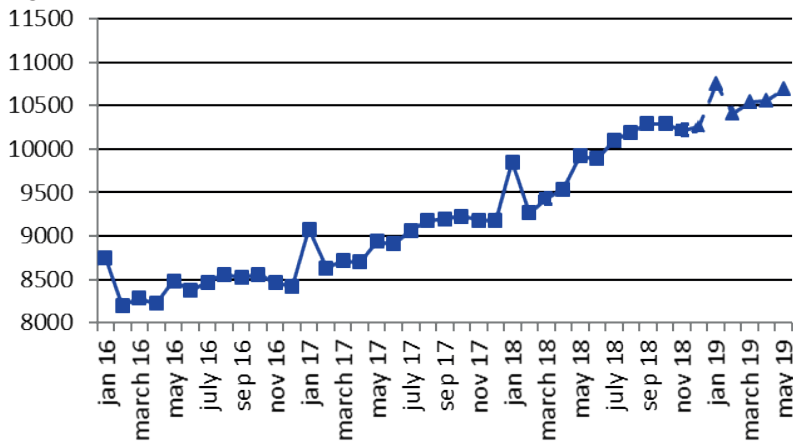
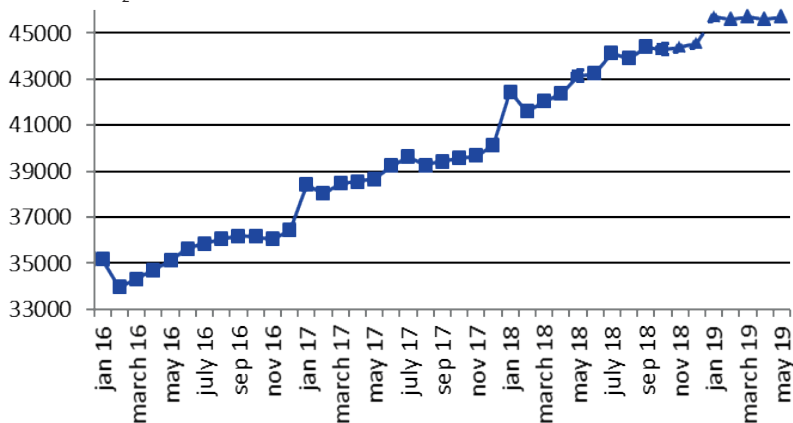


Fig. 38.  $M_2$ , billion RUB



MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Fig. 39. The international reserves of the Russian Federation, million USD

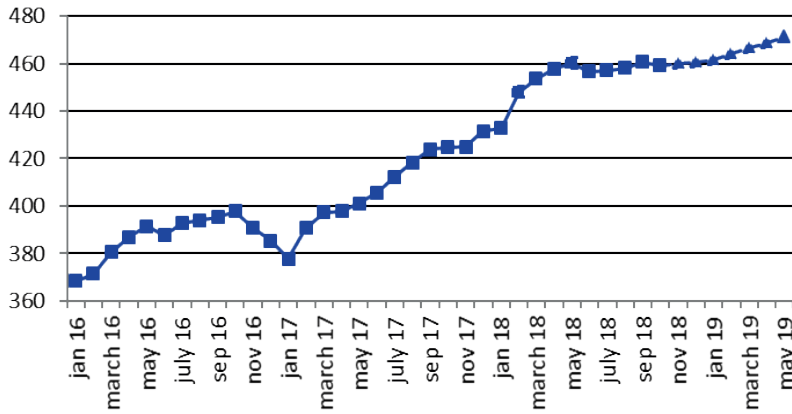


Fig. 40. The RUB/USD exchange rate

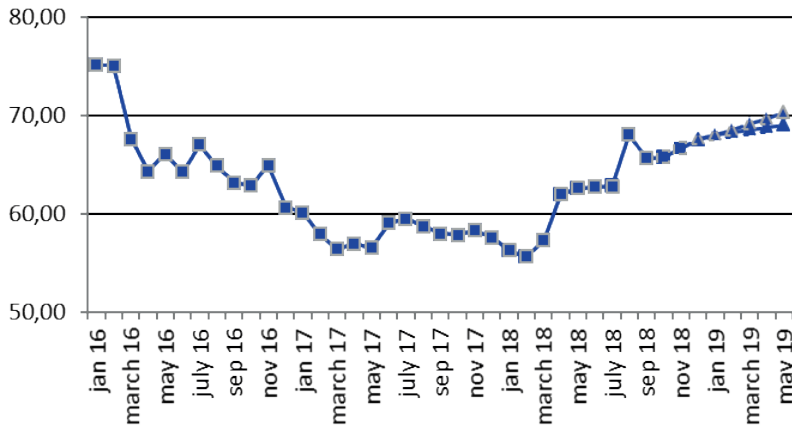


Fig. 41. The USD/EUR exchange rate

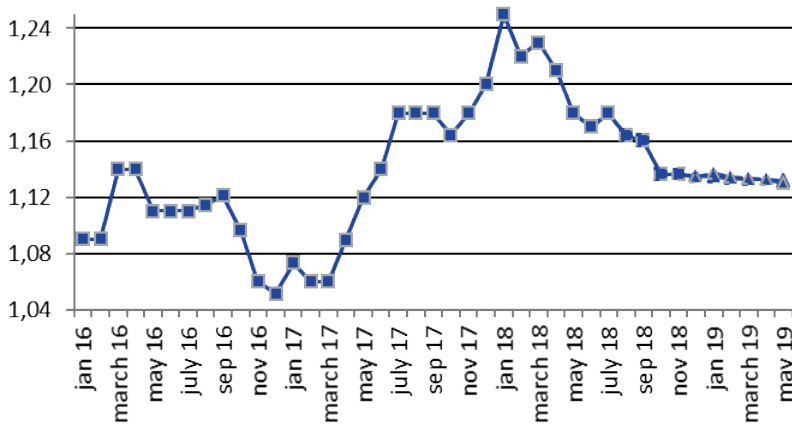


Fig. 42. Real disposable cash income (as a percentage of that in the same period of the previous year)

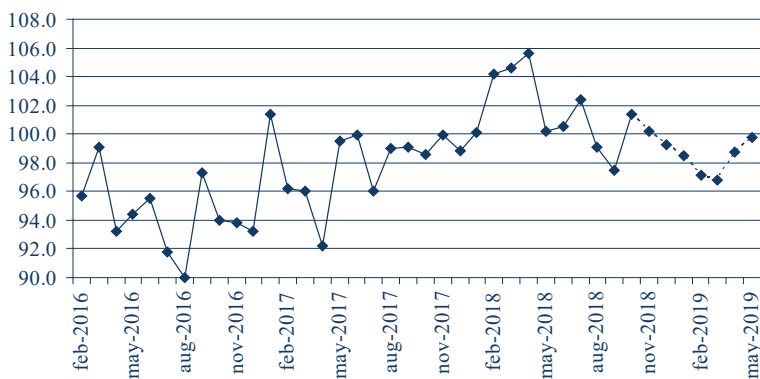


Fig. 43. Real cash income (as a percentage of that in the same period of the previous year)

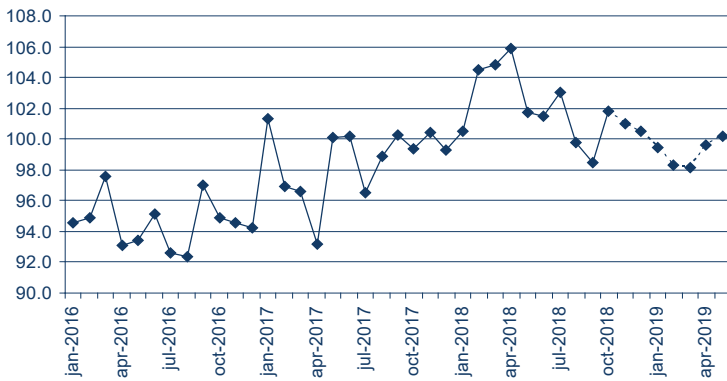


Fig. 44. Real accrued wages (as a percentage of those in the same period of the previous year)

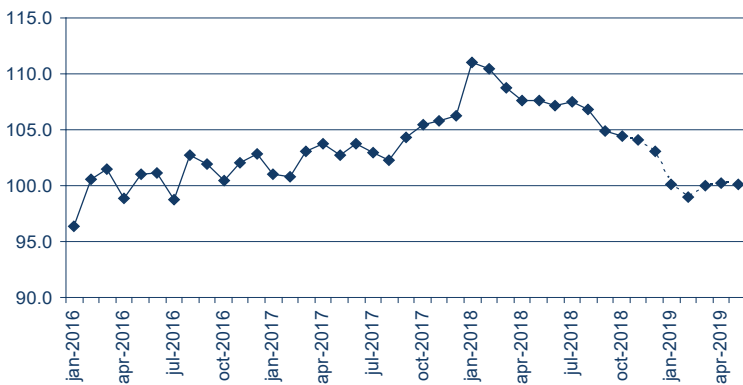


Fig. 45. Employment (million people)

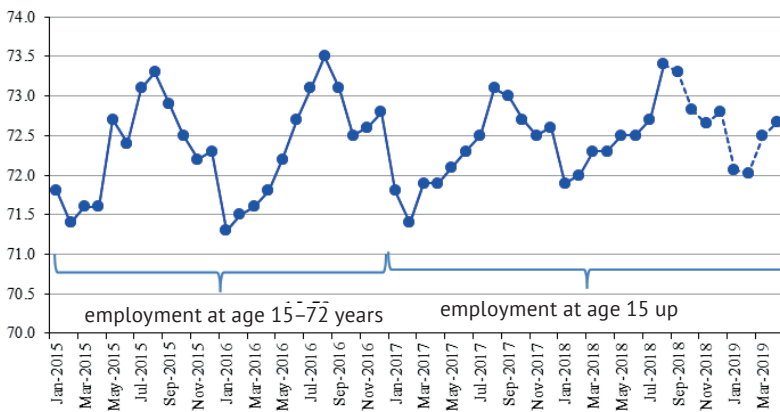


Fig. 46. Unemployment (million people)



## MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Model calculations of short-term forecasts of social and economic indices of the Russian Federation:  
November 2018

Index	2018				2019				
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Rosstat IIP (growth rate, %)*	2.1	4.1	3.5	3.2	2.5	3.4	3.0	3.1	1.9
HSE IIP (growth rate %)*	3.9	4.2	3.6	3.2	2.8	3.8	2.5	2.8	1.1
Rosstat IIP for mining (growth rate, %)*	6.9	6.4	7.5	7.0	5.5	5.4	3.9	3.4	3.4
HSE IIP for mining (growth rate, %)*	5.4	5.0	5.6	5.2	5.2	6.0	4.5	4.0	4.4
Rosstat IIP for manufacturing (growth rate, %)*	-0.1	0.5	3.6	2.8	3.1	3.0	1.4	1.1	-0.3
HSE IIP for manufacturing (growth rate, %)*	3.5	4.9	2.4	3.6	0.5	3.3	2.9	1.9	0.7
Rosstat IIP for utilities (electricity, water, and gas) (growth rate, %)*	-0.4	-1.7	0.4	0.4	0.9	-1.5	-5.4	-0.7	0.4
HSE for utilities (electricity, water, and gas) (growth rate, %)*	-0.3	-3.0	-2.4	0.3	-2.0	-3.3	-5.8	-0.9	1.0
Rosstat IIP for food products (growth rate, %)*	6.7	3.6	2.3	3.4	2.8	4.5	2.8	3.3	3.5
HSE IIP for food products (growth rate, %)*	2.5	3.9	3.6	2.7	2.3	4.7	2.3	3.5	3.5
Rosstat IIP for coke and petroleum (growth rate, %)*	3.5	3.6	2.0	1.2	0.5	2.6	2.1	1.1	0.1
HSE for coke and petroleum (growth rate, %)*	2.3	-0.9	-0.5	-1.8	0.1	2.2	0.7	1.6	-0.3
Rosstat for primary metals and fabricated metal products (growth rate, %)*	-6.5	5.4	2.9	-1.7	-8.3	-3.6	-0.6	-0.5	-8.2
HSE IIP for primary metals and fabricated metal products (growth rate, %)*	5.5	5.8	6.6	5.1	4.2	6.6	4.9	1.6	3.3
Rosstat IIP for machinery (growth rate, %)*	15.7	5.8	11.8	6.9	-5.1	-0.2	6.3	-5.8	-3.3
HSE IIP for machinery (growth rate %)*	7.9	-9.9	-10.3	-13.2	-9.8	-7.7	-6.7	-8.3	7.9
Retail sales, trillion Rb	2.72	2.75	2.72	3.26	2.44	2.38	2.60	2.59	2.64
Real retail sales (growth rate, %)*	2.1	1.8	2.8	2.0	1.5	1.3	1.2	1.2	0.9
Export to all countries (billion \$)	38.4	41.3	41.8	46.2	38.3	43.4	43.1	42.6	42.9
Export to countries outside the CIS (billion \$)	33.8	35.9	36.3	38.5	33.4	36.0	35.9	36.0	35.7
Import from all countries (billion \$)	20.0	21.6	24.1	25.7	21.6	23.6	24.3	23.6	23.9
Import from countries outside the CIS (billion \$)	17.9	19.3	21.7	23.1	18.7	20.7	22.2	21.1	21.5
CPI (growth rate, %)**	0.2	0.3	0.4	0.4	0.7	0.4	0.4	0.3	0.4
PPI for industrial goods (growth rate, %)**	1.3	1.1	0.9	0.6	0.3	0.6	0.6	0.9	0.9
PPI for mining (growth rate, %)**	1.5	4.7	1.4	5.8	-1.8	-0.7	4.3	4.7	1.0
PPI for manufacturing (growth rate, %)**	1.5	0.9	1.0	1.5	1.5	1.7	0.8	1.1	1.6
PPI for utilities (electricity, water, and gas) (growth rate, %)**	0.6	0.2	-0.1	0.0	0.0	1.5	0.5	-0.6	0.3
PPI for food products (growth rate, %)**	0.7	0.6	0.8	1.4	0.8	0.5	0.7	0.9	0.9
PPI for the textile and sewing industry (growth rate, %)**	1.6	0.9	0.9	0.2	0.5	0.7	0.8	0.7	0.5
PPI for wood products (growth rate, %)**	0.2	0.7	0.4	0.7	0.6	1.1	0.7	0.6	0.5
PPI for the pulp and paper industry (growth rate, %)**	1.7	1.9	2.1	1.0	1.8	0.9	0.9	2.0	0.9
PPI for coke and petroleum (growth rate, %)**	5.0	2.6	0.9	-2.1	-3.4	1.6	1.4	1.6	1.5
PPI for the chemical industry (growth rate, %)**	2.0	1.5	1.2	0.1	0.4	0.7	1.1	1.2	1.5
PPI for primary metals and fabricated metal products (growth rate, %)**	1.5	1.1	1.0	1.5	2.0	1.5	0.5	0.5	2.1
PPI for machinery (growth rate, %)**	-1.4	0.4	0.4	0.5	1.7	1.0	0.7	0.8	0.7
PPI for transport equipment manufacturing (growth rate, %)**	-0.2	1.2	0.6	0.3	1.0	-0.1	0.6	0.5	0.5
The cost of the monthly per capita minimum food basket (thousand Rb)	3.84	3.83	3.86	3.90	3.93	3.95	3.98	4.00	4.03
The composite index of transportation tariffs (growth rate, %)**	0.0	-0.1	-0.2	-0.2	1.5	-0.2	-0.2	-0.2	-0.3
The index of pipeline tariffs (growth rate, %)**	-0.1	-4.7	2.6	4.0	-2.3	-3.7	2.5	7.3	1.2
The index of motor freight tariffs (growth rate, %)**	0.1	-4.3	0.1	0.1	0.1	0.1	0.0	3.8	0.0
The Brent oil price (\$ a barrel)	82.7	75.5	77.1	75.0	74.7	73.0	71.6	70.3	68.1
The aluminum price (thousand \$ a ton)	2.05	1.96	1.95	1.93	1.89	1.88	1.89	1.87	1.86
The gold price (thousand \$ per ounce)	1.20	1.22	1.22	1.21	1.21	1.22	1.23	1.22	1.22
The nickel price (thousand \$ a ton)	6.26	6.00	5.94	5.86	5.87	5.85	5.84	5.82	5.80
The copper price (thousand \$ a ton)	12.5	11.5	11.1	10.9	10.7	10.6	10.6	10.5	10.5
The monetary base (trillion Rb)	10.3	10.3	10.2	10.3	10.8	10.4	10.5	10.6	10.7

Index	2018				2019				
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
M <sub>2</sub> (trillion Rb)	<b>44.4</b>	<b>44.3</b>	44.4	44.5	45.7	45.6	45.7	45.6	45.7
Gold and foreign exchange reserves (billion \$)	<b>0.46</b>	<b>0.46</b>	0.46	0.46	0.46	0.46	0.47	0.47	0.47
The RUR/USD exchange rate (rubles per one USD)	65.59	65.77	66.67	67.59	68.02	68.43	68.85	69.25	69.73
The USD/EUR exchange rate (USD per one Euro)	<b>1.16</b>	<b>1.14</b>	<b>1.14</b>	1.14	1.14	1.13	1.13	1.13	1.13
Real disposable cash income (growth rate, %)*	<b>-2.5</b>	<b>1.4</b>	0.2	-0.8	-1.6	-2.8	-3.2	-1.2	-0.2
Real cash income (growth rate, %)*	<b>-1.5</b>	<b>1.8</b>	1.0	0.5	-0.6	-1.7	-1.8	-0.4	0.1
Real accrued wages (growth rate, %)*	<b>4.9</b>	<b>4.4</b>	4.1	3.1	0.1	-1.1	0.0	0.2	0.2
Employment (million people)	<b>73.1</b>	72.6	72.5	72.6	71.8	71.8	72.3	72.4	72.7
Unemployment (million people)	<b>3.4</b>	3.5	3.6	3.6	3.7	3.6	3.6	3.6	3.5

Note: actual values are printed in the bold type

\* % of the respective month of the previous year

\*\* % of the previous month.



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