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 *July* 2020 to *December* 2020[1], which were performed using time series models developed as a result of research conducted by the Gaidar Institute over the past few years.[2] A method of forecasting falls within the group of *formal* or *statistical* methods. In other words, the calculated values neither express the *opinion* nor *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[3], 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.[4]

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

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[1] Given that from early 2019 Rosstat does not release monthly data on indexes of real disposable cash income of the population, commencing from issue 8/2019 we release forecasts in quarter terms for 2 quarters ahead.

[2] 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 Indexes*. Moscow, IET, 2001; R.M. Entov, V.P. Nosko, A.D. Yudin, P.A. Kadochnikov, S.S. Ponomarenko. *Problems of Forecasting of Some Macroeconomic Indexes*. 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. Kiblitskaya, *Qualitative Properties of Different Approaches to Forecasting of Social and Economic Indexes of the Russian Federation*. Moscow, IET, 2010.

[3] Ibid.

[4] See.: Perron, P. Further Evidence on Breaking Trend Functions in Macroeconomic Variables, *Journal of Econometrics*, 1997, 80, p. 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, p. 251–270.

aggregated forecasts (i.e. forecasts obtained as average value from several models) may help make forecast values more accurate.

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[1] that the use of series of business surveys as explanatory variables[2] 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 choose a model for the CPI, which included 9th, 12th and 13th lags of the four principal components, as well as 1st and 12th lags of the variable itself, and a model for the PPI, which included 8th, 9th and 12th lags of the four principal components, as well as 1st, 3rd and 12th lags of the variable itself.

All calculations were performed using the Eviews econometric package.

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

[2] 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 the industrial production indexes[1] (%)

Month	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	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE	Rosstat	NRU HSE
	ARIMA	BS	ARIMA	BS														
Expected growth on the respective month of the previous year																		
July 2020	-2.6	-6.9	-8.5	-6.3	-1.6	-13.3	-4.5	-3.1	-1.3	0.8	2.7	4.1	-4.7	-6.0	-8.8	-7.9	4,4	0,4
August 2020	-2.1	-5.8	-7.2	-5.2	-2.5	-6.9	-4.7	-2.7	-0.4	1.0	4.3	3.5	-3.7	-5.7	-14.5	-12.2	1,1	-1,9
September 2020	-2.4	-4.2	-5.4	-3.6	-2.7	-5.8	-4.3	-2.3	0.2	-0.3	2.9	2.5	-1.0	-4.6	-9.3	-9.8	-2,8	-6,6
October 2020	-2.7	-5.4	-3.6	-4.8	-2.4	-0.6	-6.9	-3.6	1.1	1.1	3.8	1.8	-4.5	-6.6	-9.7	-9.6	-6,3	-0,5
November 2020	-1.6	-4.6	-0.7	-4.0	-2.8	-0.1	-2.1	1.6	-0.5	-1.6	3.6	4.1	-4.5	-3.8	-0.3	-4.9	-10,7	-4,0
December 2020	-2.3	-3.4	-0.6	-2.8	-3.5	-0.9	-3.8	-0.4	2.7	0.6	3.8	4.8	-7.7	-2.6	-0.5	-8.9	-14,6	-7,6
For reference: actual growth in 2019 on the respective month of 2018																		
July 2019	2.8			1.5	2.0	1.8	3.7	1.6	0.9	0.6	6.8	3.9	1.0	0.0	-1.1	-2.4	13.6	11.9
August 2019	2.8			2.4	2.1	1.8	3.4	3.2	1.1	1.3	1.3	2.4	4.5	4.9	6.2	4.4	4.8	2.7
September 2019	3.8			2.5	1.4	0.9	5.9	4.1	3.7	5.3	6.1	4.9	1.2	-0.6	3.8	2.5	7.8	1.0
October 2019	3.0			1.3	-0.7	-0.8	6.3	3.6	2.0	2.5	4.4	3.1	7.0	4.1	-0.6	-2.4	17.2	16.8
November 2019	0.7			-0.7	0.1	-0.2	1.5	-0.9	0.1	-0.2	5.1	2.7	3.6	-1.1	-2.2	-4.0	5.1	3.0
December 2019	1.7			0.1	0.5	0.6	4.0	1.5	-4.8	-6.5	7.6	6.6	3.0	-3.1	3.4	2.8	-6.8	-6.7

Note. In the time spans under review, the series of the Rosstat and the NRU HSE chain indexes 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 indexes are stationary at levels.

[1] It is to be noted that for making of forecasts so-called "raw" indexes (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 July to December 2020, the series of monthly data of the indexes of industrial production released by the Federal State Statistics Service (Rosstat) from January 2002 to April 2020, as well as the series of the base indexes of industrial production released by the National Research University Higher School of Economics (NRU HSE[1]) over the period from January 2010 to May 2020 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 industrial production indexes are calculated using business surveys (BS) as well. The obtained results are shown in Table 1.

As seen from *Table 1*, the Rosstat average[2] decrease in the industrial production index in H2 2020 compared to the same period of the previous year for the industry as a whole comes to 3.7%. The NRU HSE industrial production index comes to 4.4%. The Rosstat and the NRU HSE IPI in July-December 2020 constitute 1.9% and 2.5%, respectively year-on-year.

The average monthly decline in the Rosstat and the NRU HSE industrial production indexes for mining and quarrying amount to 2.6% and 4.6%, respectively in July-December 2020.

The average decrease in the Rosstat industrial production index in manufacturing industry for H2 2020 amounts to 4.4% compared to the same period of the previous year and the NRU HSE industrial production index in manufacturing industry comes to 1.7%. The average monthly increase in production of food products to average by 3.5% and 3.5% for the Rosstat and the NRU HSE indexes, respectively. The production of coke and petroleum products is forecast to decline on average by 4.3% and 4.9% for the Rosstat and the NRU HSE indexes, respectively. The average monthly decline in the industrial production index for primary metals and fabricated metal products for July-December 2020 computed by Rosstat and the NRU HSE constitutes 7.2% and 8.9%, respectively. Manufacturing of machinery and equipment is forecast to drop on average by 4.8% and 3.4% for the Rosstat and the NRU HSE indexes, respectively.

The average gain in the Rosstat industrial production index for electricity, gas, and water supply; for air conditioning in H2 2020 constitutes 0.3% in comparison with the same period of the previous year; the same indicator the NRU HSE industrial production index comes to 0.3%.

Retail Sales

This section (Table 2) presents forecasts of monthly retail sales made on the basis of monthly Rosstat data over January 1999 – May 2020.

As seen from *Table 2,* the average forecast decrease in the monthly turnover for July-December 2020 against the corresponding period of 2019 amounts to around 3.4%. The average forecast drop in the monthly real turnover for the period July-December 2020 compared to the same period of 2019 constitutes 7.1%.

At an annualized rate, the projected decline in the retail turnover index in December 2020 in nominal terms comes to 1.0% and in real terms – 7%.

Table 2

Calculations of forecast values of retail sales and real retail sales

Forecast value according to ARIMA-model		
Month	Retail sales, billion RUB (in brackets – growth on the respective month of the previous year, %)	Real retail sales (as % of the respective period of the previous year)
July 2020	2618.9 (-6.7)	90.9
August 2020	2793.2 (-3.6)	90.4
September 2020	2739.1 (-4.1)	90.1
October 2020	2817.5 (-3.0)	90.6
November 2020	2873.9 (-2.0)	93.8
December 2020	3438.2 (-1.0)	96.2
For reference: actual values in the same months of 2019		
July 2019	2807.0	101.8
August 2019	2897.5	101.5
September 2019	2856.2	101.1
October 2019	2904.6	100.9
November 2019	2932.5	101.9
December 2019	3472.9	102.6

Note. The series of retail sales and real retail sales over January 1999 – May 2020.

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[1] The indexes in question are calculated by E.F. Baranov and V.A. Bessonov.
[2] 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 volumes of foreign trade turnover with countries outside the CIS

Month	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)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year		Forecast values (billion USD a month)		Percentage of actual data in the respective month of the previous year	
	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM	ARIMA	SM
July 2020	24.5	26.9	73	80	20.1	19.8	90	89	24.4	24.6	85	85	18.6	17.6	93	88
August 2020	29.3	27.2	85	79	20.6	19.7	94	90	23.1	24.7	78	83	17.1	16.9	87	86
September 2020	29.0	29.3	82	82	21.8	20.1	104	96	24.6	25.1	80	81	17.7	17.4	95	93
October 2020	30.6	28.2	83	77	19.7	20.4	82	85	25.9	25.3	81	79	17.5	17.7	81	82
November 2020	31.4	29.4	88	83	19.4	19.9	83	86	25.8	26.1	85	86	17.7	18.5	85	89
December 2020	31.0	31.8	79	82	19.7	20.9	81	86	25.8	26.0	77	78	18.0	18.7	83	86

For reference: actual values in respective months of 2019 (billion USD)

Month	Exports to all countries	Imports from all countries	Exports to countries outside the CIS	Imports from countries outside the CIS
July 2019	33.4	22.4	28.8	19.9
August 2019	34.4	22.0	29.6	19.6
September 2019	35.5	21.0	30.8	18.7
October 2019	36.8	23.9	32.0	21.5
November 2019	35.5	23.2	30.4	20.8
December 2019	39.0	24.2	33.5	21.7

Note. Over the period from January 1999 to May 2020, 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 indexes

Month	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	for utilities (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	for transport equipment manufacturing
										Producer price indexes:								
Forecast values (% of the previous month)																		
July 2020	100.5	100.3	100.5	100.0	100.5	100.0	100.0	99.6	100.5	101.5	100.4	100.3	99.5	102.4	98.7	101.7	100.6	100.6
August 2020	100.3	100.2	100.4	99.8	100.8	100.3	100.6	99.9	102.2	100.9	100.8	100.7	99.8	103.2	99.2	101.8	100.6	100.0
September 2020	100.4	100.3	100.6	100.0	100.7	100.3	99.5	100.1	100.0	101.0	100.5	100.4	100.2	102.9	99.5	100.9	100.5	100.2
October 2020	100.5	100.3	100.5	99.6	100.5	100.4	98.0	100.0	100.5	101.1	100.4	100.0	99.8	104.1	98.9	101.2	100.4	101.0
November 2020	100.5	100.3	100.4	99.9	100.4	100.4	102.4	98.7	99.7	100.9	100.6	100.3	100.2	103.3	98.5	100.2	100.3	100.4
December 2020	100.5	100.3	100.6	100.5	100.0	100.5	97.6	99.3	99.9	101.0	100.4	100.2	100.2	99.4	98.3	99.8	100.4	100.8
Forecast values (% of December 2019)																		
July 2020	103.9	102.9	103.9	88.8	96.5	89.2	67.0	94.1	101.9	106.7	106.6	104.0	95.2	77.4	94.5	116.4	104.2	104.1
August 2020	104.2	103.1	104.3	88.6	97.3	89.5	67.4	94.0	104.1	107.7	107.4	104.7	95.0	79.9	93.7	118.5	104.9	104.1
September 2020	104.6	103.5	104.9	88.6	98.0	89.7	67.1	94.1	104.1	108.7	108.0	105.1	95.2	82.2	93.2	119.6	105.4	104.4
October 2020	105.2	103.8	105.4	88.2	98.5	90.1	65.7	94.1	104.6	109.8	108.4	105.1	95.0	85.6	92.2	121.1	105.9	105.4
November 2020	105.7	104.1	105.9	88.1	98.9	90.5	67.3	92.9	104.3	110.9	109.0	105.4	95.2	88.4	90.8	121.4	106.2	105.8
December 2020	106.3	104.4	106.5	88.5	98.9	90.9	65.7	92.3	104.2	112.0	109.5	105.6	95.4	87.9	89.3	121.2	106.6	106.6
For reference: actual values in the same periods of 2019 (% of December 2018)																		
July 2019		102.5			97.9		92.4	99.4	102.3	99.3	101.2	99.0	98.5	92.8	97.1	100.6	102.2	103.1
August 2019		102.3			97.4		91.7	98.7	102.7	99.2	99.5	98.6	96.7	89.2	95.7	100.9	102.8	102.7
September 2019		102.1			97.1		91.3	98.7	101.6	98.6	99.2	98.5	95.9	89.5	94.8	100.8	102.7	102.8
October 2019		102.2			96.9		90.1	98.7	102.1	98.4	100.6	97.8	95.5	90.2	94.0	100.4	102.8	102.8
November 2019		102.5			96.1		89.4	97.8	101.6	98.0	99.7	97.8	93.9	88.2	92.2	97.8	102.6	102.4
December 2019		102.9			95.7		90.8	96.7	101.2	97.5	100.2	96.9	93.1	84.6	90.5	95.5	102.6	102.5

Note. Over the period from January 1999 to April 2020, 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 indexes are stationary at levels.

FOREIGN TRADE INDEXES

Model calculations of forecast values of the export, export to countries outside the CIS and the import, 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 May 2020 on the basis of the data released by the Central Bank of Russia.[1] The results of calculations are presented in Table 3.

Export, import, export outside the CIS and import from the countries outside the CIS are forecast to decrease on average by 18.8%, 11.5%, 18.6%, and 12.7%, respectively for July-December 2020 against July-December 2019. The average forecast trade balance volume with all countries for July-December 2020 will total $53.3 bn, which corresponds to a decrease by 31.6% in relation to July-December 2019.

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 April 2020.[2] Table 4 presents the results of model calculations of forecast values over July to December of 2020 in accordance with ARIMA-models, structural models (SM) and models computed with the help of business surveys (BS).

The forecast average monthly gain in the consumer price index in H2 2020 will come to 0.5%. The producer price index for industrial goods for the same period is forecast to average at -0.1% per month. At 2020-end, the forecast average inflation of consumer prices will come to 6.4% according to three models. The same index for producer price index will demonstrate a decline of 7.2%.

The Rosstat OKVED producer price indexes are forecast to grow at average monthly rate for July-December 2020: for mining and quarrying (-0.3%), for manufacturing (-0.4%), for utilities (electricity, gas, and water) 0.5%, for food products 1.1%, for textile and sewing industry 0.5%, for wood products 0.3%, for pulp and paper industry -0.1%, for coke and refined petroleum 2.5%, for chemical industry (-1.1%), for basic metals and fabricated metal products 1.0%, for machinery and equipment 0.5%, and for transport equipment manufacturing 0.5%.

The average decline in producer prices at 2020-end will come to 0.3%. The maximum drop is forecast in mining and quarrying at 34.3%. The maximum gain if forecast in primary metals and fabricated metal products at 21.2%.

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 July to December 2020. The forecasts were made on the basis of time series with the use of the Rosstat data over the period from January 2000 to May 2020. The results are presented in Table 5.

Table 5
The forecast of the cost of the monthly per capita minimum food basket

Forecast values according to ARIMA-model (RUB)	
July 2020	4504.0
August 2020	4483.3
September 2020	4324.0
October 2020	4230.7
November 2020	4217.9
December 2020	4227.3
For reference: actual values in the same months of 2019 (billion RUB)	
July 2019	4311.7
August 2019	4170.0
September 2019	4062.7
October 2019	4022.6
November 2019	4031.5
December 2019	4067.7
Expected growth on the respective month of the previous year (%)	
July 2020	4.5
August 2020	7.5
September 2020	6.4
October 2020	5.2
November 2020	4.6
December 2020	4.9

Note. The series of the cost of the monthly per capita minimum food basket over the period from January 2000 to May 2020 are stationary in the first-order differences.

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[1] The data on the foreign trade turnover is calculated by the CBR in accordance with the methods for making of the balance of payment in prices of the exporter-country (FOB) in billion USD.
[2] 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 level of the previous year. Having said that, the minimum set of food products is forecast to average RUB 4,331.2. The minimum set of food products' cost is forecast to grow on average at around 5.5% against the same period of last year. The annual gain in the minimum set of food products will amount to 4.9% in December 2020.

Indexes of Freight Rates

This section presents calculations of forecast values of freight tariff indexes on cargo carriage,[1] made on the basis of time-series models evaluated on the Rosstat data over the period from September 1998 to April 2020. Table 6 shows the results of model calculations of forecast values in the July-December of 2020. It should be noted that some of the indexes under review (for instance, the index of pipeline tariff) 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 in tariffs in the period of forecasting or in case of absence of such an increase in the forecasting period, but with it taking place shortly before the beginning of that period.

According to the forecast results for July-December 2020, the composite index of transport tariffs on freight carriage during six months under review will be declining at an average monthly rate of -0.1%. In July 2020, the seasonal growth in the index is expected at 3.4 p.p. and in October a seasonal decline at -4.3 p.p. As a result, its annual growth in 2020 will come to 3.8%.

The index of motor freight tariffs will be decreasing during these six months at an average monthly rate of 0.6%. Its annual decline is forecast at 7.5% in 2020.

The index of pipeline tariffs will be growing at an average monthly rate of 0.6%. In July 2020, the seasonal growth in the index is expected at 2.8 p.p. As a result, its annual gain will come to 1.7% in 2020.

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 June to November 2020 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 May 2020.

The crude oil price is forecast to average around $33.6 per barrel, which is below its corresponding year-earlier indexes on average by 46.2%. The alu-

Table 6

Calculations of forecast values of freight tariffs indexes

Month	The composite index of transport tariff	The index of motor freight tariff	The index of pipeline tariff
Forecast values according to ARIMA-models (% of the previous month)			
July 2020	103.4	99.4	102.8
August 2020	100.1	99.4	102.9
September 2020	100.1	99.4	97.0
October 2020	95.7	99.4	96.6
November 2020	100.1	99.4	102.3
December 2020	100.1	99.4	101.8
Forecast values according to ARIMA-models (% of December of the previous year)			
July 2020	107.9	95.4	100.3
August 2020	108.0	94.8	103.2
September 2020	108.2	94.3	106.1
October 2020	103.6	93.7	102.9
November 2020	103.7	93.1	99.4
December 2020	103.8	92.5	101.7
For reference: actual values in the same period of 2019 (% of the previous month)			
July 2019	103.1	100.0	107.6
August 2019	100.2	100.1	100.3
September 2019	99.9	100.0	99.8
October 2019	95.8	100.0	90.1
November 2019	100.0	100.1	100.0
December 2019	99.9	100.0	99.9

Note. Over the period from September 1998 to April 2020, the series of the freight tariff index were identified as stationary ones; the other series were identified as stationary ones over the period from September 1998 to January 2020, too; fictitious variables for taking into account particularly dramatic fluctuations were used in respect of all the series.

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[1] 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 indexes 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).

minum prices are forecast to average around $1,488 per ton and their average forecast decline constitutes around 15% compared to the same level of last year. The gold price is forecast to average $1,767 per ounce. The copper price is forecast to average $5,639 per ton, and prices for nickel – around $12,446 per ton. The average forecast price increase in gold constitutes around 20%, the average decline in copper prices – around 4%, nickel prices – 20% against the corresponding level of last year.

At 2020-end, the forecast decease in prices on oil, aluminum, copper, and nickel compared to the end of 2019 will come to 49.8, 17.0, 7.4 and 11.1%, respectively. The projected increase in gold prices – 21.8%.

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

Month	Brent oil ($ per barrel)	Aluminum ($ per ton)	Gold ($ per ounce)	Copper ($ per ton)	Nickel ($ per ton)
Forecast values					
July 2020	35.51	1490	1731	5570	12367
August 2020	34.35	1484	1748	5597	12408
September 2020	32.63	1493	1763	5617	12445
October 2020	32.79	1494	1775	5655	12474
November 2020	32.92	1487	1786	5684	12483
December 2020	33.15	1485	1798	5714	12496
Expected growth on the respective month of the previous year (%)					
July 2020	-45.5	-16.4	22.5	-6.2	-15.0
August 2020	-43.2	-14.4	16.6	-1.0	-30.7
September 2020	-46.3	-12.6	16.7	-1.6	-27.3
October 2020	-45.6	-15.2	18.7	-2.6	-25.3
November 2020	-47.3	-16.5	21.5	-3.3	-8.7
December 2020	-49.8	-17.0	21.8	-7.4	-11.1
For reference: actual values in the same period of 2019					
July 2019	65.17	1782	1413	5935	14553
August 2019	60.43	1733	1499	5652	17900
September 2019	60.78	1708	1511	5710	17110
October 2019	60.23	1762	1495	5806	16690
November 2019	62.43	1780	1470	5879	13668
December 2019	66.00	1789	1476	6169	14053

Note. Over the period from January 1980 to May 2020, the series of prices of crude oil, nickel, gold, copper, and aluminum are series of DS type.

MONETARY INDEXES

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 July to December 2020 were received on the basis of models of time-series of respective indexes calculated by the CBR[1] in the period from October 1998 to June 2020 for the monetary base and to April 2020 for M_2 monetary. Table 8 presents the results of calculations of forecast values and actual values of those indexes 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 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 July-December 2020, the monetary base in the period under review will be growing at an average monthly rate of 0.8%. According to projections, the annual gain of the monetary base will come to 23.2% in 2020. In the period under review, M_2 monetary index will be growing at an average monthly rate of 0.2%. The annual increment of M_2 index is projected at 7.6% in 2020.

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

INTERNATIONAL RESERVES

This section presents the outputs of the statistical estimation of such future values of the international reserves of the Russian Federation[1] as were received on the basis of evaluation of the model of time series of the gold and foreign exchange reserves on the basis of the data released by the CBR over the period from October 1998 to June of 2020. 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 findings for July-December 2020, the international reserves will be growing at an average monthly rate of 0.5%. In 2020, the international reserves will grow at 7.5%.

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 June 2020 and from February 1999 to June 2020,[2] respectively.

In July-December 2020, USD/RUB average exchange rate is forecast according to two models in the amount of RUB 72.18 per USD. The projected index will come to RUB 72.86 per USD on average according to two models at 2020-end.

Projected Euro/USD exchange rate over the period under review will average USD 1.12 per 1 euro. At 2020-end, the projected index will stay at USD 1.12 per 1 euro.

Table 8

The forecast of M_2 and the monetary base

Month	The monetary base		M_2	
	Billion RUB	Growth on the previous month, %	Billion RUB	Growth on the previous month, %
July 2020	12482	0.8	52956	1.1
August 2020	12551	0.6	52373	-1.1
September 2020	12671	1.0	52958	1.1
October 2020	12785	0.9	52371	-1.1
November 2020	12864	0.6	52961	1.1
December 2020	12981	0.9	52951	0.0
For reference: actual value in the respective months of 2019 (growth on the previous month, %)				
July 2019	0.9		1.3	
August 2019	0.4		0.0	
September 2019	1.3		0.5	
October 2019	0.4		1.4	
November 2019	-0.4		-0.4	
December 2019	0.2		2.3	

Note. Over the period from October 1998 to June 2020, the time series of monetary base were attributed to the class of series which are stationary in the first-order differences and have an explicit seasonal component and the time series of M_2 monetary aggregate from October 1998 to April 2020 was identified as stationary series with explicit seasonal component.

Table 9

The forecast of the international reserves of the Russian Federation

Month	Forecast values according to ARIMA-model	
	Billion USD	Growth on the previous month, %
July 2020	566.5	0.1
August 2020	570.0	0.6
September 2020	574.2	0.7
October 2020	577.3	0.5
November 2020	579.6	0.4
December 2020	582.6	0.5
For reference: actual values in the same period of 2019		
	Billion USD	Growth on the previous month, %
July 2019	518.4	4.7
August 2019	519.8	0.3
September 2019	529.1	1.8
October 2019	530.9	0.3
November 2019	540.9	1.9
December 2019	542.0	0.2

Note. Over the period from October 1998 to June 2020, the series of the gold and foreign exchange reserves of the Russian Federation were identified as stationary series in difference.

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

[2] The Bulletin uses the IMF data related to Euro/USD exchange rate for the period from January 1999 to March 2020, and on USD/RUB exchange rate from October 1998 to May 2020. Data for June 2020 were taken from the exchange rate website www.oanda.com.

THE LIVING STANDARD INDEXES

This section (Table 11) presents results of calculations of monthly forecast values of index of real wages, as well as quarterly forecast values of real disposable cash income and real cash income[1] as were obtained on the basis of models of time series of respective indexes computed by Rosstat and taken over the period from January 1999 to March 2020, as well as from Q1 2014 to Q1 2020. The above indexes 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 indexes under review. Consequently, the future values of the indexes of real wages and real disposable cash income calculated on the basis of the series which last observations are either considerably higher or lower than the previous ones due to such a raise may differ greatly from those which are implemented in reality.

The results presented in *Table 11*, project growth in real wages. The real wages are expected to gain on average 7.2% compared to the same period of the previous year.

At the end of 2020, the projected increment of real wages will come to 3.6% for 12 months.

The results presented in *Table 12* project average quarterly decrease in real disposable cash income by 0.5%. The forecast average gain in real cash income will be 0.4% compared to the corresponding period of the last year.

At the end of 2020, the projected decrease in real disposable cash income will come to 2%; decrease in real cash income will be 1.4% for 12 months.

Table 10

Forecasts of the USD/RUB and EUR/USD exchange rates

Month	The USD/RUB exchange rate (RUB per USD)		The EUR/USD exchange rate (USD per EUR)	
	ARIMA	SM	ARIMA	SM
July 2020	71.53	71.31	1.12	1.12
August 2020	71.77	71.61	1.12	1.12
September 2020	72.04	72.23	1.12	1.12
October 2020	72.30	72.41	1.12	1.12
November 2020	72.56	72.69	1.12	1.12
December 2020	72.82	72.90	1.12	1.12
For reference: actual values in the similar period of 2019				
July 2019	63.38		1.11	
August 2019	66.49		1.10	
September 2019	64.42		1.09	
October 2019	63.87		1.11	
November 2019	64.08		1.10	
December 2019	61.91		1.13	

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 real wages

Month	Real accrued wages
Forecast values according to ARIMA-models (as % to the respective month of 2019)	
July 2020	106.8
August 2020	107.0
September 2020	107.1
October 2020	107.2
November 2020	107.4
December 2020	107.5
For reference: actual values in the respective period of 2019 (as % to the same period of 2018)	
July 2019	103.0
August 2019	102.4
September 2019	103.1
October 2019	103.8
November 2019	102.7
December 2019	106.6

Note. For calculation purposes, the series of real wages in base form were used (January 1999 was adopted as a base period). Over the period from January 1999 to March 2020 those series were attributed to the class of processes, which are stationary in differences and have an explicit seasonal component.

Table 12

The forecast of the living standard indexes

Period	Real disposable cash income	Real cash income
Forecast values according to ARIMA-models (as % to the corresponding quarter of 2019)		
Q3 2020	99.8	100.5
Q4 2020	99.2	100.2
For reference: actual values for the respective period of 2019 (in % to the same period of 2018)		
Q3 2019	102.9	103.5
Q4 2019	101.8	102.3

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[1]   *Real cash income – a relative index which is calculated by means of division of the index of nominal size (i.e. which was formed in the period under review) of cash income of the population by the CPI. The real disposable cash income – is cash income less mandatory payments and contributions. (See: Rossiisky Statistichesky Ezhegodnik, Moscow, Rosstat, 2004, p. 212).*

EMPLOYMENT AND UNEMPLOYMENT

For the purpose of calculation of the future values of employment (the number of gainfully employed population) and the unemployment (the total number of unemployed), models of the time series evaluated over the period from October 1998 to April 2020 on the basis of the monthly data released by Rosstat[1] were used. The unemployment was calculated on the basis of the models with results of the findings from business surveys[2] too.

It is to be noted that feasible logical inconsistencies[3] in forecasts of employment and unemployment which totals should be equal to the index of gainfully employed population may arise due to the fact that each series is forecast individually and not as a difference between the forecast values of gainfully employed population and another index.

Table 13
Calculation of forecast values of employment and unemployment indexes

Month	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
July 2020	71.4	-1.0	4.3	26.9	6.0	4.5	32.8	6.3
August 2020	72.1	-0.6	4.2	27.6	5.8	4.5	35.2	6.2
September 2020	72.0	-0.3	4.3	25.1	5.9	4.4	30.1	6.1
October 2020	71.7	-0.6	4.4	25.8	6.1	4.4	25.1	6.1
November 2020	71.8	-1.3	4.3	24.1	6.0	4.3	23.7	6.0
December 2020	71.7	-1.0	4.4	25.2	6.1	4.3	23.3	6.0
For reference: actual values in the same periods of 2019 (million people)								
July 2019	72.2		3.4					
August 2019	72.5		3.3					
September 2019	72.2		3.4					
October 2019	72.1		3.5					
November 2019	72.7		3.5					
December 2019	72.4		3.5					

Note. Over the period from October 1998 to April 2020, 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 indexes include seasonal component.

According to ARIMA-model forecast (*Table 13*), in July-December 2020, the decrease in the number of employed in the economy will average 0.8% per month against the corresponding period of the previous year. At 2020-end, the projected number of employed in the economy will come to 71.7 mn.

The average increase in the total number of unemployed is forecast at 27.1% per month against the same period of last year. The average number of jobless at 2020-end is projected at 4.4 mn.

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

[2] The model is evaluated over the period from January 1999 to April 2020.

[3] For example, deemed as such a difference may be a simultaneous decrease both in employment and 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 gainfully employed population.

ANNEXES

Annex 1. Diagrams of the Time Series of the Economic Indexes of the Russian Federation

Fig. 1a. The Rosstat industrial production index
(ARIMA-model) (% of December 2001)
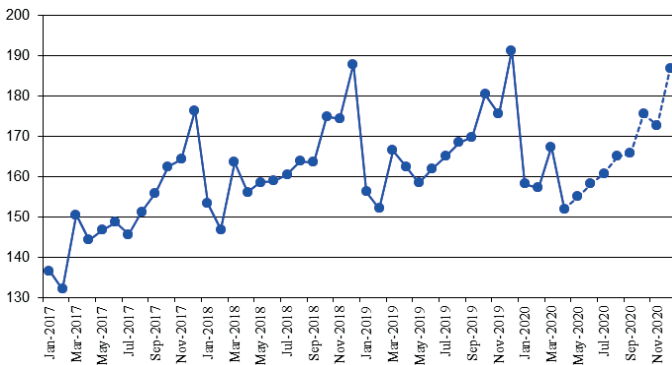
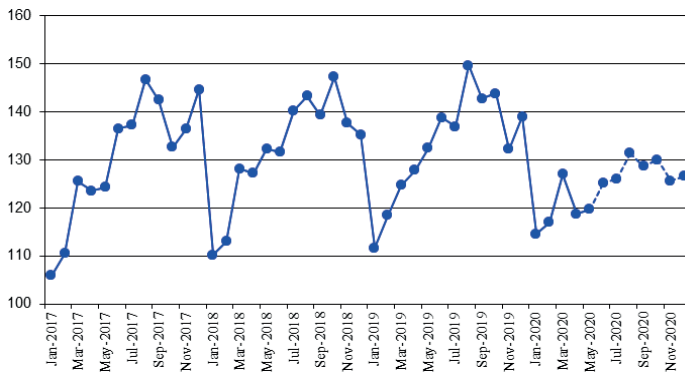*Fig. 1b. The NRU HSE industrial production index*
(ARIMA-model) (% of January 2010)
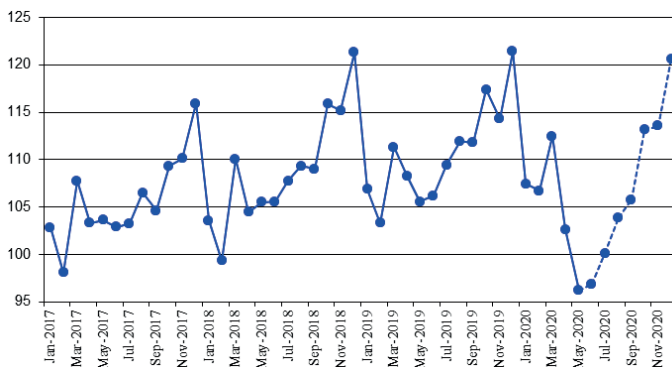
Fig. 2a. The Rosstat industrial production index for mining
(% of December 2001)
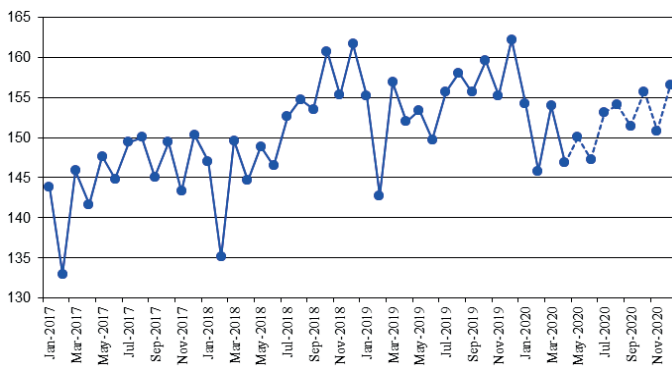
Fig. 2b. The NRU HSE industrial production index for mining
(% of January 2010)
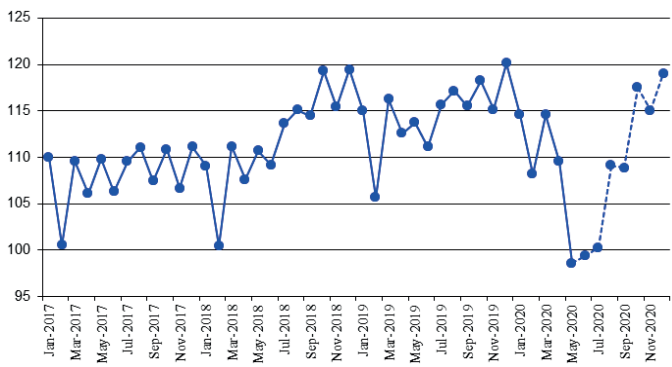
Fig. 3a. The Rosstat industrial production index for manufacturing (% of December 2001)
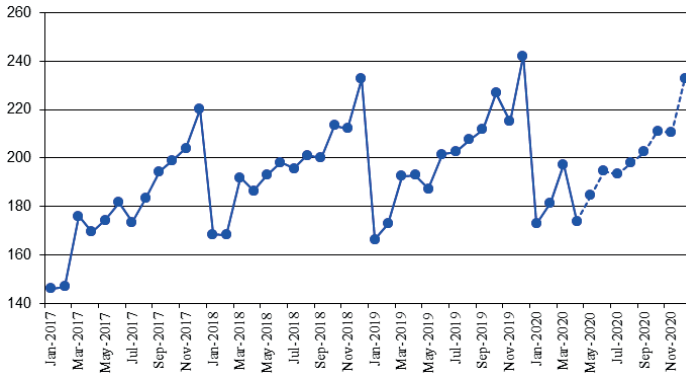
Fig. 3b. The NRU HSE industrial production index for manufacturing (% of January 2010)
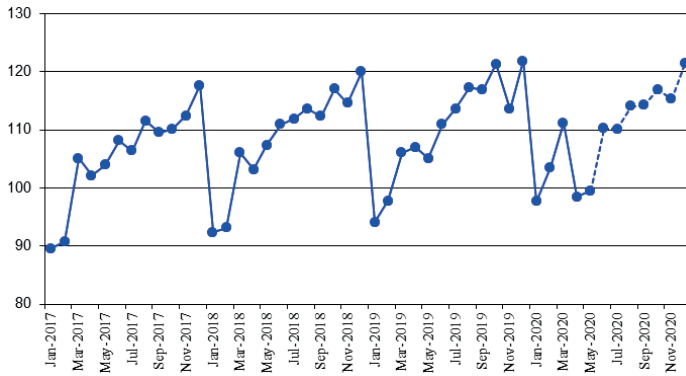
Fig. 4a. The Rosstat industrial production index for utilities (electricity, water, and gas) (as a percentage of that in December 2001)
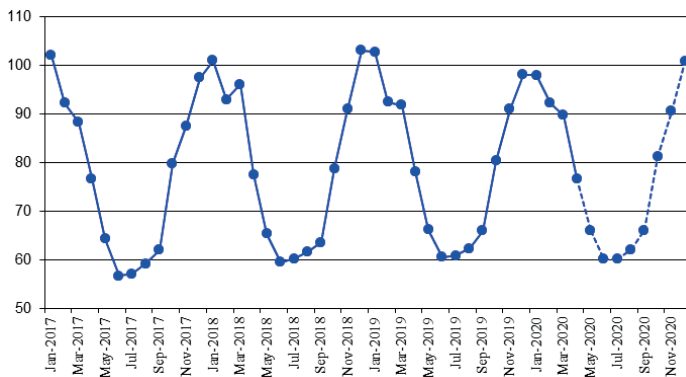
Fig. 4b. The NRU HSE industrial production index for utilities (electricity, water, and gas) (as a percentage of that in January 2010)
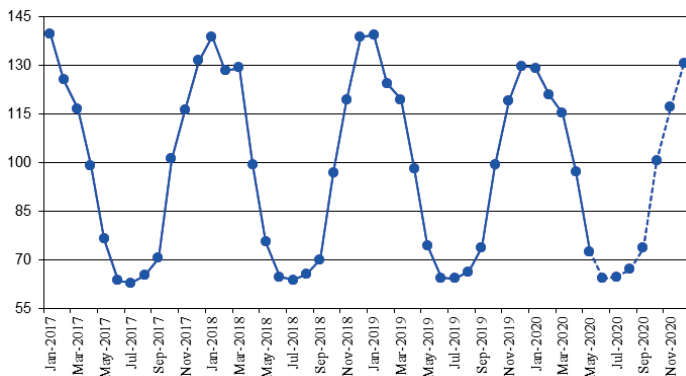
*Fig. 5a. The Rosstat industrial production index for food products
(as a percentage of that in December 2001)*
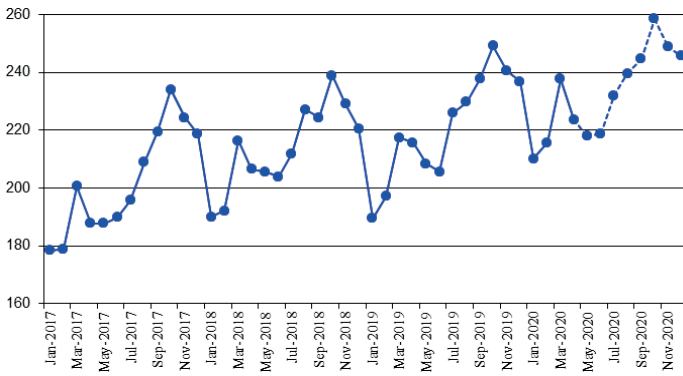
*Fig. 5b. The NRU HSE industrial production index for food products
(as a percentage of that in January 2010)*
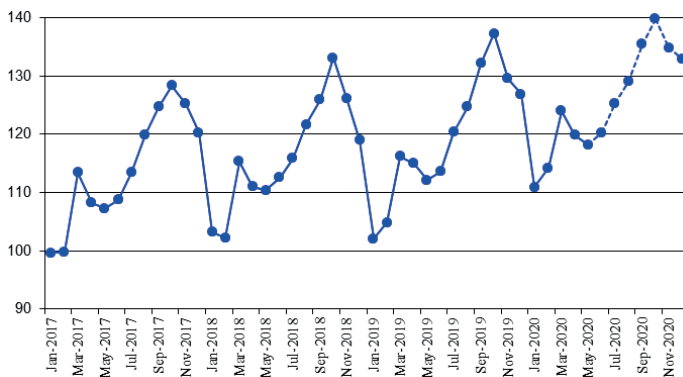
*Fig. 6a. The Rosstat industrial production index for coke and petroleum
(as a percentage of that in December 2001)*
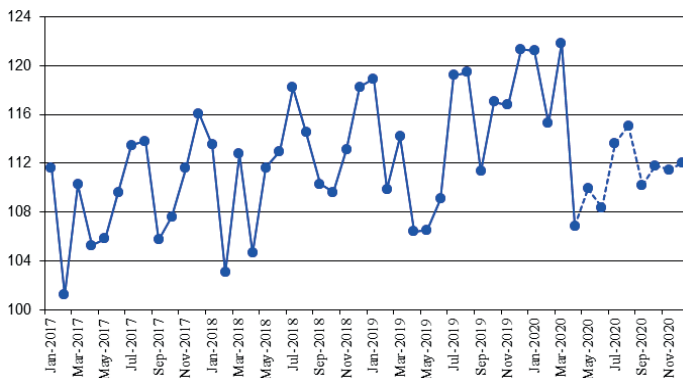
*Fig. 6b. The NRU HSE industrial production index for petroleum and coke
(as a percentage of that in January 2010)*
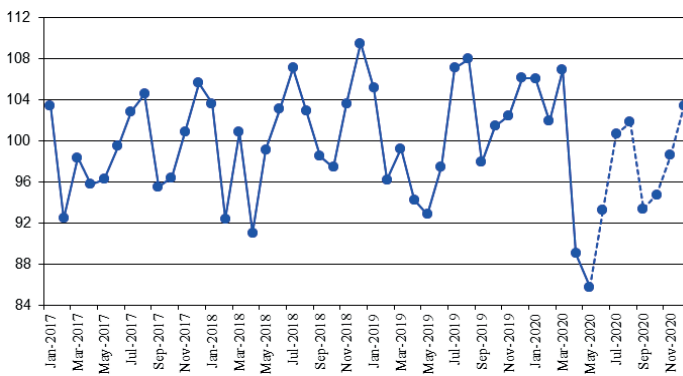
Fig.7a. The Rosstat industrial production index
for primary metals and fabricated metal products
(as a percentage of that in December 2001)
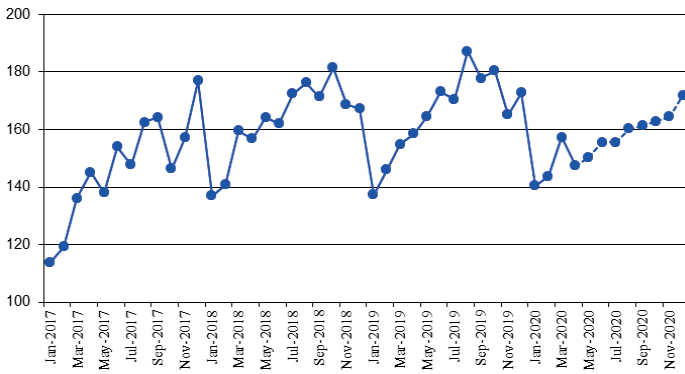
Fig. 7b. The NRU HSE industrial production index
for primary metals and fabricated metal products
(as a percentage of that in January 2010)

Fig. 8a. The Rosstat industrial production index for machinery
(as a percentage of that in December 2001)
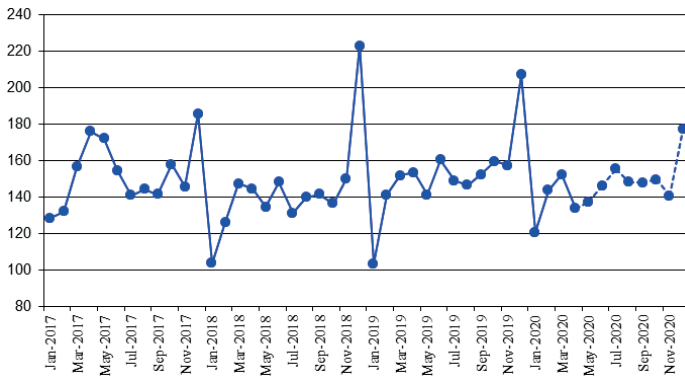
Fig. 8b. The NRU HSE industrial production index for machinery
(as a percentage of that in January 2010)
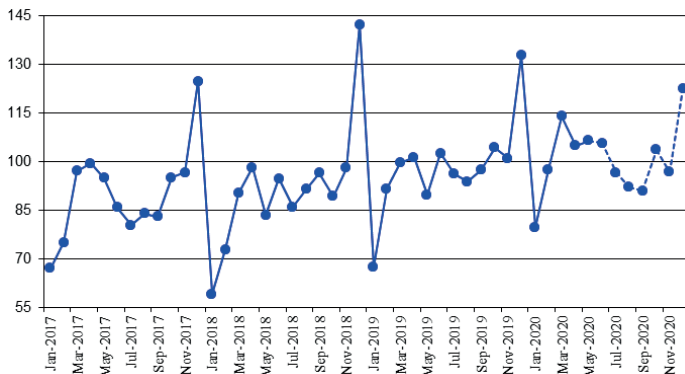
Fig. 9. The volume of retail sales (billion RUB)
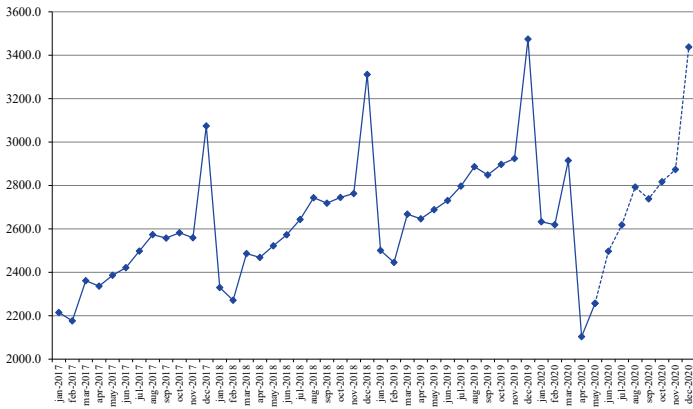
Fig. 9a. The real volume of retail sales
(as a percentage of that in the same period of the previous year)
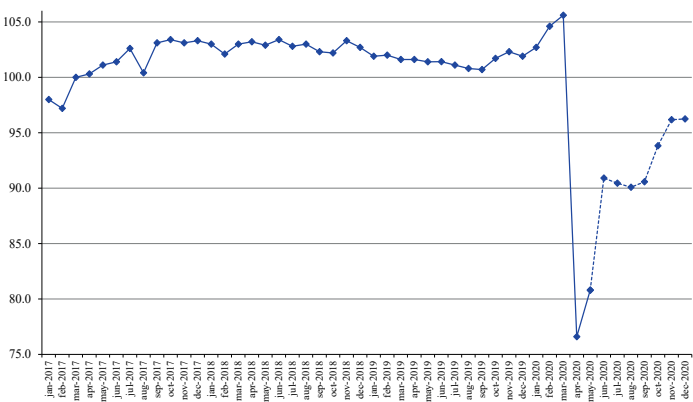
Fig.10. Export to all countries (billion USD)
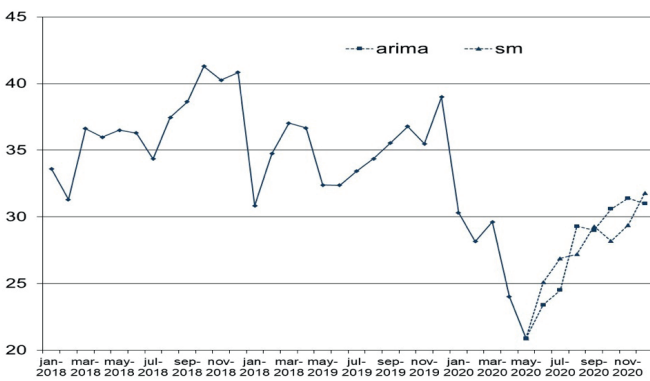
Fig. 11. Export to countries outside the CIS (billion USD)
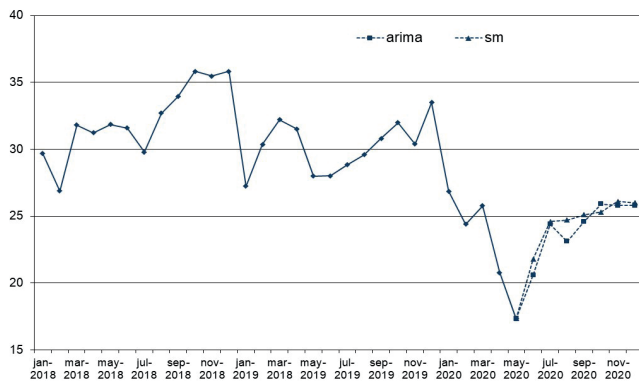
Fig. 12. Import from all countries (billion USD)
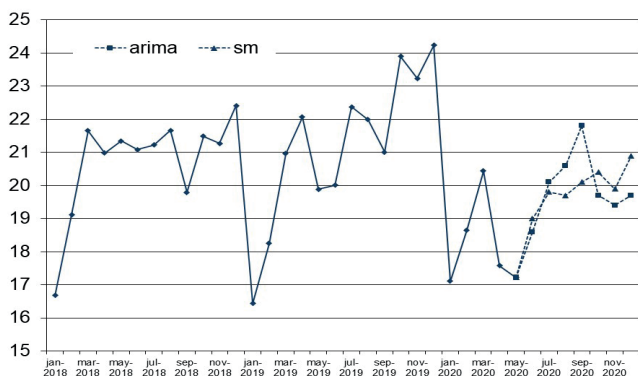
Fig. 13. Import from countries outside the CIS (billion USD)
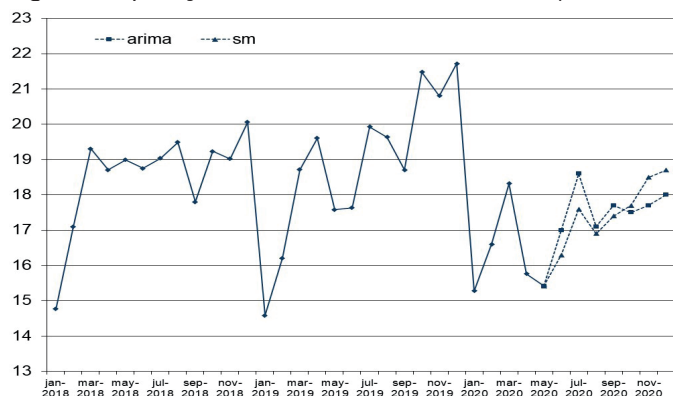
Fig. 14. The consumer price index
(as a percentage of that in December of the previous year)
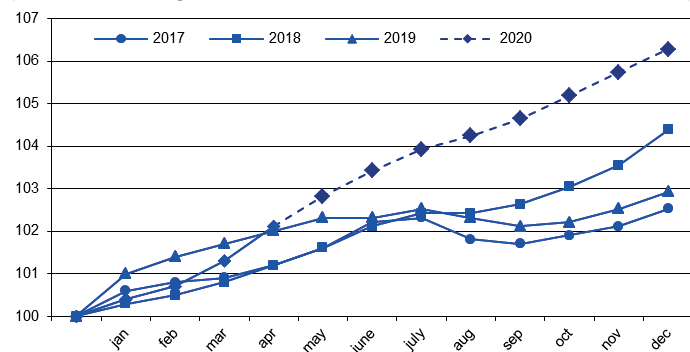
Fig. 14a. The consumer price index
(as a percentage of that in December of the previous year) (SM)

06/ 2020
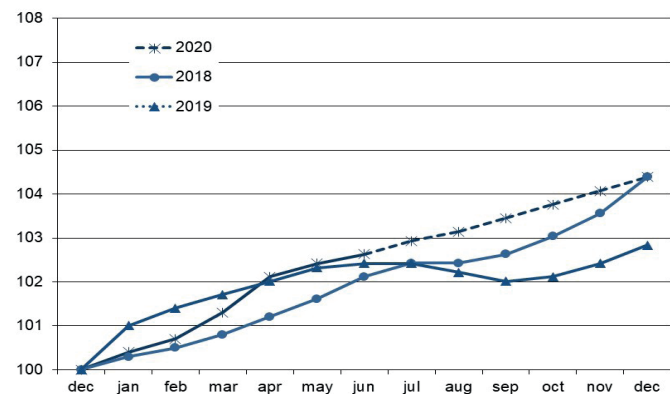
Fig.15. The producer price index for industrial goods
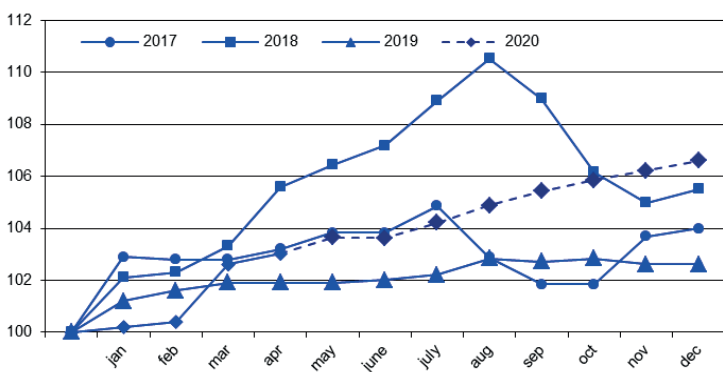*(as a percentage of that in December of the previous year)*
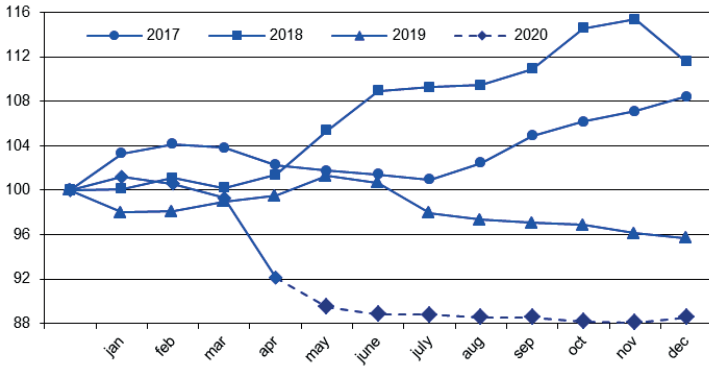
Fig. 16. The price index for mining
(as a percentage of that in December of the previous year)
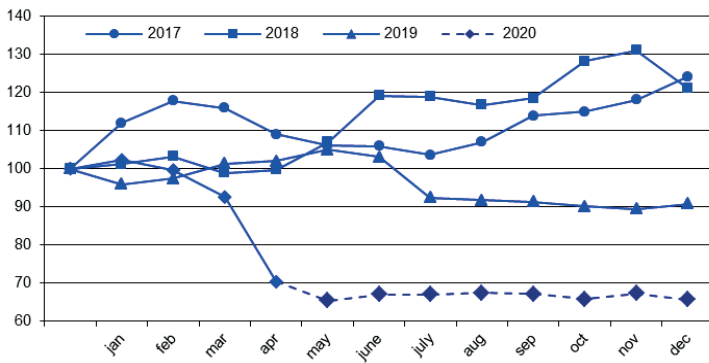
Fig. 17. The price index for manufacturing
(as a percentage of that in December of the previous year)
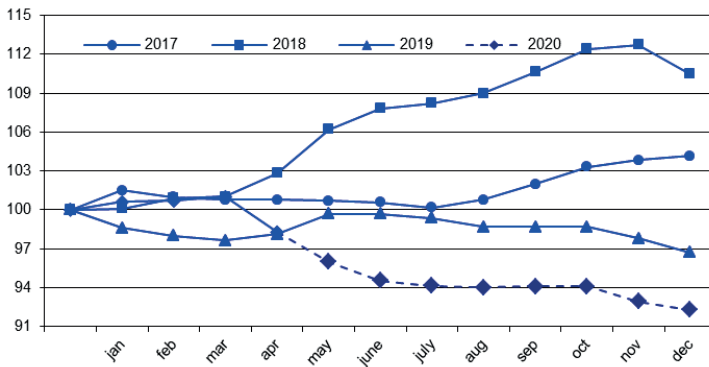
Fig. 18. The price index for utilities (electricity, water, and gas)
(as a percentage of that in December of the previous year)
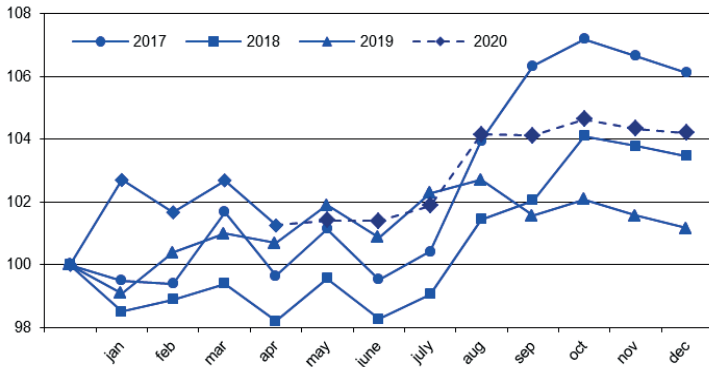
Fig. 19. The price index for food products
(as a percentage of that in December of the previous year)
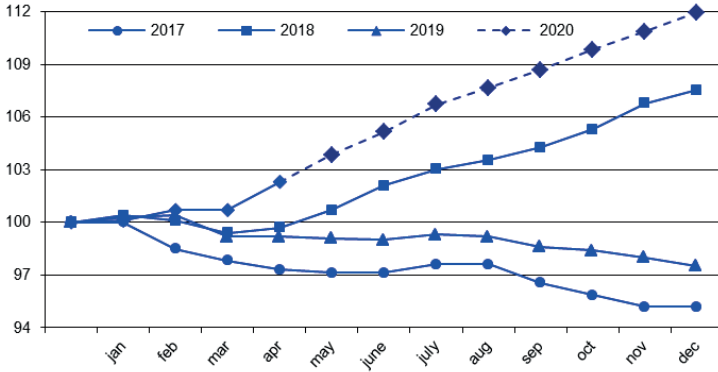
Fig. 20. The price index for the textile and sewing industry
(as a percentage of that in December of the previous year)
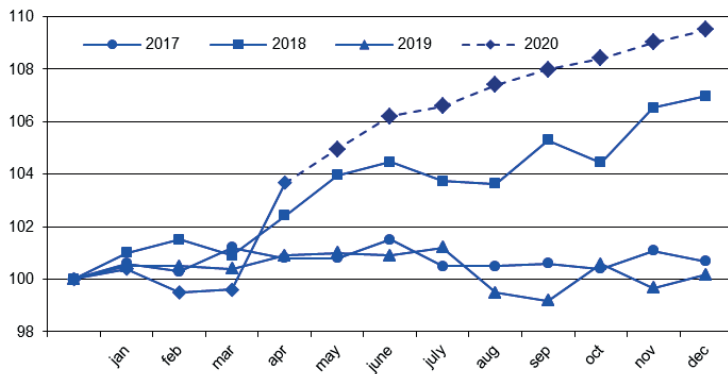
Fig. 21. The price index for wood products
(as a percentage of that in December of the previous year)
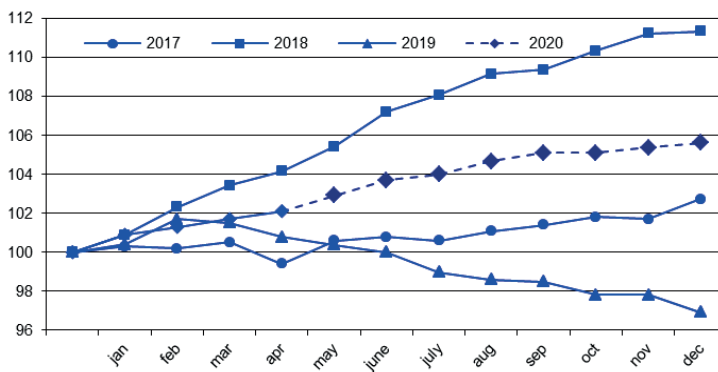
Fig. 22. The price index for the pulp and paper industry
(as a percentage of that in December of the previous year)
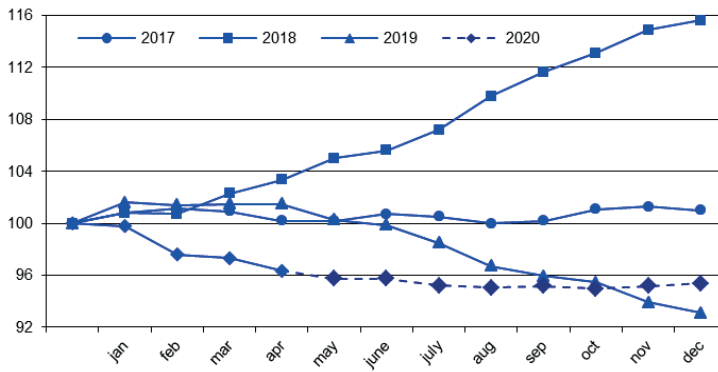
Fig. 23. The price index for coke and petroleum
(as a percentage of that in December of the previous year)
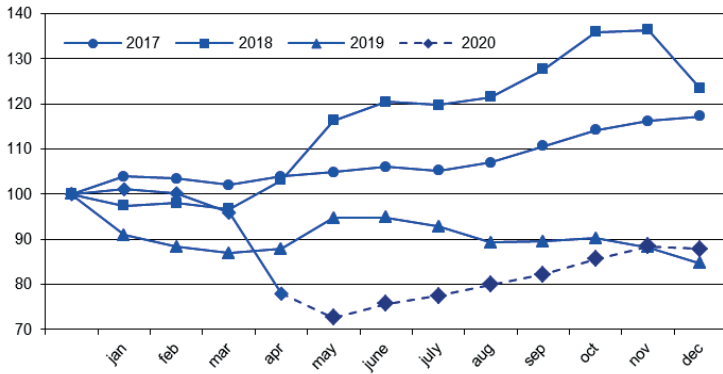
Fig. 24. The price index for the chemical industry
(as a percentage of that in December of the previous year)
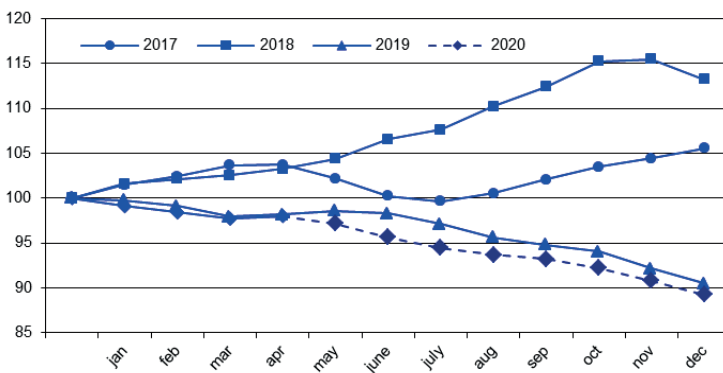
Fig. 25. The price index for primary metals and fabricated metal products
(as a percentage of that in December of the previous year)
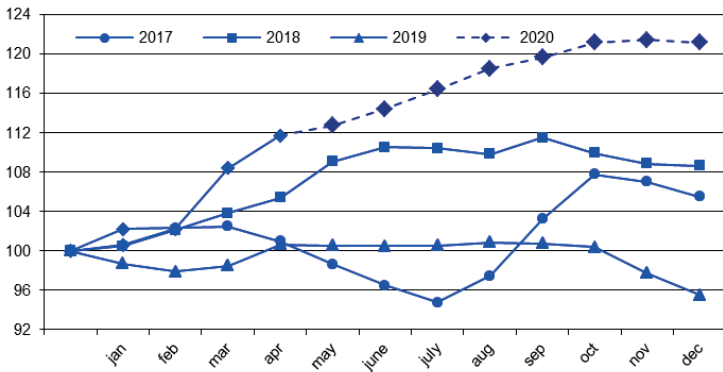
Fig. 26. The price index for machinery
(as a percentage of that in December of the previous year)

Fig. 27. The price index for transport equipment manufacturing (as a percentage of that in December of the previous year)
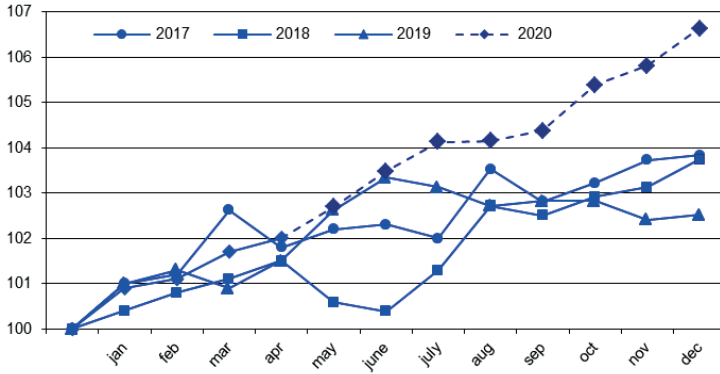
Fig. 28. The cost of the monthly per capita minimum food basket (RUB)
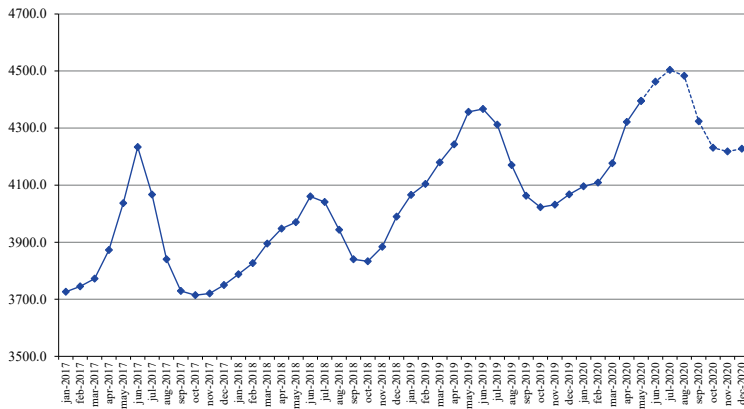
Fig. 29. The composite index of transport tariffs (for each year, as a percentage of that in the previous month)
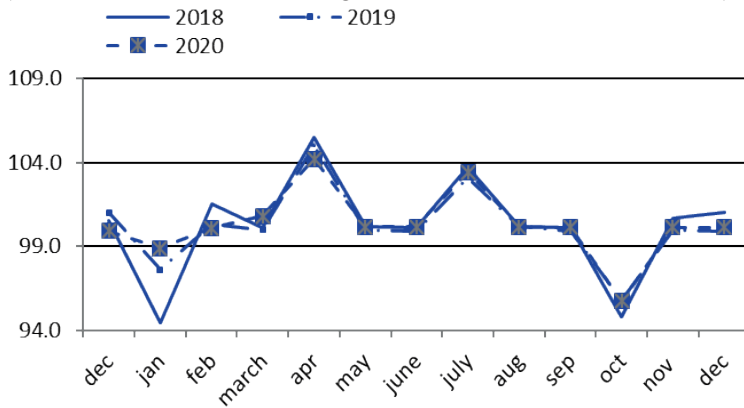
Fig. 30. The index of motor freight tariffs (for each year, as a percentage of that in the previous month)
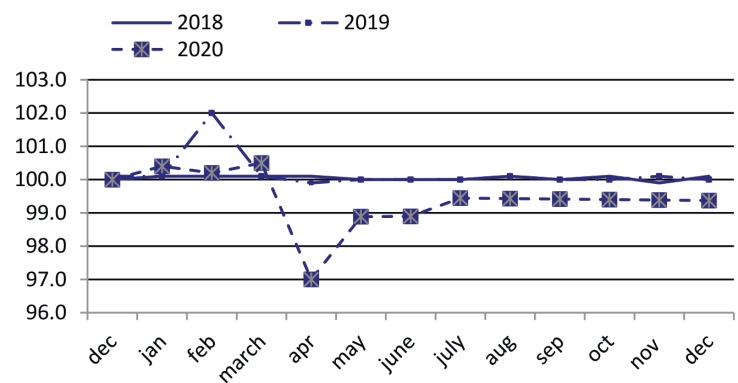
Fig. 31. The index of pipeline tariffs
(for each year, as a percentage of that in the previous month)
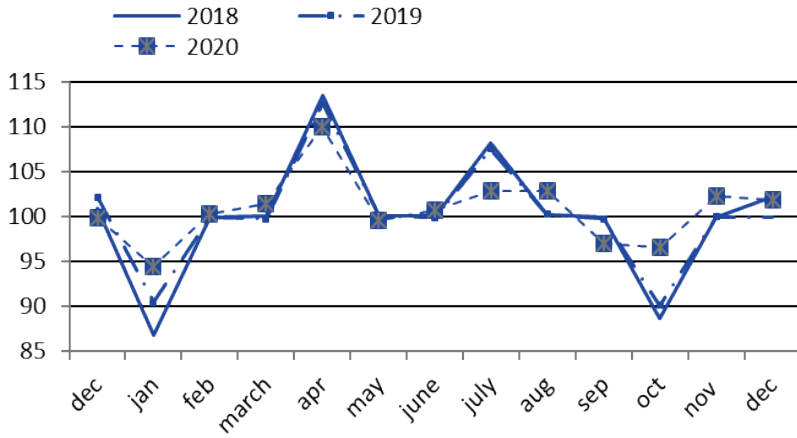
Fig. 32. The Brent oil price ($ per barrel)
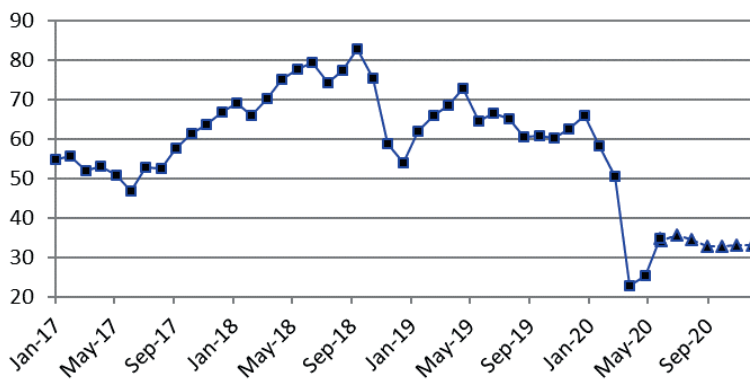
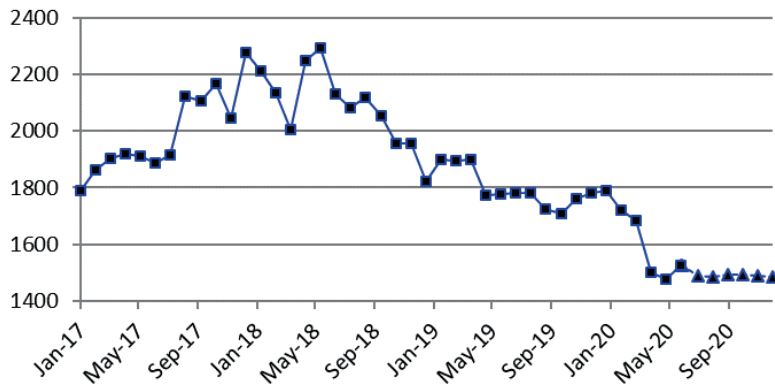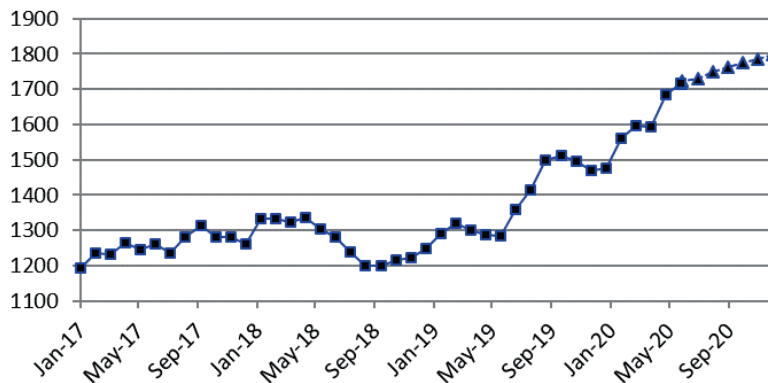*Fig. 33. The aluminum price ($ per ton)*

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

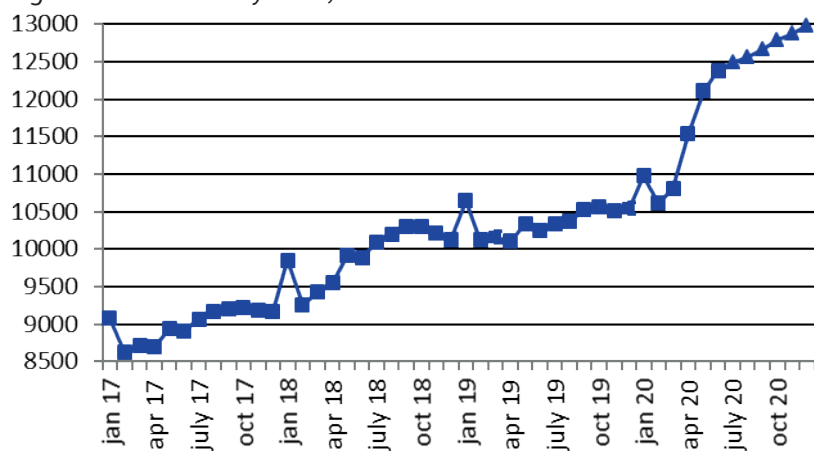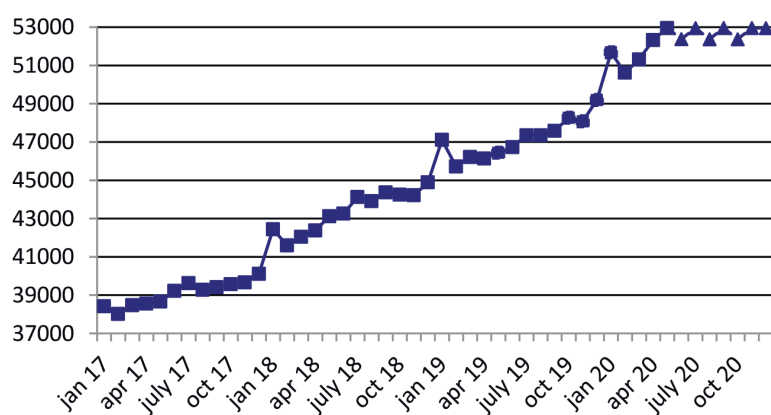*Fig. 38. M_2, billion RUB*

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

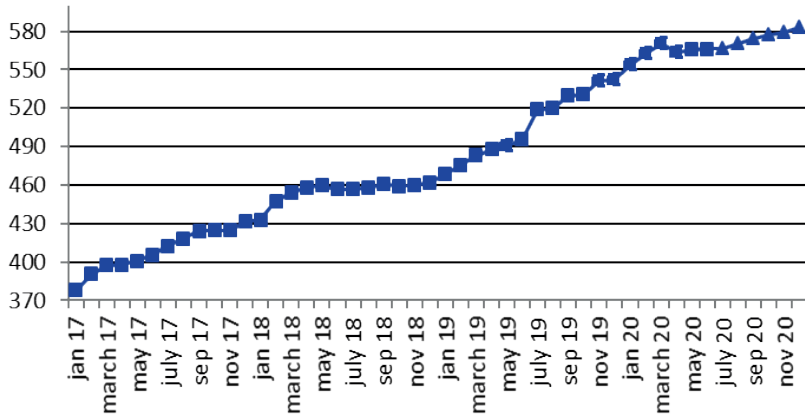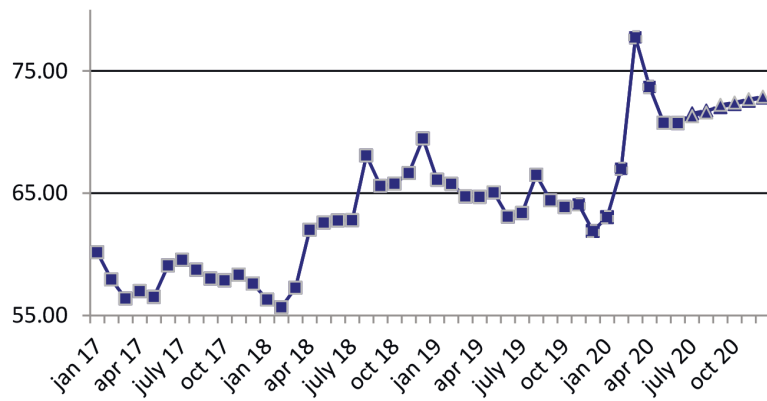*Fig. 40. The RUB/USD exchange rate*

Fig. 41. The USD/EUR exchange rate

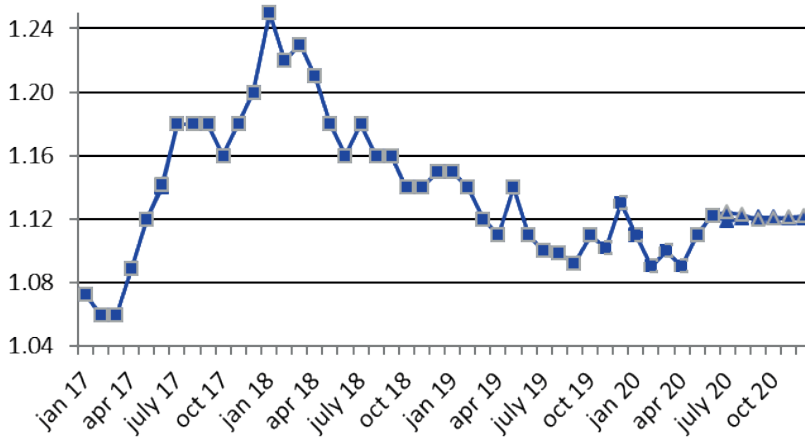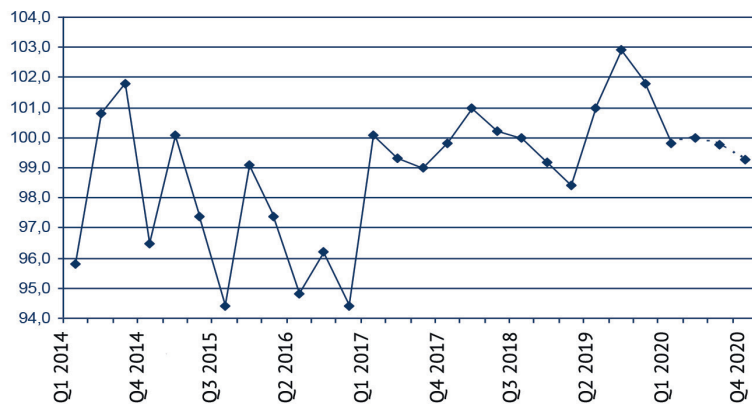*Fig. 42. Real disposable cash income*
(as a percentage of that in the same period of the previous year)

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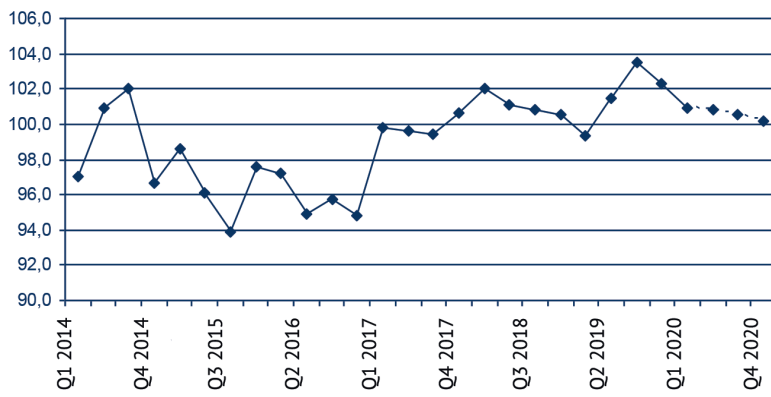

Fig. 44. Real accrued wages
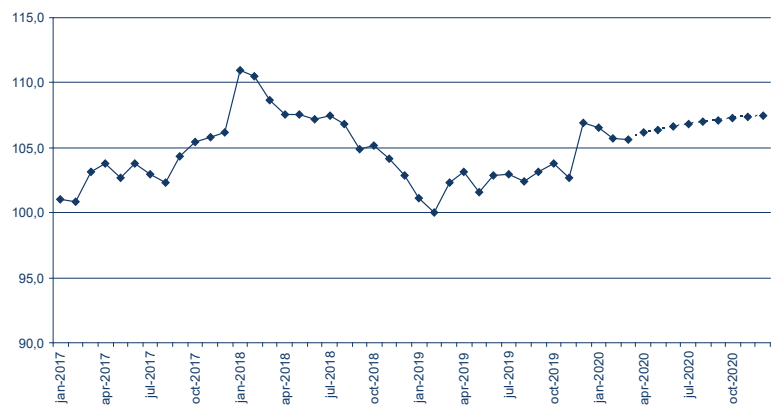*(as a percentage of those in the same period of the previous year)*
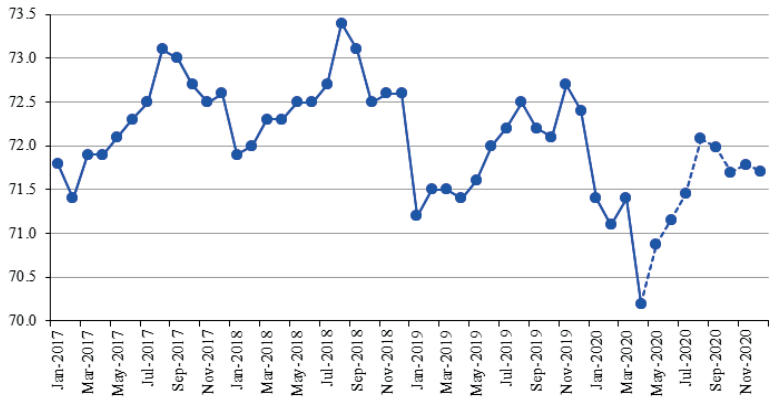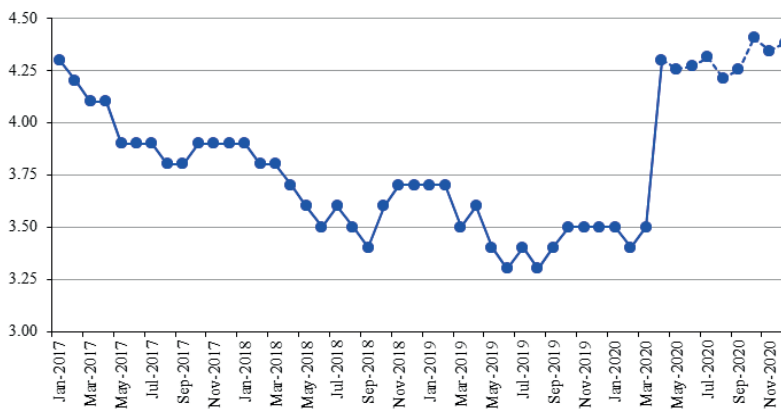

Fig. 45. Employment (million people)

Fig. 46. Unemployment (million people)

Annex 2. Model calculations of short-term forecasts of social and economic indices of the Russian Federation: June 2020

Index	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020	October 2020	November 2020	December 2020
Rosstat IIIP (growth rate, %)*	**-6,6**	-2,2	-2,3	-4,8	-4,0	-3,3	-4,1	-3,1	-2,9
HSE IIP (growth rate %)*	**-5.2**	**-8.9**	-8.8	-7.4	-6.2	-4.5	-4.2	-2.4	-1.7
Rosstat IIP for mining (growth rate, %)*	**-3.2**	-2.2	-1.6	-1.6	-2.5	-2.7	-2.4	-2.8	-3.5
HSE IIP for mining (growth rate, %)*	**-2.7**	**-13.3**	-10.5	-13.3	-6.9	-5.8	-0.6	-0.1	-0.9
Rosstat IIIP for manufacturing (growth rate, %)*	**-10.0**	-1.4	-3.4	-4.5	-4.7	-4.3	-6.9	-2.1	-3.8
HSE IIP for manufacturing (growth rate, %)*	**-8.0**	**-5.3**	-0.6	-3.1	-2.7	-2.3	-3.6	1.6	-0.4
Rosstat IIP for utilities (electricity, water, and gas) (growth rate, %)*	**-1.9**	-0.4	-0.7	-1.3	-0.4	0.2	1.1	-0.5	2.7
HSE for utilities (electricity, water, and gas) (growth rate, %)*	**-0.9**	**-2.7**	-0.2	0.8	1.0	-0.3	1.1	-1.6	0.6
Rosstat IIP for food products (growth rate, %)*	**3.7**	4.6	6.4	2.7	4.3	2.9	3.8	3.6	3.8
HSE IIP for food products (growth rate, %)*	**4.3**	**5.4**	5.9	4.1	3.5	2.5	1.8	4.1	4.8
Rosstat IIP for coke and petroleum (growth rate, %)*	**0.7**	3.2	-0.7	-4.7	-3.7	-1.0	-4.5	-4.5	-7.7
HSE for coke and petroleum (growth rate, %)*	**-5.5**	-7.6	-4.3	-6.0	-5.7	-4.6	-6.6	-3.8	-2.6
Rosstat for primary metals and fabricated metal products (growth rate, %)*	**-7.1**	-8.6	-10.1	-8.8	-14.5	-9.3	-9.7	-0.3	-0.5
HSE IIP for primary metals and fabricated metal products (growth rate, %)*	**-7.1**	**-9.6**	-9.8	-7.9	-12.2	-9.8	-9.6	-4.9	-8.9
Rosstat IIP for machinery (growth rate, %)*	**-12.0**	-2.8	-8.8	4.4	1.1	-2.8	-6.3	-10.7	-14.6
HSE IIP for machinery (growth rate %)*	**3.6**	**18.8**	3.1	0.4	-1.9	-6.6	-0.5	-4.0	-7.6
Retail sales, trillion Rb	**2.10**	**2.26**	2.50	2.62	2.79	2.74	2.82	2.87	3.44
Real retail sales (growth rate, %)*	**-23.4**	**-19.2**	-9.1	-9.6	-9.9	-9.4	-6.2	-3.8	-3.8
Export to all countries (billion $)	**24.0**	**20.9**	24.3	25.7	28.3	29.2	29.4	30.4	31.4
Export to countries outside the CIS (billion $)	**20.8**	**17.3**	21.2	24.5	23.9	24.9	25.6	26.0	25.9
Import from all countries (billion $)	**17.6**	**17.2**	18.8	20.0	20.2	21.0	20.1	19.7	20.3
Import from countries outside the CIS (billion $)	**15.8**	**15.4**	16.7	18.1	17.0	17.6	17.6	18.1	18.4
CPI (growth rate, %)**	**0.8**	0.6	0.4	0.4	0.3	0.4	0.4	0.4	0.5
PPI for industrial goods (growth rate, %)**	**-7.2**	-2.7	-0.7	0.2	0.3	0.3	0.2	0.2	0.3
PPI for mining (growth rate, %)**	**-24.0**	-7.1	2.6	0.0	0.6	-0.5	-2.0	2.4	-2.4
PPI for manufacturing (growth rate, %)**	**-2.7**	-2.3	-1.5	-0.4	-0.1	0.1	0.0	-1.3	-0.7
PPI for utilities (electricity, water, and gas) (growth rate, %)**	**-1.4**	0.2	0.0	0.5	2.2	0.0	0.5	-0.3	-0.1
PPI for food products (growth rate, %)**	**1.6**	1.5	1.3	1.5	0.9	1.0	1.1	0.9	1.0
PPI for the textile and sewing industry (growth rate, %)**	**4.1**	1.2	1.2	0.4	0.8	0.5	0.4	0.6	0.4

Index	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020	October 2020	November 2020	December 2020
PPI for wood products (growth rate, %)**	**0.4**	0.8	0.8	0.3	0.7	0.4	0.0	0.3	0.2
PPI for the pulp and paper industry (growth rate, %)**	**-1.0**	-0.6	0.0	-0.5	-0.2	0.2	-0.2	0.2	0.2
PPI for coke and petroleum (growth rate, %)**	**-18.7**	-6.8	4.1	2.4	3.2	2.9	4.1	3.3	-0.6
PPI for the chemical industry (growth rate, %)**	**0.3**	-0.8	-1.6	-1.3	-0.8	-0.5	-1.1	-1.5	-1.7
PPI for primary metals and fabricated metal products (growth rate, %)**	**3.0**	1.0	1.5	1.7	1.8	0.9	1.2	0.2	-0.2
PPI for machinery (growth rate, %)**	**0.4**	0.6	0.0	0.6	0.6	0.5	0.4	0.3	0.4
PPI for transport equipment manufacturing (growth rate, %)**	**0.3**	0.7	0.8	0.6	0.0	0.2	1.0	0.4	0.8
The cost of the monthly per capita minimum food basket (thousand Rb)	**4.32**	**4.39**	4.46	4.50	4.48	4.32	4.23	4.22	4.23
The composite index of transportation tariffs (growth rate, %)**	**-3.0**	-1.1	-1.1	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
The index of pipeline tariffs (growth rate, %)**	**10.1**	-0.5	0.8	2.8	2.9	-3.0	-3.4	2.3	1.8
The index of motor freight tariffs (growth rate, %)**	**4.2**	0.2	0.2	3.4	0.1	0.1	-4.3	0.1	0.1
The Brent oil price ($ a barrel)	**25.3**	**34.9**	34.2	35.5	34.3	32.6	32.8	32.9	33.1
The aluminum price (thousand $ a ton)	**1.48**	**1.52**	1.52	1.49	1.48	1.49	1.49	1.49	1.49
The gold price (thousand $ per ounce)	**1.68**	**1.72**	1.72	1.73	1.75	1.76	1.77	1.79	1.80
The nickel price (thousand $ a ton)	**5.19**	**5.38**	5.56	5.57	5.60	5.62	5.65	5.68	5.71
The copper price (thousand $ a ton)	**12.1**	**12.4**	12.4	12.4	12.4	12.4	12.5	12.5	12.5
The monetary base (trillion Rb)	**11.5**	**12.1**	**12.4**	12.5	12.6	12.7	12.8	12.9	13.0
M2 (trillion Rb)	**52.3**	**53.0**	52.4	53.0	52.4	53.0	52.4	53.0	53.0
Gold and foreign exchange reserves (billion $)	**0.56**	**0.57**	**0.57**	0.57	0.57	0.57	0.58	0.58	0.58
The RUR/USD exchange rate (rubles per one USD)	**73.69**	**70.75**	**70.73**	71.42	71.69	72.14	72.36	72.63	72.86
The USD/EUR exchange rate (USD per one Euro)	**1.09**	**1.11**	**1.12**	1.12	1.12	1.12	1.12	1.12	1.12
Real accrued wages (growth rate, %)*	6.2	6.4	6.6	6.8	7.0	7.1	7.2	7.3	7.5
Employment (million people)	**70.2**	70.9	71.2	71.4	72.1	72.0	71.7	71.8	71.7
Unemployment (million people)	**4.3**	4.3	4.3	4.4	4.4	4.4	4.4	4.3	4.4

Note. Actual values are printed in the bold type
    * % of the respective month of the previous year
    ** % of the previous month.