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

02/2021

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INTRODUCTION TO ALL THE ISSUES

This paper presents calculations by researchers at the Gaidar Institute[1] of economic indicators derived from time series models for the period *over March to August of 2021*[2]. The forecasting method belongs to the group of *formal* or *statistical* methods. In other words, the calculated values neither express the *opinion* nor the *expert evaluation* of the researcher, but rather, they are calculations of future values for a specific economic indicator derived by formal ARIMA(*p, d, q*)-models, given a prevailing trend and divergences, in some cases, by a significant amount. The forecasts here are inertial in nature because the 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 forecasted time horizon. These calculations of future values of economic indicators for the Russian Federation can be used in making economic policy decisions, provided that the general trends that were observed prior to forecasting for each 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 deteriorated where 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 in 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, calculated using models developed at the Gaidar Institute and volumes of import/export estimates between all countries, calculated using structural models (SM). Forecast values based on structural models may, in some cases, produce better results than ARIMA-models do, because structural models are constructed by adding 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.

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[1]   See, for example, R.M. Entov, S.M. Drobyshevsky, V.P. Nosko, A.D. Yudin. *The Econometric Analysis of the Time Series of the Main Macroeconomic 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.

[2]   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.

[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.

The dynamic Consumer Price Index was modeled using theoretical assumptions arising from monetary theory. The following were 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 manufacturers' costs rely heavily on this indicator.

The baseline indicator 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 the most significant factor determining the dynamics of exports: a higher price leads to greater exports. 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 – captured seasonal fluctuations. In regard to imports, an increase in personal and corporate incomes triggers higher demand for all goods, including imported ones. Real disposable cash income reflects personal income; the Industrial Production Index reflects corporate income.

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

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

The paper also estimates values of the Industrial Production Index, the Producer Price Index and the Total Unemployment Index using Gaidar Institute business survey responses. Empirical studies show[1] that the use of business surveys as explanatory variables [2] in forecasting models can make forecasting more accurate on 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.

INDUSTRIAL PRODUCTION AND RETAIL SALES

Industrial production
The forecast for March to August 2021 is based on monthly indexes of industrial production by the Federal State Statistics Service (Rosstat) from January 2002 to December 2020, and on base indexes of industrial production by the National Research University Higher School of Economics (NRU HSE[3]) over the period from January 2010 to January 2021 (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 forecasts by Rosstat and the NRU HSE industrial production indexes are calculated using business surveys (BS) as well. The results are shown in Table 1.

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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.
[3]   The indexes in question are calculated by E.F. Baranov and V.A. Bessonov.

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Table 1
Calculations of forecast values of the industrial production indexes¹ (%)

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																		
Mar 21	-2.6	-0.7	-3.8	0.9	-8.4	-5.8	0.4	0.0	4.2	6.4	-0.6	0.5	-9.3	-7.0	-5.5	-5.4	6.6	12.4
Apr 21	3.5	3.6	2.1	5.9	-8.4	-9.7	10.8	4.8	1.9	3.2	0.9	1.4	-4.0	1.4	-2.0	-1.5	12.3	10.0
May 21	3.7	9.9	3.5	14.8	5.2	2.3	9.8	8.3	4.5	6.3	3.9	2.0	5.4	8.9	-1.0	-1.2	7.3	8.5
Jun 21	3.6	6.5	2.4	11.0	5.3	2.5	7.6	1.9	4.4	7.2	2.7	2.5	7.3	3.6	-2.2	-2.7	-4.7	-0.9
Jul 21	3.5	4.1	1.3	7.4	5.4	2.3	4.4	0.6	2.1	5.3	3.5	2.8	3.7	0.3	-4.5	-7.0	-4.5	7.6
Aug 21	3.4	4.3	2.4	8.2	2.7	2.1	4.6	0.5	2.6	5.6	3.3	3.0	2.6	-0.3	-2.4	-4.1	0.1	9.4
For reference: actual growth in 2020 on the respective month of 2019																		
Mar 20		2.2		1.5	-0.3	-0.9	5.7	5.4	-3.6	-3.7	8.9	6.7	8.5	7.7	1.8	2.0	9.2	14.5
Apr 20		-4.7		-4.6	-1.1	-1.7	-7.7	-7.6	-1.6	-0.6	3.9	4.3	1.1	-5.5	-6.7	-6.8	-7.8	3.6
May 20		-8.0		-8.6	-12.7	-13.5	-4.6	-4.6	-4.1	-2.9	2.4	4.4	-4.6	-7.6	-8.4	-8.2	-3.3	6.4
Jun 20		-7.3		-8.1	-13.2	-13.8	-3.2	-3.4	-4.3	-3.6	4.7	4.4	-7.7	-6.1	-6.4	-6.4	1.4	20.2
Jul 20		-6.1		-6.0	-14.2	-14.9	-0.3	1.9	-1.8	-2.2	-0.2	1.5	-7.7	-7.3	-0.1	0.5	7.2	32.5
Aug 20		-4.5		-5.7	-10.8	-11.8	0.2	-0.7	-2.7	-3.2	2.2	-0.2	-6.4	-6.1	-7.4	-6.6	11.6	10.1

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.

FOREIGN TRADE INDEXES

As seen in *Table 1*, the Rosstat industrial production index average[1] gain in March-August 2021 compared to the same period of the previous year comes to 3.6% in the industry as a whole. The NRU HSE industrial production index comes to 4.7%. Note quite significant differences between ARIMA forecasts and forecasts built on business surveys' findings for both indexes.

The average monthly gain in the Rosstat and the NRU HSE industrial production indexes for mining and quarrying amounts to 0.3% and (-1.1%) respectively in March-August 2021.

The average gain in the Rosstat industrial production index for manufacturing industry in March-August 2021 amounts to 6.2% compared to the same period of the previous year and the NRU HSE industrial production index for manufacturing industry comes to 2.7%. The average monthly gain in the industrial production index for production of food products will average 2.3% and 2.0% for the Rosstat and the NRU HSE indexes, respectively. The production of coke and petroleum products average gain is forecast at 0.9% and 1.2% for the Rosstat and the NRU HSE indexes, respectively. The average monthly change in the industrial production index for primary metals and fabricated metal products for March-August 2021 computed by Rosstat and the NRU HSE constitutes (-2.9%) and (-3.7%), respectively. Manufacturing of machinery and equipment is forecast to average at 2.9% and 7.8% 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 for March-August 2021 constitutes 3.3% in comparison with the same period of the previous year; the same indicator for the NRU HSE industrial production index comes to 5.7%.

Retail Sales

This section (Table 2) presents forecasts of monthly retail sales made on the basis of monthly Rosstat data over January 1999 to January 2021.

As seen from *Table 2,* the average forecast gain in the monthly turnover for March-August 2021 against the corresponding period of 2020 amounts to around 19.5%.

The average forecast gain in the monthly real turnover for the period March-August 2021 compared to the same period of 2020 constitutes 14.8%.

Table 2

Calculations of forecast values of retail sales and real retail sales

Month	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 respective period of the previous year)
Mar 21	3037.8 (4.1)	99.3
Apr 21	2988.4 (40.6)	135.2
May 21	3039.2 (33.7)	129.3
Jun 21	3117.1 (18.0)	115.8
Jul 21	3253.2 (12.7)	104.4
Aug 21	3207.9 (8.2)	105.0
For reference: actual values in the same months of 2020		
Mar 20	2917.5	105.7
Apr 20	2125.3	77.4
May 20	2273.6	81.4
Jun 20	2642.5	92.9
Jul 20	2886.7	98.9
Aug 20	2965.0	98.2

Note. The series of retail sales and real retail sales over January 1999 – January 2021.

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 Septem-ber 1998 to January 2021 on the basis of the data released by the Central Bank of Russia.[2] 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 grow on average by 32.8%, 10.1%, 35.5% and 12.2%, respectively for March-August 2021 against March-August 2020. The average forecast trade balance volume with all countries for March-August 2021 will total $71.1 bn, which corresponds to a twofold increase against March-August 2020.

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[1] Average growth of industrial production indexes is the average value of these indexes for six months under review.

[2] The data on the foreign trade turnover are calculated by the CBR in accord with the methods used to derive the balance of payment in prices of the exporter-country (FOB) in billion USD.

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
Mar 21	32.4	33.2	108	111	19.7	21.7	96	106	27.4	28.3	106	109	18.0	19.1	98	104
Apr 21	32.5	33.8	130	135	20.4	22.4	116	127	27.0	29.0	125	135	18.6	20.4	118	130
May 21	30.5	31.6	145	151	20.1	20.5	117	119	27.1	27.7	155	159	18.4	18.2	119	118
Jun 21	32.8	31.7	134	129	20.7	21.0	108	110	27.4	27.9	135	138	19.2	18.6	113	109
Jul 21	32.6	33.3	133	136	21.5	20.8	109	106	27.6	29.1	136	143	19.5	18.9	111	108
Aug 21	33.7	35.4	146	153	22.0	20.5	110	103	28.1	30.7	147	161	20.2	19.4	114	109
For reference: actual values in respective months of 2020 (billion USD)																
Mar 20		30.0				20.5				25.9				18.3		
Apr 20		25.0				17.6				21.5				15.7		
May 20		21.0				17.2				17.4				15.4		
Jun 20		24.5				19.1				20.3				17.0		
Jul 20		24.6				19.7				20.3				17.6		
Aug 20		23.2				20.0				19.1				17.8		

Note. Over the period from January 1999 to January 2021, 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)																		
Mar 21	100.7	100.7	100.5	99.6	100.6	100.6	103.4	101.0	100.5	101.2	100.5	100.9	101.2	101.5	101.7	100.6	100.7	100.4
Apr 21	100.8	100.5	100.4	99.1	100.4	100.4	101.0	100.9	99.0	100.9	100.5	100.7	100.9	101.8	100.9	100.0	100.4	101.0
May 21	100.6	100.4	100.0	100.0	100.3	100.4	101.8	100.9	99.9	100.8	100.3	101.1	100.8	101.5	100.8	100.2	100.2	100.7
Jun 21	100.6	100.3	100.4	100.4	100.0	100.6	101.5	101.4	99.9	100.9	100.5	100.6	101.0	101.7	100.8	100.5	100.1	100.6
Jul 21	100.7	100.3	100.4	100.0	99.3	100.6	102.6	101.6	101.0	101.2	100.4	100.7	100.9	101.8	101.3	100.7	100.6	101.0
Aug 21	100.2	100.0	100.4	99.6	99.4	100.6	101.8	101.0	103.9	100.6	100.4	100.6	100.8	101.7	100.8	101.0	100.5	99.8
Forecast values (% of December 2020)																		
Mar 21	102.6	102.2	101,7	99.2	106.8	101.8	103.9	104.0	102.9	104.1	101.4	104.0	103.5	101.3	105.7	104.4	102.0	101.4
Apr 21	103.4	102.7	102,1	98.3	107.2	1102.2	105.0	104.9	101.9	105.1	101.9	104.7	104.4	103.1	106.7	104.4	102.3	102.4
May 21	104.0	103.1	102,5	98.3	107.5	102.6	106.8	105.9	101.8	105.9	102.2	105.8	105.2	104.7	107.6	104.6	102.6	103.1
Jun 21	104.7	103.5	102,9	98.7	107.5	103.2	108.4	107.3	101.7	106.8	102.6	106.5	106.2	106.5	108.4	105.1	102.7	103.7
Jul 21	105.3	103.8	103,3	98.7	106.8	103.9	111.1	109.1	102.7	108.1	103.0	107.2	107.2	108.4	109.8	105.9	103.3	104.8
Aug 21	105.5	103.8	103,8	98.3	106.2	104.5	113.1	110.2	106.7	108.8	103.5	107.9	108.1	110.3	110.7	107.0	103.8	104.6
For reference: actual values in the same periods of 2020 (% of December 2019)																		
Mar 20		101.3			99.3		92.6	101.0	102.7	100.7	99.6	101.7	97.3	95.9	97.7	108.4	102.6	101.7
Apr 20		102.1			92.1		70.3	98.3	101.3	102.3	103.7	102.1	96.3	78.0	98.0	111.7	103.0	102.0
May 20		102.4			89.6		60.2	98.0	101.2	102.9	104.7	103.2	96.8	76.5	96.7	108.8	102.8	103.7
Jun 20		102.6			95.0		79.7	99.5	100.0	103.6	105.2	102.5	98.1	88.7	95.0	104.6	102.0	105.5
Jul 20		103.0			99.1		91.2	101.2	102.5	105.2	104.9	103.0	99.2	96.4	95.4	103.0	103.4	104.8
Aug 20		103.0			100.1		92.2	101.9	106.0	106.1	104.5	103.3	99.4	95.2	96.9	106.6	104.2	106.9

Note. Over the period from January 1999 to January 2021, 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.

PRICE DYNAMICS

The Consumer and Producer Price Indexes
This section presents estimates of forecast values of the consumer and producer price indexes (including both the industry in general and some branch activities under the National Industry Classification Standard (NICS)) derived from time-series models from Rosstat data for the period from January 1999 to January 2021.[1] Table 4 presents the results of model calculations of forecast values from March to August of 2021 by 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 March-August 2021 will come to 0.5%. The producer price index for industrial goods for the same period is forecast to grow on average at 0.1% per month.

The producer price indexes are forecast to gain at an average monthly rate for March-August 2021: for mining and quarrying 2.0%, for manufacturing 1.1%, for utilities (electricity, gas, and water) 0.7%, for food products 0.9%, for the textile and sewing industry 0.4%, for wood products 0.8%, for pulp and paper industry 0.9%, for coke and refined petroleum 1.7%, for the chemical industry 1.1%, for primary metals and fabricated metal products 0.5%, for machinery and equipment 0.4%, and for transport equipment manufacturing 0.6%.

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 March to August of 2021. The forecasts were estimated by time series from Rosstat data for January 2000 to January 2021. The results are presented in Table 5.

As can be seen from *Table 5* the cost of per capita minimum food basket is forecast to grow compared to the corresponding level of the previous year. At the same time, the cost of per capita minimum food basket is forecast to average around RUB 4,684.1. The cost of per capita minimum food basket is forecast to grow on average at around 7.1% against the same period of last year.

Indexes of Freight Rates
This section presents calculations of forecast values of freight tariff indexes on cargo carriage,[2] made on the basis of time-series models evaluated on the Rosstat data over the period from September 1998 to December 2020. Table 6 shows the results of model calculations of forecast values in the March to August of 2021. 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.

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

Month	Forecast values according to ARIMA-model (RUB)
Mar 21	4570.2
Apr 21	4645.9
May 21	4687.9
Jun 21	4748.5
Jul 21	4751.2
Aug 21	4700.9
For reference: actual values in the same months of 2020 (billion RUB)	
Mar 20	4176.9
Apr 20	4321.4
May 20	4394.9
Jun 20	4507.6
Jul 20	4494.2
Aug 20	4364.9
Expected growth on the respective month of the previous year (%)	
Mar 21	9.4
Apr 21	7.5
May 21	6.7
Jun 21	5.3
Jul 21	5.7
Aug 21	7.7

Note. The series of the cost of the monthly per capita minimum food basket over the period from January 2000 January 2021 are stationary in the first differences.

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[1]   Structural models were evaluated in the period from October 1998.
[2]   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).

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)			
Mar 21	99.9	99.6	101.2
Apr 21	103.6	99.6	105.0
May 21	99.9	99.6	101.1
Jun 21	99.8	99.6	101.3
Jul 21	102.9	99.6	101.0
Aug 21	99.8	99.6	100.7
Forecast values according to ARIMA-models (% of December of the previous year)			
Mar 21	99.6	100.6	95.8
Apr 21	103.3	100.2	100.6
May 21	103.1	99.9	101.8
Jun 21	102.9	99.5	103.1
Jul 21	105.9	99.1	104.1
Aug 21	105.7	98.7	104.9
For reference: actual values in the same period of 2020 (% of the previous month)			
Mar 20	100.8	100.5	101.4
Apr 20	104.2	97.0	110.1
May 20	99.8	99.9	99.5
Jun 20	99.9	99.9	99.9
Jul 20	99.7	100.1	99.3
Aug 20	100.0	98.6	100.3

Note. Over the period from September 1998 to December 2020, the freight tariffs indexes were identified as stationary; the other series were identified as stationary over the period from September 1998 to December 2020, too; fictitious variables for taking into account particularly dramatic fluctuations were applied to all series.

Table 7
Estimates of forecast values of world prices of natural resources

Month	Brent oil ($ per barrel)	Aluminum ($ per ton)	Gold ($ per ounce)	Copper ($ per ton)	Nickel ($ per ton)
Forecast values					
Mar 21	52.58	2017	1884	7888	18572
Apr 21	52.69	1973	1889	7930	18582
May 21	53.36	1979	1899	7972	18730
Jun 21	53.87	2004	1914	8010	18694
Jul 21	54.11	1995	1926	8053	18673
Aug 21	54.15	1991	1940	8095	18614
Expected growth on the respective month of the previous year (%)					
Mar 21	131.2	34.3	18.4	60.1	61.9
Apr 21	108.5	33.6	12.2	52.9	53.2
May 21	52.9	29.8	10.6	48.1	51.4
Jun 21	30.8	26.6	10.5	32.6	46.1
Jul 21	25.3	18.6	4.5	26.3	35.7
Aug 21	20.1	12.4	-1.4	21.3	21.4
For reference: actual values in the same period of 2020					
Mar 20	22.74	1502	1592	4927	11470
Apr 20	25.27	1478	1683	5186	12133
May 20	34.89	1524	1716	5382	12375
Jun 20	41.18	1583	1732	6039	12798
Jul 20	43.2	1683	1843	6378	13763
Aug 20	45.10	1772	1969	6676	15328

Note. Over the period from January 1980 to January 2021, the series of prices of crude oil, nickel, gold, copper, and aluminum are series of DS type.

According to the forecast findings for March-August 2021, the composite index of transport tariffs on freight carriage will be growing at an average monthly rate of 1.0%. In April 2021, the seasonal growth in the index is expected at 3.6 p.p., and in July – at 2.9 p.p. The index of motor freight tariffs will be decreasing during these six months at an average monthly rate of -0.4%.

The index of pipeline tariffs will be growing during the next six months at an average monthly rate of 1.7%. In April 2021, the seasonal growth in the index is expected at 5.0 p.p. and in July – at 1.0 p.p.

World Prices of Natural Resources

This section presents estimates of average monthly values of Brent crude prices (US$ per barrel), aluminum prices (US$ per ton), gold prices ($ per ounce), copper prices (US$ per ton), and nickel prices (US$ per ton) over March to August 2021 as were received on the basis of nonlinear models of time series evaluated on the basis of IMF data over the period from January 1980 to January 2021.

The crude oil price is forecast to average around $53.5 per barrel, which is above its corresponding year-earlier indexes on average by 61.5%. The aluminum prices are forecast to average around $1,993 per ton and their average forecast gain constitutes around 29% compared to the same level of last year. The gold price is forecast to average $1,909 per ounce. The copper price is forecast to average $7,991 per ton, and prices for nickel – around $18,644 per ton. The average forecast price gain for gold comes to around 9%, of copper – 40%, of nickel – 45% against the corresponding level of last year.

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 March to August 2021 were derived from models of time-series of respective indexes calculated by the CBR[1] in the period from October 1998 to February 2021 for the monetary base and to January 2021 for M_2 monetary aggregate. Table 8 presents the results of calculations of forecast values and actual values of those indexes in the same period of the previous year. It is to be noted that due to the fact that the monetary base is an instrument of the 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 March-August 2021, the monetary base in the period under review will be growing at an average monthly rate of 0.9%. In the period under review, the M_2 monetary index will not change much.

INTERNATIONAL RESERVES

This section presents the outputs of the statistical estimation of future values of the international reserves of the Russian Federation[2] as derived from time series modeling of gold and foreign exchange reserves from data released by the CBR over the period from October 1998 to February of 2021. 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 be overestimated (or otherwise underestimated) as compared to actual values.

Subsequent to the forecast findings for March-August 2021, international reserves will be growing at an average monthly rate of 0.3%.

FOREIGN EXCHANGE RATES

The model calculations of prospective values of foreign exchange rates (RUB per USD and USD per euro) were derived from time series models (ARIMA) and structural

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, %
Mar 21	13741	1.1	58674	0.5
Apr 21	13824	0.6	58355	-0.5
May 21	13979	1.1	58674	0.5
Jun 21	14062	0.6	58355	-0.5
Jul 21	14218	1.1	58674	0.5
Aug 21	14303	0.6	58355	-0.5
For reference: actual value in the respective months of 2020 (growth on the previous month, %)				
Mar 20	1.9		1.4	
Apr 20	6.7		2.0	
May 20	5.0		1.2	
Jun 20	2.2		0.2	
Jul 20	3.3		2.5	
Aug 20	1.6		0.5	

Note. Over the period from October 1998 to February 2021, the time series of the 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 the M_2 monetary aggregate from October 1998 to January 2021 was identified as a stationary series with an explicit seasonal component.

Table 9

The forecast of international reserves of the Russian Federation

Month	Forecast values according to ARIMA-model	
	Billion USD	Growth on the previous month, %
Mar 21	592.6	0.3
Apr 21	591.2	-0.2
May 21	590.4	-0.1
Jun 21	594.6	0.7
Jul 21	598.6	0.7
Aug 21	601.7	0.5
For reference: actual values in the same period of 2020		
Mar 20	570.4	1.4
Apr 20	563.5	-1.2
May 20	566.0	0.5
Jun 20	566.1	0.0
Jul 20	568.9	0.5
Aug 20	591.8	4.0

Note. Over the period from October 1998 to February 2021, 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] Data for a specific month is given, as by the CBR, as of the beginning of the following month.
[2] The volume of the gold and foreign exchange reserves is presented as of the first day of the following month.

LIVING STANDARD INDEXES

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
Mar 21	74.52	75.21	1.21	1.21
Apr 21	74.39	75.19	1.21	1.20
May 21	74.92	75.62	1.21	1.21
Jun 21	75.02	75.70	1.21	1.21
Jul 21	75.41	76.09	1.21	1.21
Aug 21	75.60	76.33	1.21	1.21
For reference: actual values in the similar period of 2020				
Mar 20	77.73		1.10	
Apr 20	73.69		1.09	
May 20	70.75		1.11	
Jun 20	69.95		1.12	
Jul 20	73.36		1.19	
Aug 20	74.64		1.19	

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

Table 11
Forecast of real wages

Month	Real accrued wages
Forecast values according to ARIMA-models (as % to the respective month of 2020)	
Mar 21	104.8
Apr 21	104.9
May 21	105.0
Jun 21	105.0
Jul 21	105.0
Aug 21	105.1
For reference: actual values in the respective period of 2020 (as % to the same period of 2019)	
Mar 20	105.9
Apr 20	98.0
May 20	101.0
Jun 20	100.6
Jul 20	102.9
Aug 20	100.1

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

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 February 2021and from February 1999 to February 2021,[1] respectively.

In March-August 2021, USD/RUB average exchange rate is forecast according to two models at RUB 75.33 per USD. Projected Euro/USD exchange rate over the period under review will average USD 1.21 per 1 euro.

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[2] obtained from time series models of respective indexes computed by Rosstat for the period from January 1999 to December 2020, as well as from Q1 2014 to Q4 2020. The above indexes depend to a certain extent on centralized decisions on raising wages and salaries to public sector workers, as well as on raising pensions, scholarships, and allowances; this introduces some change in the dynamics of the indexes under review. Consequently, future values of the indexes of real wages and real disposable cash income that are either considerably higher or lower than the previous ones due to such decisions may differ greatly from those which are implemented in reality.

Table 12
Forecasts of living standard indexes

Period	Real disposable cash income	Real cash income
Forecast values according to ARIMA-models (as % to the corresponding quarter of 2019/2020)		
Q1 2021	100.7	101.7
Q2 2021	91.6	91.7
For reference: actual values for the respective period of 2020 (in % to the same period of 2019)		
Q1 2020	96.7	97.0
Q2 2020	98.2	98.2

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[1]   The Bulletin uses the IMF data related to Euro/USD exchange rate for the period from January 1999 to January 2021, and on USD/RUB exchange rate from October 1998 to January 2021. Data for February 2021 were taken from the exchange rate website www.oanda.com.

[2]   *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*).

The results presented in *Table 11*, project increase in real wages. The average monthly increase in real wages is expected at 5% compared to the same period of the previous year.

The results presented in *Table 12* predict decline in real disposable cash income by around 3.8% per quarter. Also, real cash income is projected to decrease quarterly on average by 3.3% compared to the corresponding last year level.

EMPLOYMENT AND UNEMPLOYMENT

For the purpose of estimating future values of employment (the number of the gainfully employed population) and unemployment (the total number of the unemployed), models of time series, evaluated over the period from October 1998 to December 2020 from monthly data released by Rosstat,[1] were used. Unemployment was also estimated from models with results from responses to business surveys.[2]

Potential logical inconsistencies[3] in forecasts of employment and unemployment, for which totals should be equal to the index of the 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
Mar 21	69.7	-2.3	4.3	23.0	6.2	4.2	20.0	6.0
Apr 21	68.7	-2.2	4.3	0.3	6.3	4.2	-2.3	6.1
May 21	68.6	-2.0	4.3	-5.0	6.2	4.1	-8.9	6.0
Jun 21	68.8	-1.8	4.3	-7.5	6.2	4.1	-10.9	6.0
Jul 21	68.8	-2.0	4.3	-9.4	6.2	4.1	-12.8	6.0
Aug 21	69.1	-2.0	4.2	-12.3	6.1	4.1	-14.6	5.9
For reference: actual values in the same periods of 2019/2020 (million people)								
Mar 20	71.4		3.5					
Apr 20	70.2		4.3					
May 20	70,0		4.5					
Jun 20	70.1		4.6					
Jul 20	70.2		4.7					
Aug 20	70.5		4.8					

Note. Over the period from October 1998 to December 2020, the unemployment series is a stochastic process, which is stationary around the trend. The unemployment series is a stochastic process with first order integration. Both indexes include a seasonal component.

According to ARIMA-model forecast (*Table 13*), in March-August 2021, the decrease in the number of employed in the economy will average 2.1% per month against the corresponding period of the previous year.

The average monthly decline in the total number of unemployed is forecast at 3.4% per month against the same period of last year.

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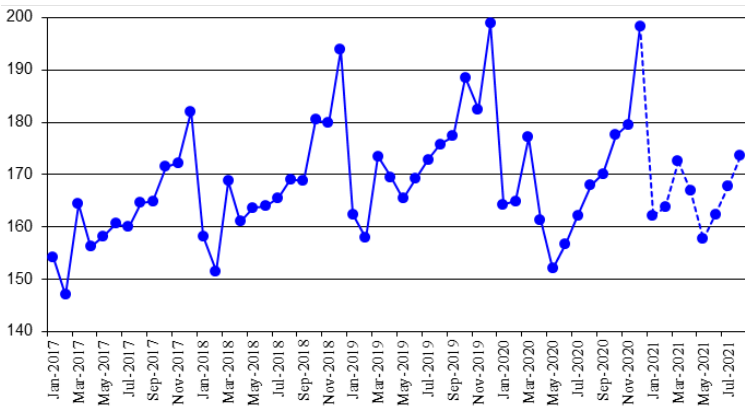
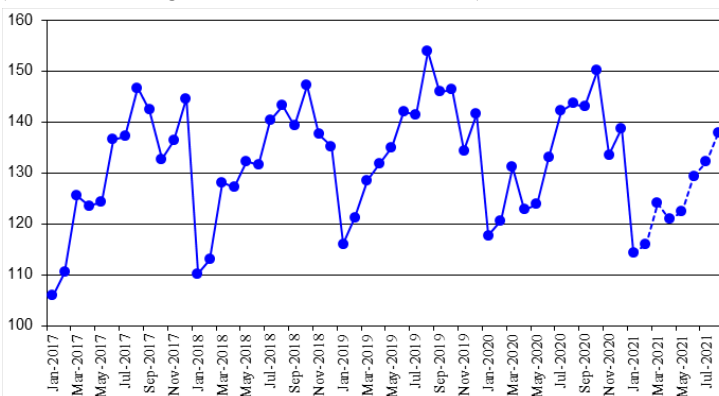*Fig. 1b. The NRU HSE industrial production index (ARIMA-model) (% of January 2010)*
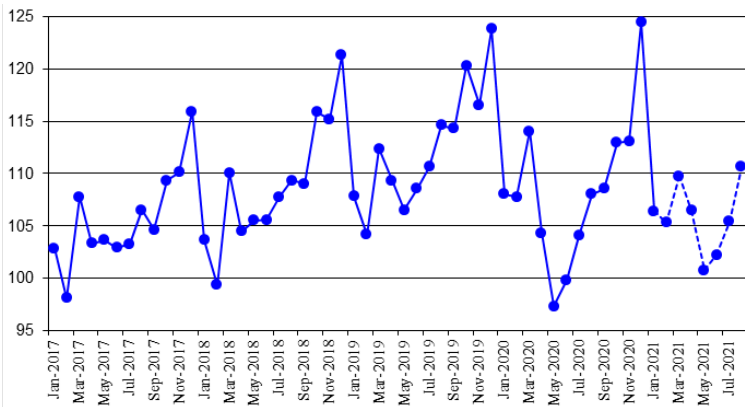
Fig. 2a. The Rosstat industrial production index for mining (% of December 2001)
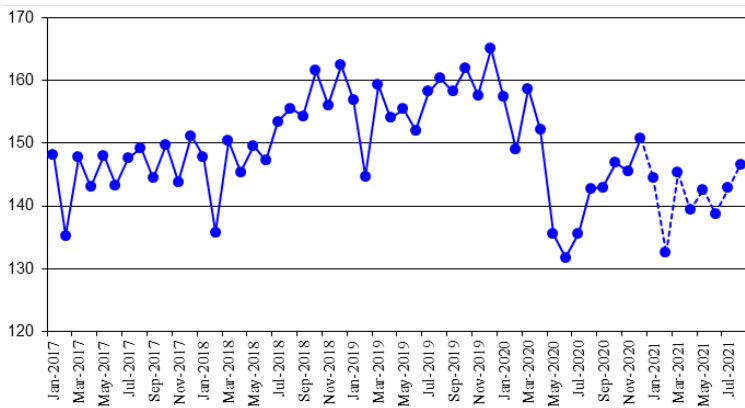
Fig. 2b. The NRU HSE industrial production index for mining (% of January 2010)
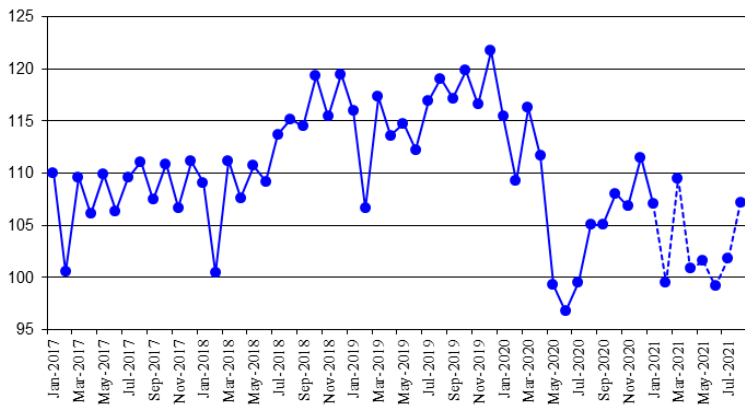
*Fig. 3a. The Rosstat industrial production index for manufacturing
(% of December 2001)*
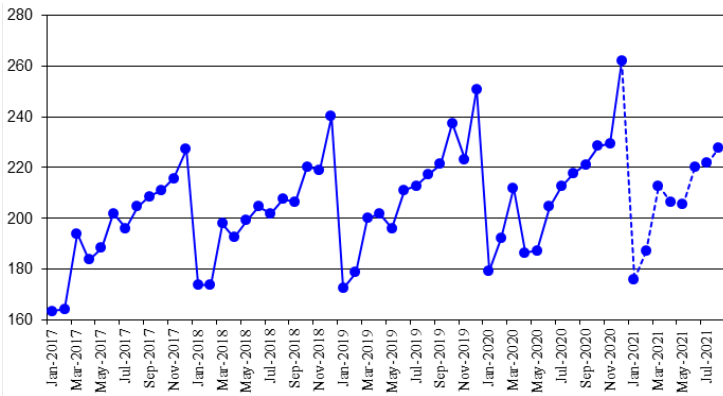
*Fig. 3b. The NRU HSE industrial production index for manufacturing
(% of January 2010)*
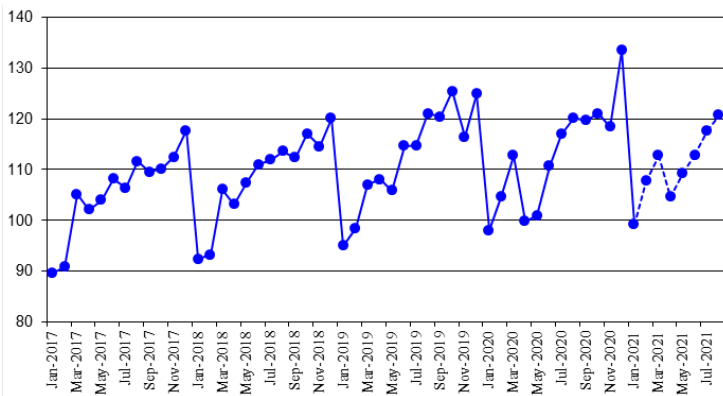
*Fig. 4a. The Rosstat industrial production index for utilities (electricity, water, and gas)
(as a percentage of that in December 2001)*
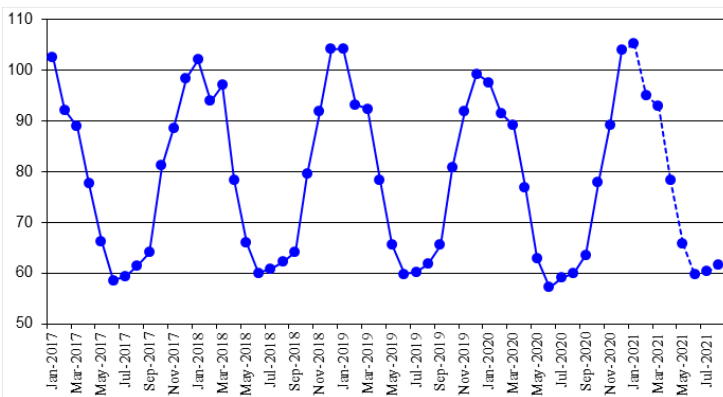
*Fig. 4b. The NRU HSE industrial production index for utilities (electricity, water, and gas)
(as a percentage of that in January 2010)*
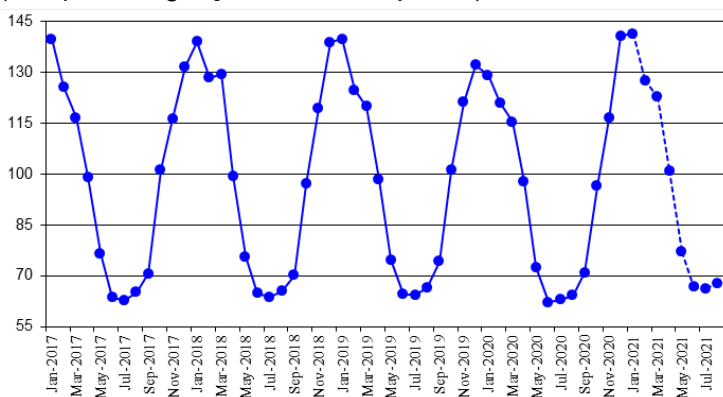
Fig. 5a. The Rosstat industrial production index for food products
(as a percentage of that in December 2001)
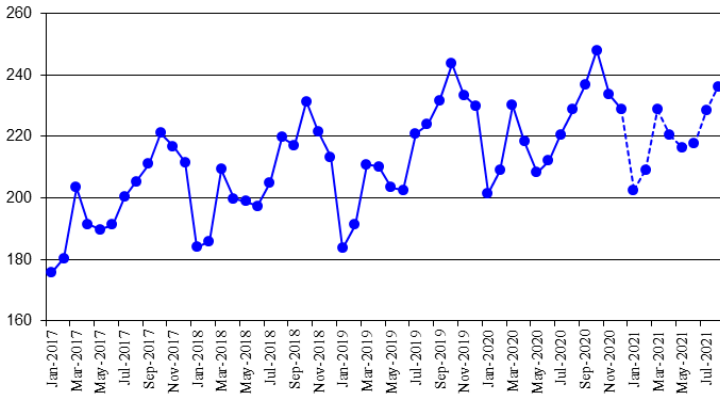
Fig. 5b. The NRU HSE industrial production index for food products
(as a percentage of that in January 2010)
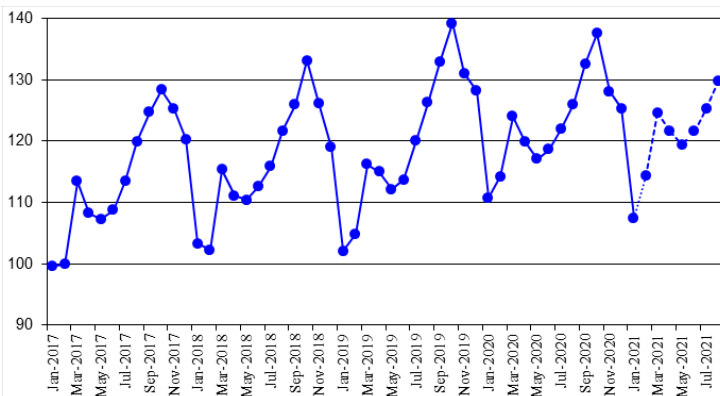
Fig. 6a. The Rosstat industrial production index for coke and petroleum
(as a percentage of that in December 2001)
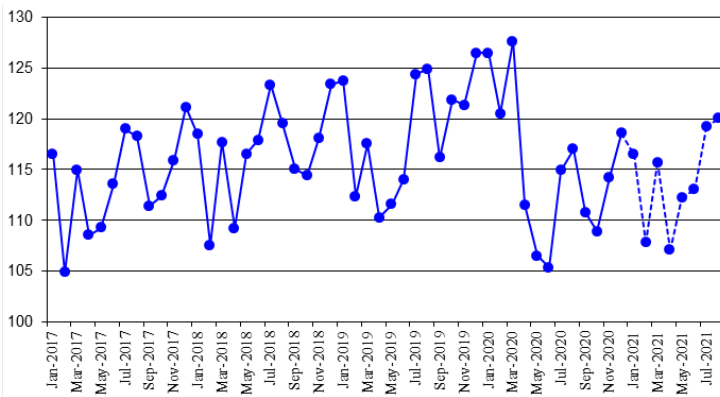
Fig. 6b. The NRU HSE industrial production index for petroleum and coke
(as a percentage of that in January 2010)
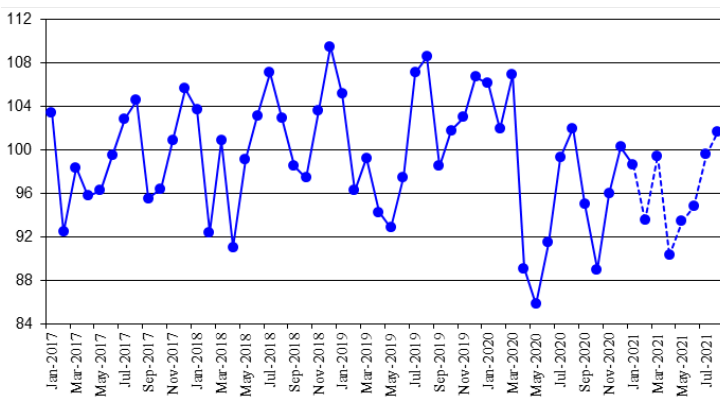
Fig.7a. The Rosstat industrial production index for primary metals and fabricated metal products (as a percentage of that in December 2001)
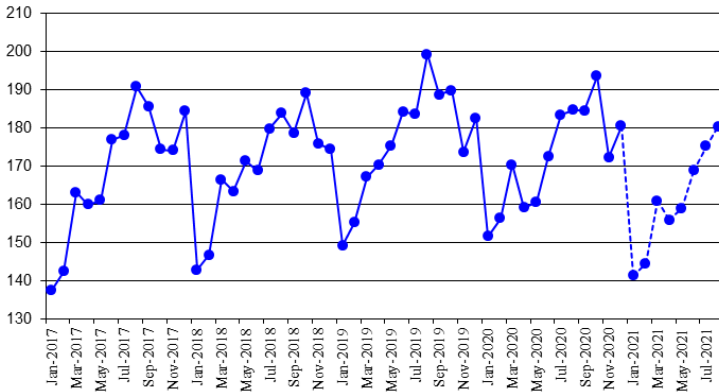
Fig. 7b. The NRU HSE industrial production index for primary metals and fabricated metal products (as a percentage of that in January 2010)

Fig. 8a. The Rosstat industrial production index for machinery (as a percentage of that in December 2001)
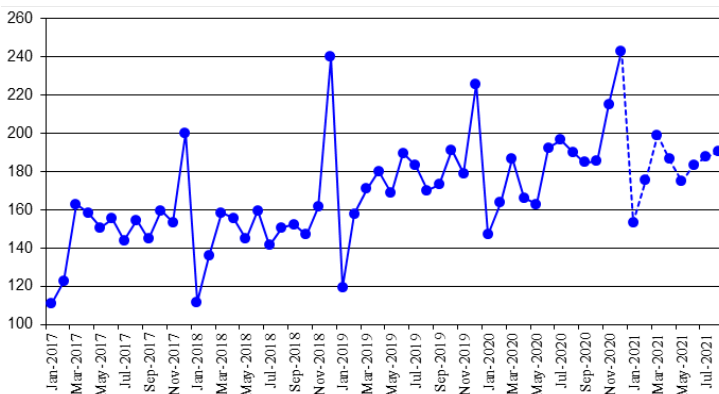
Fig. 8b. The NRU HSE industrial production index for machinery (as a percentage of that in January 2010)
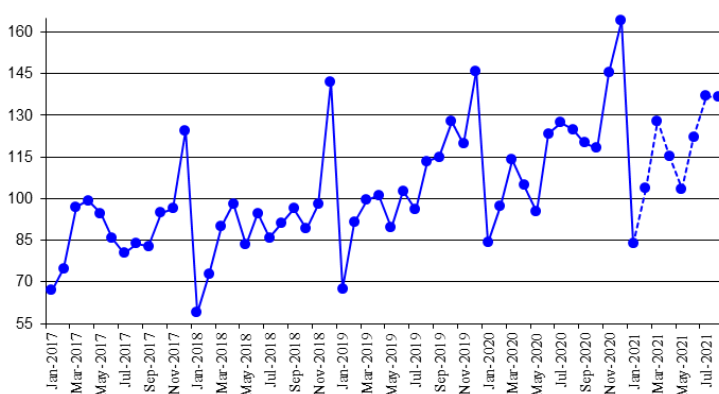
Fig. 9. The volume of retail sales (billion RUB)
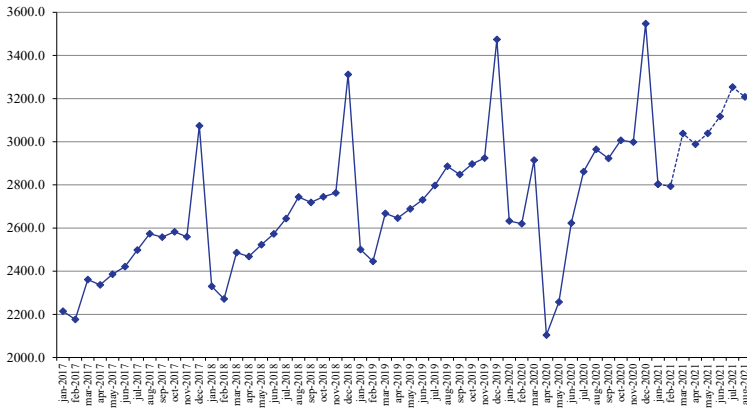
Fig. 9a. The real volume of retail sales (as a percentage of that in the same period of the previous year)
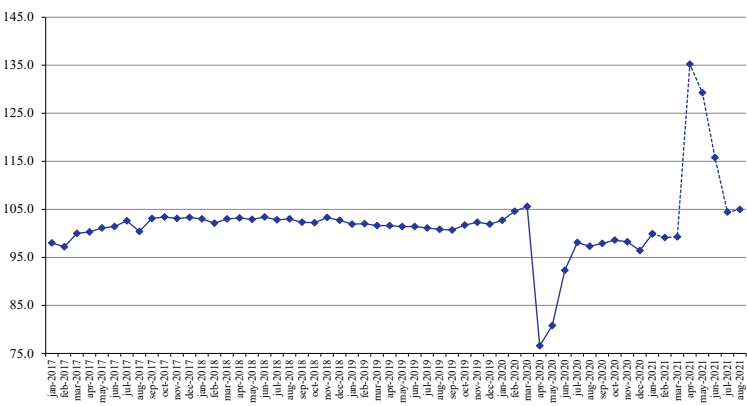
Fig.10. Export to all countries (billion USD)
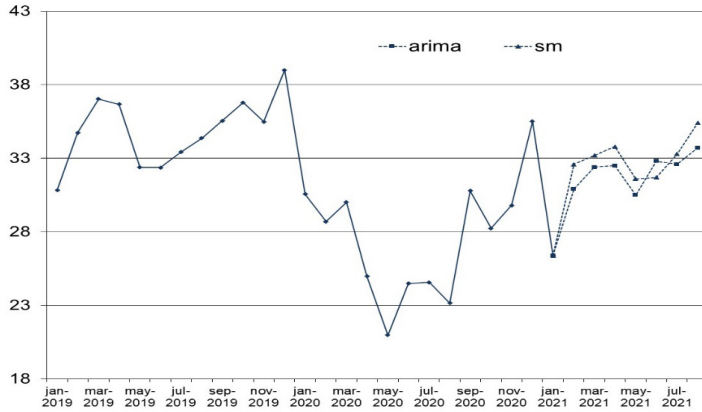
Fig. 11. Export to countries outside the CIS (billion USD)
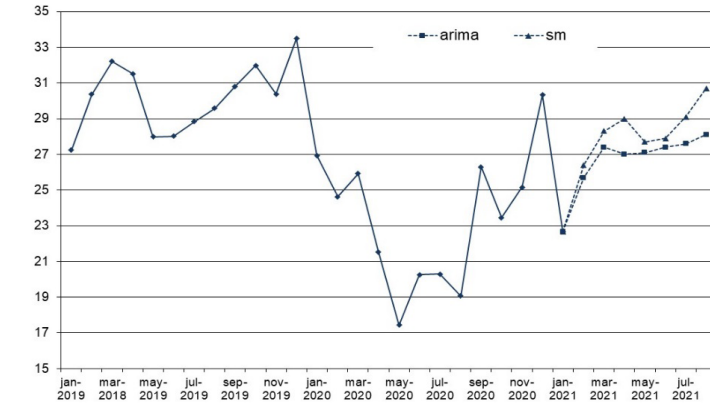
Fig. 12. Import from all countries (billion USD)
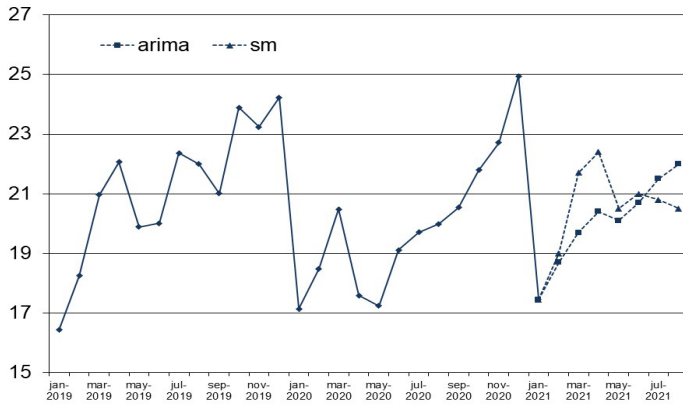
Fig. 13. Import from countries outside the CIS (billion USD)
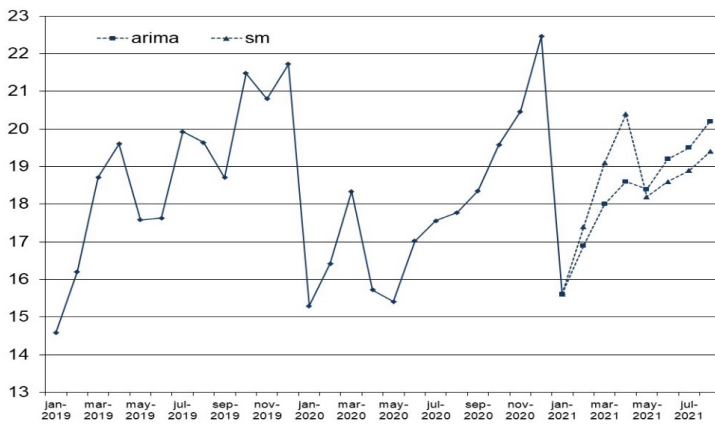
Fig. 14. The consumer price index (as a percentage of that in December of the previous year)
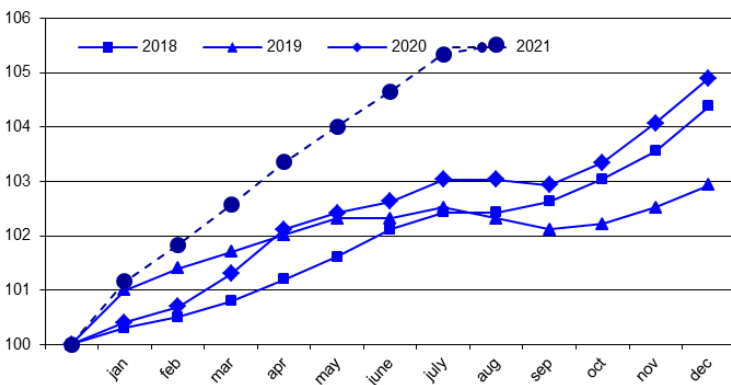
Fig. 14a. The consumer price index (as a percentage of that in December of the previous year) (SM)
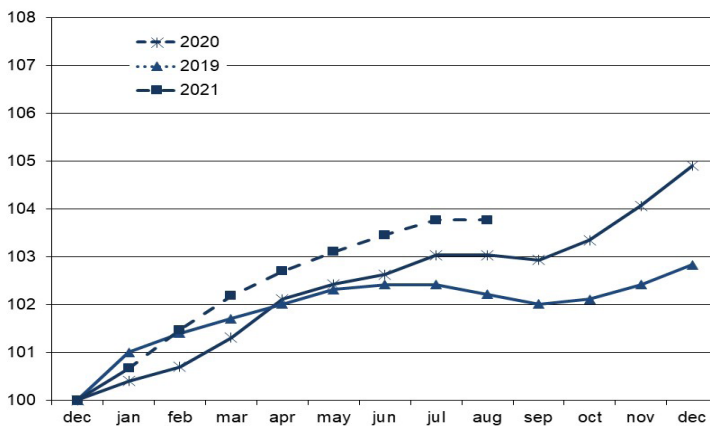
Fig.15. The producer price index for industrial goods
(as a percentage of that in December of the previous year)
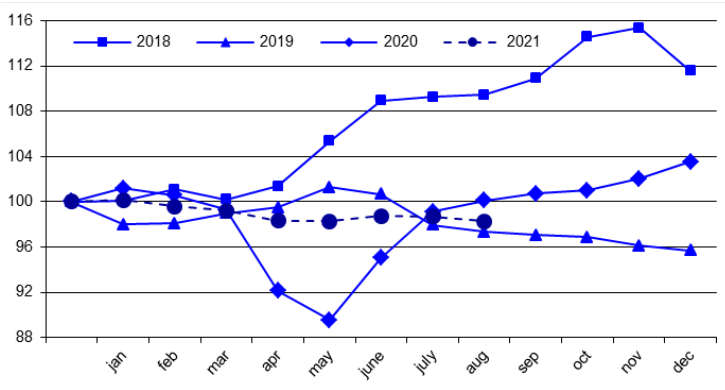
Fig. 16. The price index for mining (as a percentage of that
in December of the previous year)
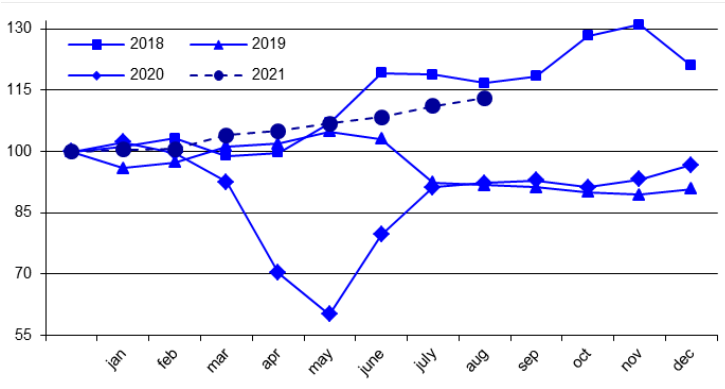
Fig. 17. The price index for manufacturing (as a percentage
of that in December of the previous year)
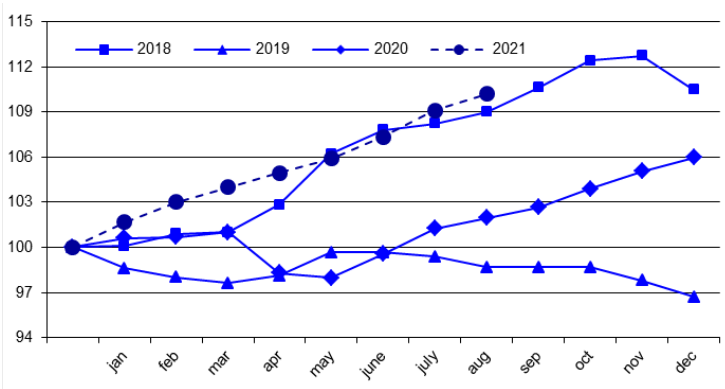
Fig. 18. The price index for utilities (electricity, water, and gas)
(as a percentage of that in December of the previous year)
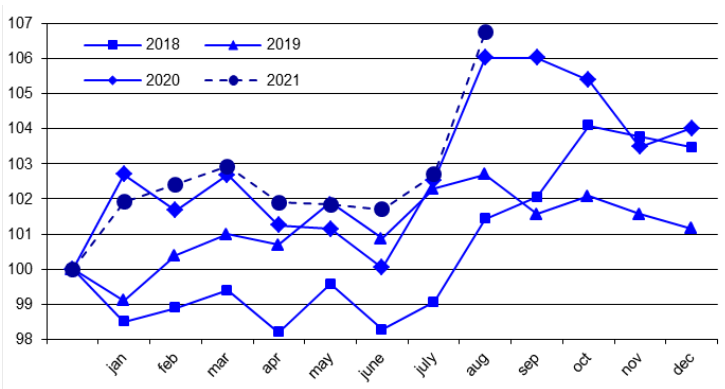
Fig. 19. The price index for food products (as a percentage of that in December of the previous year)
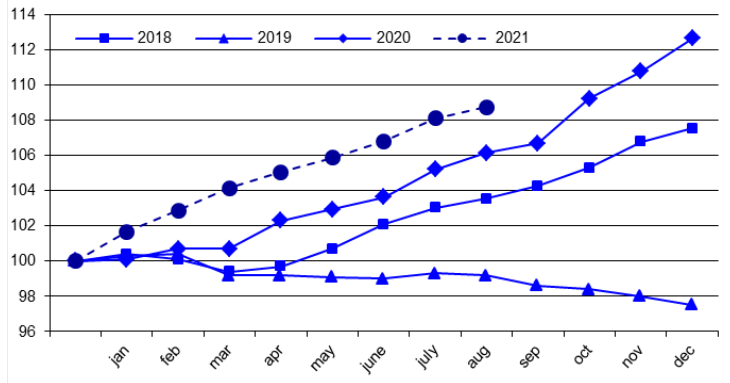
Fig. 20. The price index for the textile and sewing industry (as a percentage of that in December of the previous year)
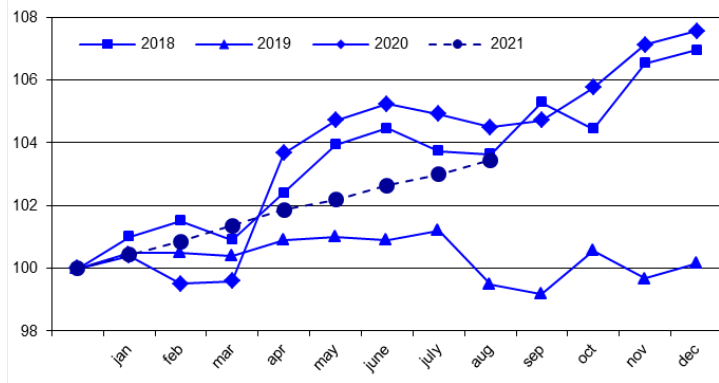
Fig. 21. The price index for wood products (as a percentage of that in December of the previous year)
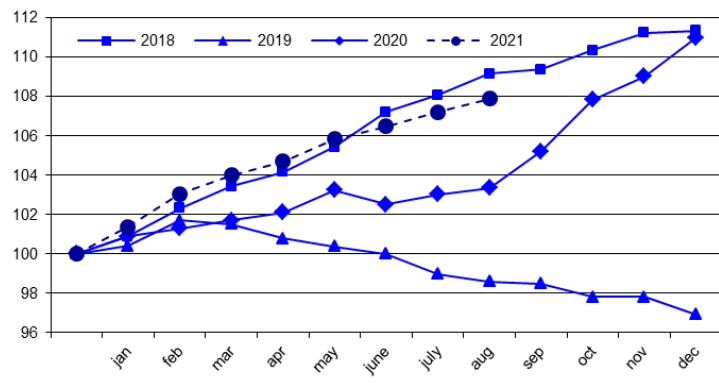
Fig. 22. The price index for the pulp and paper industry (as a percentage of that in December of the previous year)
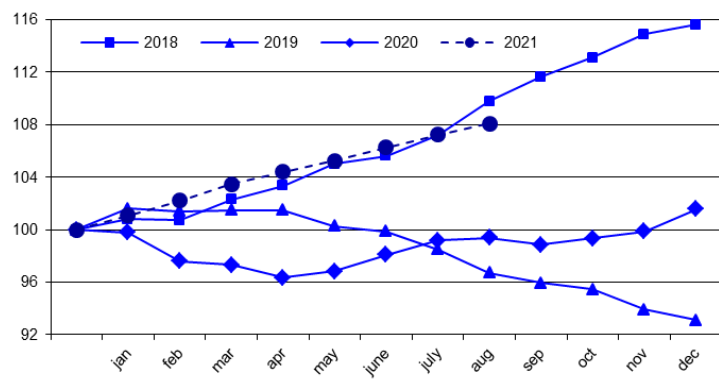
Fig. 23. The price index for coke and petroleum
(as a percentage of that in December of the previous year)
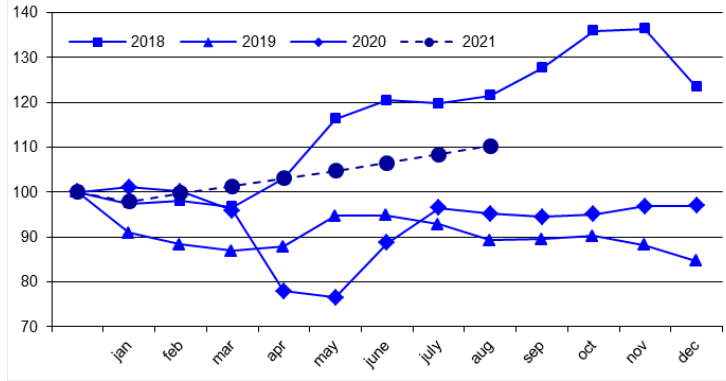
Fig. 24. The price index for the chemical industry
(as a percentage of that in December of the previous year)
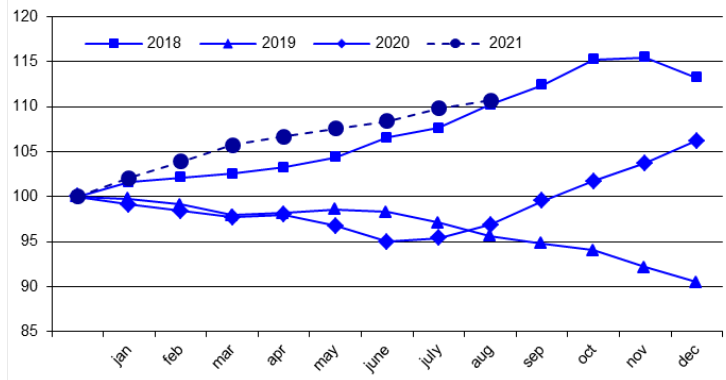
Fig. 25. The price index for primary metals and fabricated metal products
(as a percentage of that in December of the previous year)
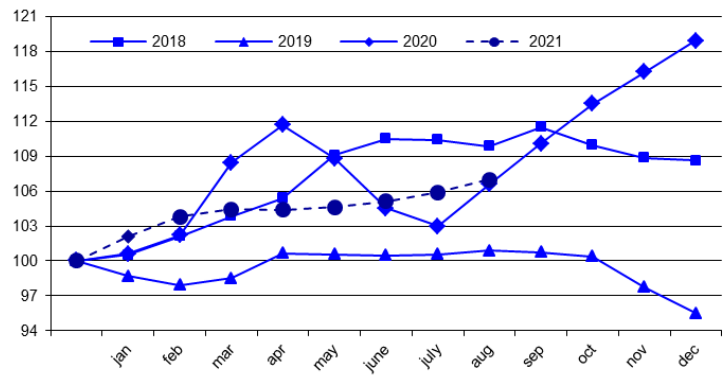
Fig. 26. The price index for machinery (as a percentage of that
in December of the previous year)
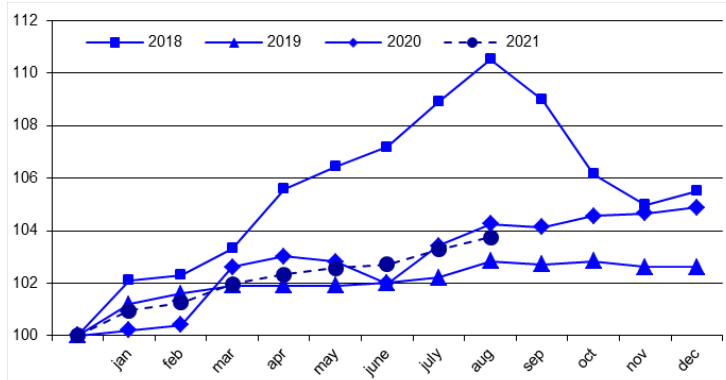
Fig. 27. The price index for transport equipment manufacturing
(as a percentage of that in December of the previous year)
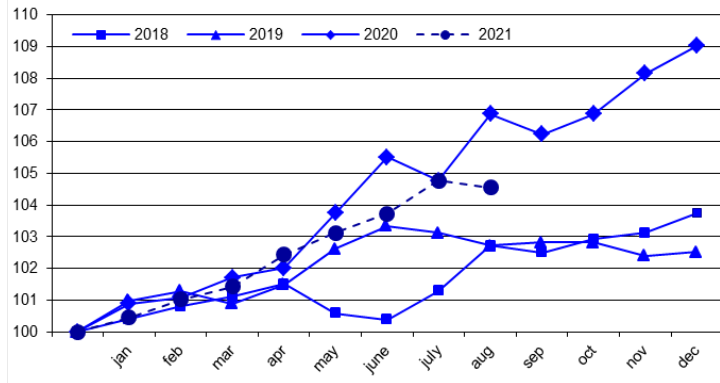
Fig. 28. The cost of the monthly per capita minimum food basket (RUB)
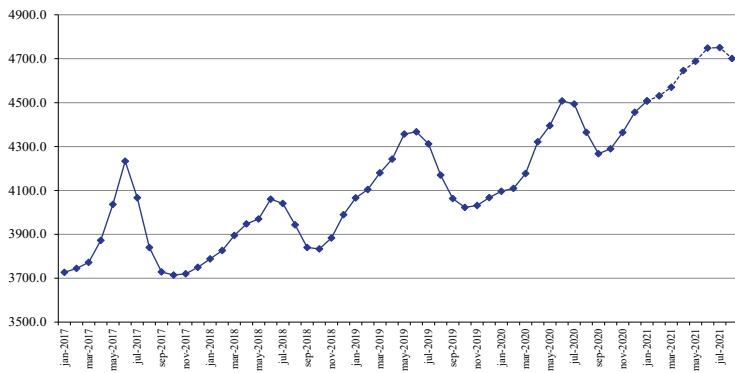
Fig. 29. The composite index of transport tariffs
(for each year, as a percentage of that in the previous month)
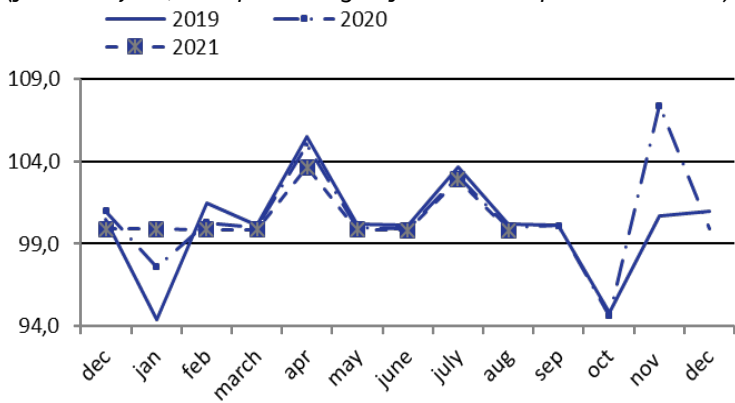
Fig. 30. The index of motor freight tariffs (for each year, as a percentage
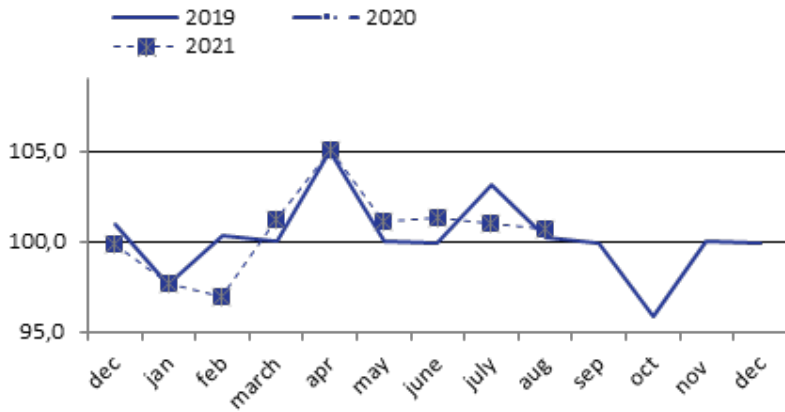*of that in the previous month)*
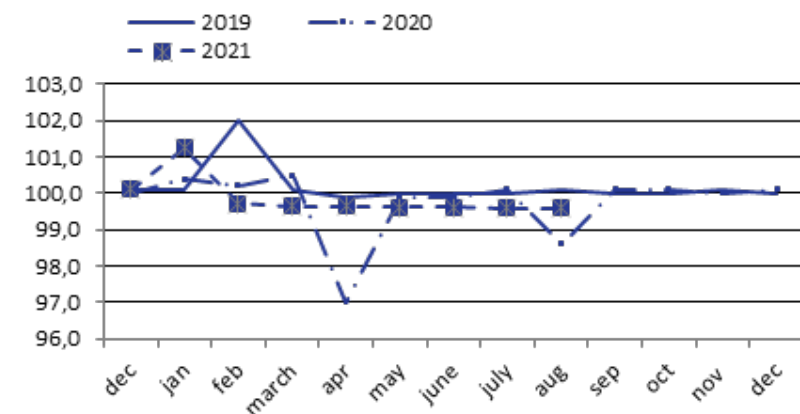
Fig. 31. The index of pipeline tariffs (for each year, as a percentage of that in the previous month)

Fig. 32. The Brent oil price ($ per barrel)
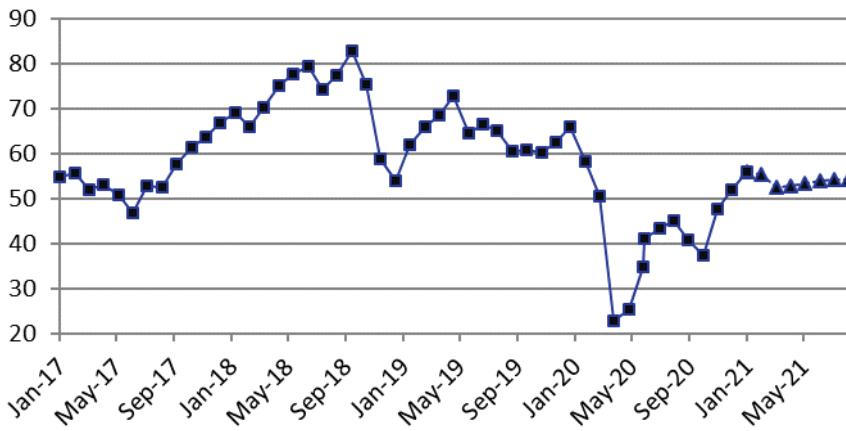
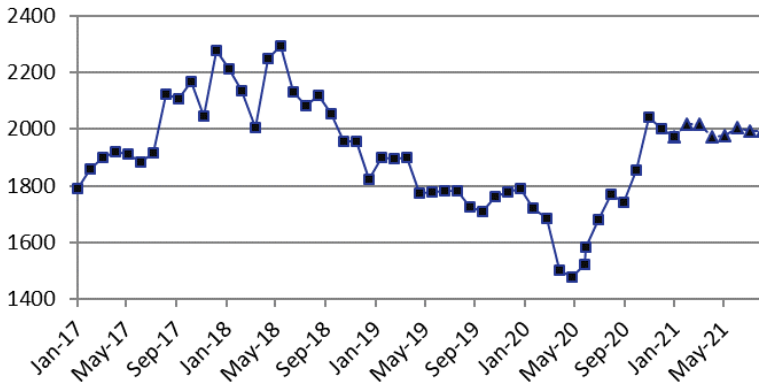
Fig. 33. The aluminum price ($ per ton)

Fig. 34. The gold price ($ per ounce)
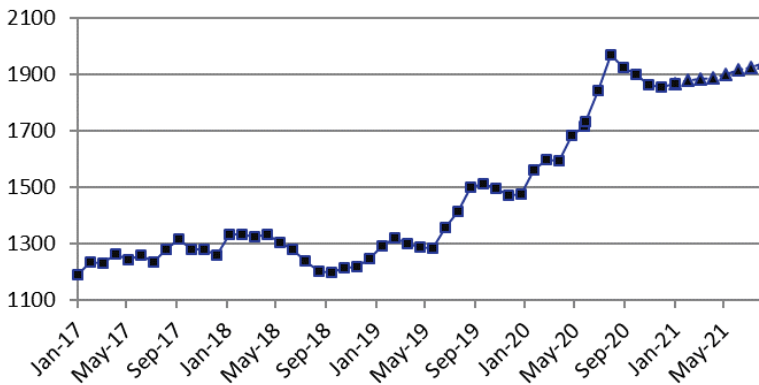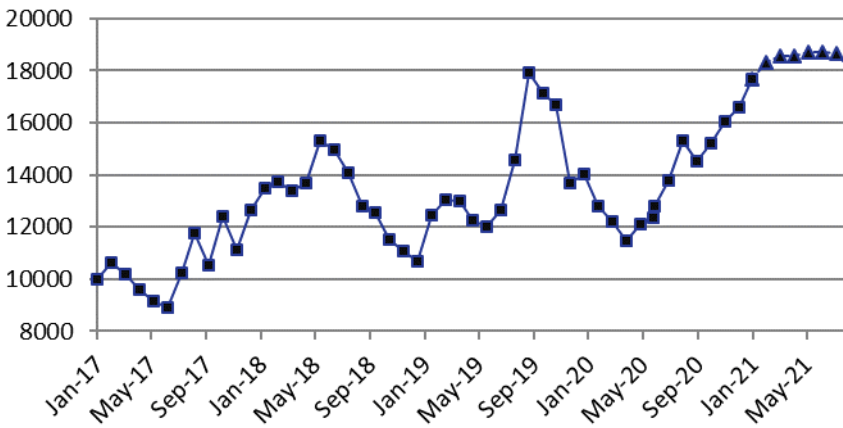
Fig. 35. The nickel price ($ per ton)
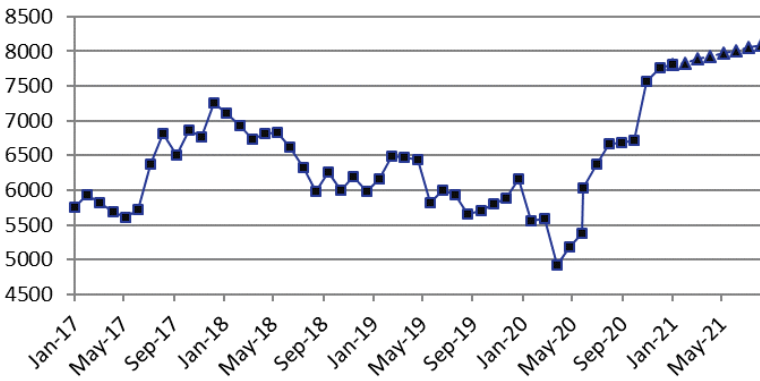

Fig. 36. The copper price ($ per ton)
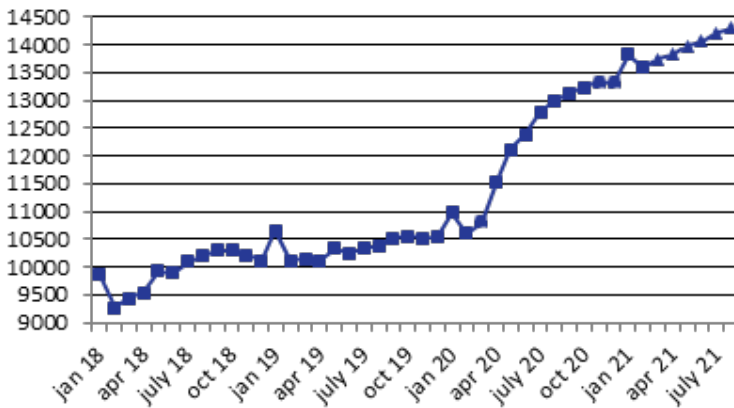

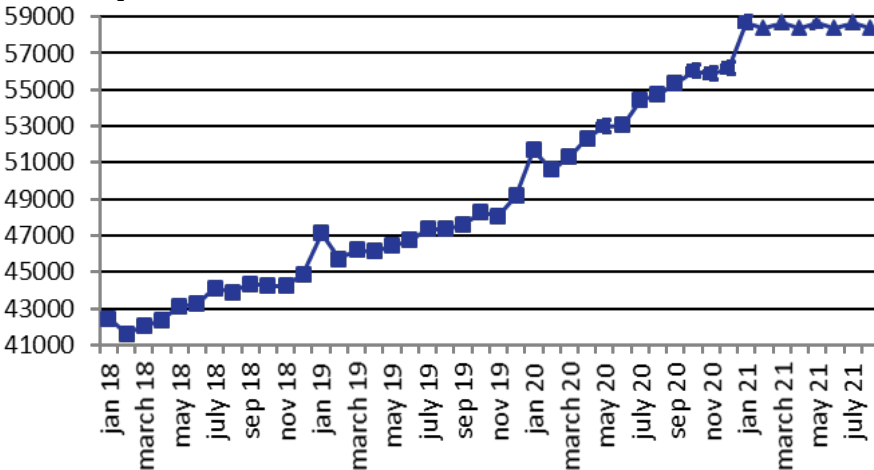*Fig. 37. The monetary base, billion RUB*

Fig. 38. M_2 billion RUB

Fig. 39. The international reserves of the Russian Federation, million USD
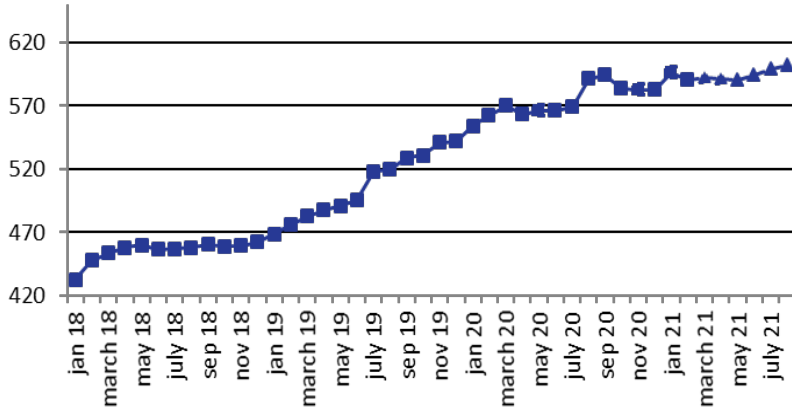
Fig. 40. The RUB/USD exchange rate

Fig. 41. The USD/EUR exchange rate
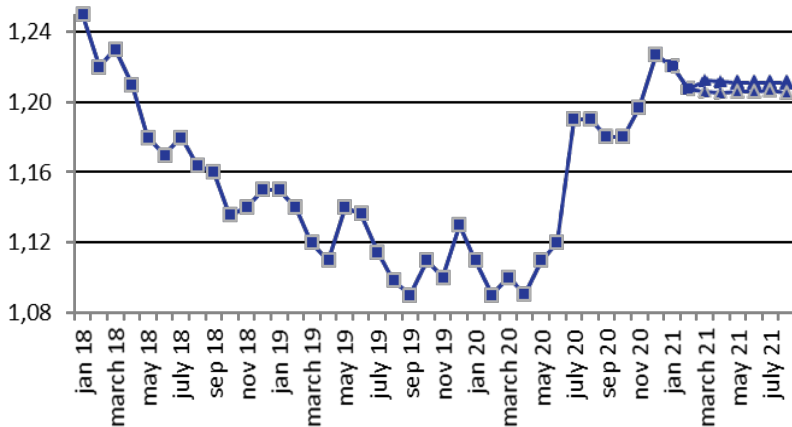
Fig. 42. Real disposable cash income (as a percentage of that in the same period of the previous year)
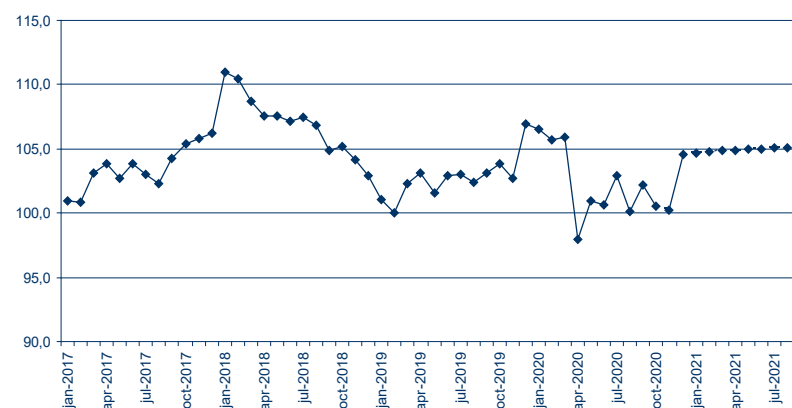
Fig. 43. Real cash income (as a percentage of that in the same period of the previous year)

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)

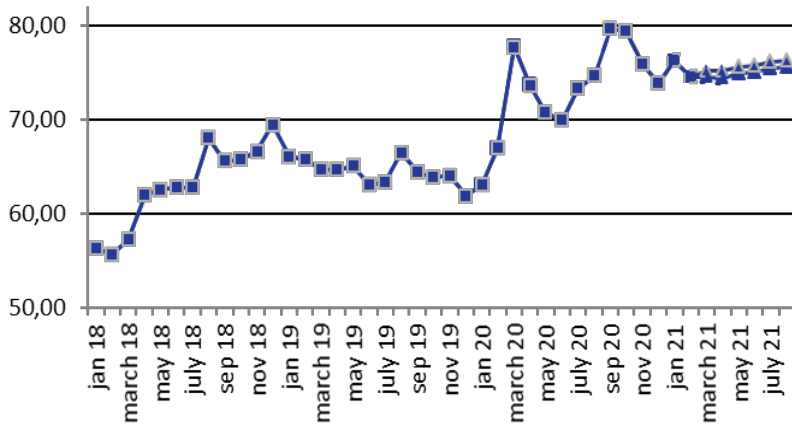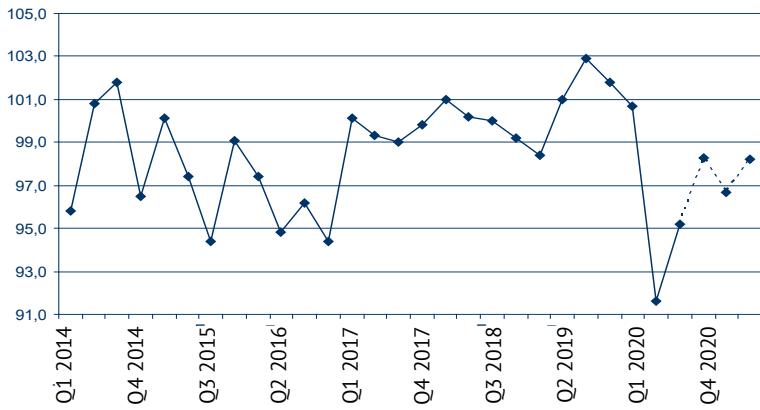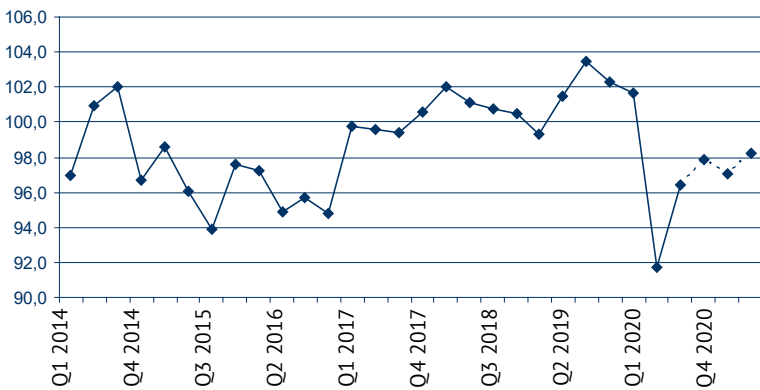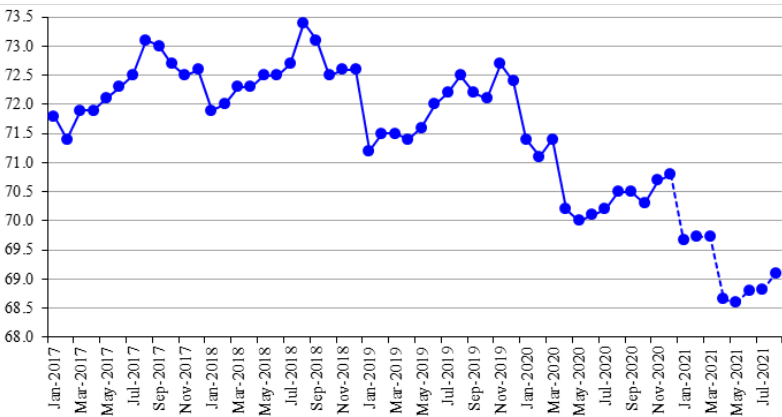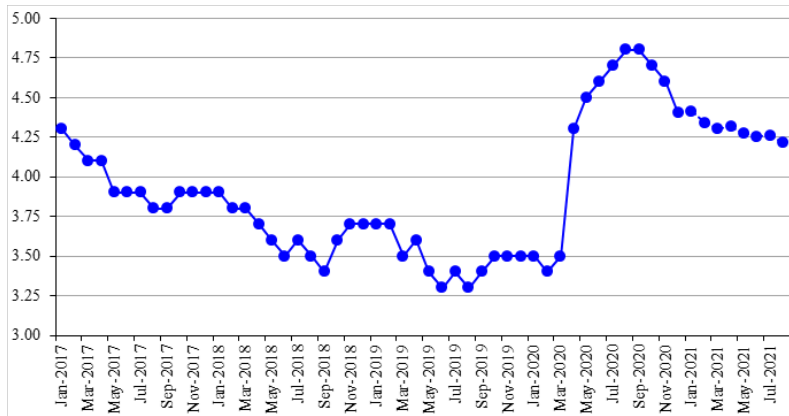## Annex 2. Model calculations of short-term forecasts of social and economic indices of the Russian Federation: February 2021

Index	2020	2021							
	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Rosstat IIIP (growth rate, %)*	-0.2	-1.3	-0.7	-1.7	3.6	6.8	5.1	3.8	3.9
HSE IIP (growth rate %)*	0.5	-1.5	-2.3	-1.5	4.0	9.2	6.7	4.4	5.3
Rosstat IIP for mining (growth rate, %)*	-8.5	-8.2	-11.0	-8.4	-8.4	5.2	5.3	5.4	2.7
HSE IIP for mining (growth rate, %)*	-8.4	-7.2	-8.9	-5.8	-9.7	2.3	2.5	2.3	2.1
Rosstat IIIP for manufacturing (growth rate, %)*	4.4	-1.9	-2.7	0.4	10.8	9.8	7.6	4.4	4.6
HSE IIP for manufacturing (growth rate, %)*	6.8	1.1	3.0	0.0	4.8	8.3	1.9	0.6	0.5
Rosstat IIP for utilities (electricity, water, and gas) (growth rate, %)*	4.7	7.8	3.9	4.2	1.9	4.5	4.4	2.1	2.6
HSE for utilities (electricity, water, and gas) (growth rate, %)*	6.5	9.4	5.5	6.4	3.2	6.3	7.2	5.3	5.6
Rosstat IIP for food products (growth rate, %)*	-0.2	0.5	0.0	-0.6	0.9	3.9	2.7	3.5	3.3
HSE IIP for food products (growth rate, %)*	-2.3	-3.0	0.1	0.5	1.4	2.0	2.5	2.8	3.0
Rosstat IIP for coke and petroleum (growth rate, %)*	-6.1	-7.9	-10.5	-9.3	-4.0	5.4	7.3	3.7	2.6
HSE for coke and petroleum (growth rate, %)*	-6.0	-7.0	-8.2	-7.0	1.4	8.9	3.6	0.3	-0.3
Rosstat for primary metals and fabricated metal products (growth rate, %)*	-1.1	-6.8	-7.5	-5.5	-2.0	-1.0	-2.2	-4.5	-2.4
HSE IIP for primary metals and fabricated metal products (growth rate, %)*	-2.0	-2.8	-3.9	-5.4	-1.5	-1.2	-2.7	-7.0	-4.1
Rosstat IIP for machinery (growth rate, %)*	7.5	4.3	7.2	6.6	12.3	7.3	-4.7	-4.5	0.1
HSE IIP for machinery (growth rate %)*	12.4	-0.3	6.4	12.4	10.0	8.5	-0.9	7.6	9.4
Retail sales, trillion Rb	3.55	2.80	2.79	3.04	2.99	3.04	3.12	3.25	3.21
Real retail sales (growth rate, %)*	-3.6	-0.1	-0.9	-0.7	35.2	29.3	15.8	4.4	5.0
Export to all countries (billion $)	35.5	26.4	31.8	32.8	33.2	31.1	32.3	33.0	34.6
Export to countries outside the CIS (billion $)	30.3	22.7	26.1	27.9	28.0	27.4	27.7	28.4	29.4
Import from all countries (billion $)	24.9	17.5	18.9	20.7	21.4	20.3	20.9	21.2	21.3
Import from countries outside the CIS (billion $)	22.5	15.6	17.2	18.6	19.5	18.3	18.9	19.2	19.8
CPI (growth rate, %)**	0.8	0.9	0.7	0.6	0.6	0.5	0.4	0.5	0.2
PPI for industrial goods (growth rate, %)**	1.5	0.4	0.0	0.3	0.0	0.2	0.3	0.0	-0.1
PPI for mining (growth rate, %)**	3.7	0.4	0.2	3.4	1.0	1.8	1.5	2.6	1.8
PPI for manufacturing (growth rate, %)**	0.9	1.7	1.3	1.0	0.9	0.9	1.4	1.6	1.0
PPI for utilities (electricity, water, and gas) (growth rate, %)**	0.5	1.9	0.5	0.5	-1.0	-0.1	-0.1	1.0	3.9
PPI for food products (growth rate, %)**	1.7	1.7	1.2	1.2	0.9	0.8	0.9	1.2	0.6
PPI for the textile and sewing industry (growth rate, %)**	0.4	0.4	0.4	0.5	0.5	0.3	0.5	0.4	0.4
PPI for wood products (growth rate, %)**	1.8	1.4	1.6	0.9	0.7	1.1	0.6	0.7	0.6
PPI for the pulp and paper industry (growth rate, %)**	1.7	1.1	1.1	1.2	0.9	0.8	1.0	0.9	0.8
PPI for coke and petroleum (growth rate, %)**	0.1	-2.2	2.0	1.5	1.8	1.5	1.7	1.8	1.7
PPI for the chemical industry (growth rate, %)**	2.4	2.0	1.8	1.7	0.9	0.8	0.8	1.3	0.8
PPI for primary metals and fabricated metal products (growth rate, %)**	2.3	2.1	1.6	0.6	0.0	0.2	0.5	0.7	1.0
PPI for machinery (growth rate, %)**	0.2	1.0	0.3	0.7	0.4	0.2	0.1	0.6	0.5
PPI for transport equipment manufacturing (growth rate, %)**	0.8	0.5	0.6	0.4	1.0	0.7	0.6	1.0	-0.2
The cost of the monthly per capita minimum food basket (thousand Rb)	4.46	4.51	4.53	4.57	4.65	4.69	4.75	4.75	4.70
The composite index of transportation tariffs (growth rate, %)**	0.1	1.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
The index of pipeline tariffs (growth rate, %)**	-0.1	-2.4	-3.0	1.2	5.0	1.1	1.3	1.0	0.7
The index of motor freight tariffs (growth rate, %)**	-0.1	-0.1	-0.1	-0.1	3.6	-0.1	-0.2	2.9	-0.2
The Brent oil price ($ a barrel)	51.8	55.9	55.3	52.6	52.7	53.4	53.9	54.1	54.2
The aluminum price (thousand $ a ton)	2.00	1.97	2.02	2.02	1.97	1.98	2.00	1.99	1.99
The gold price (thousand $ per ounce)	1.86	1.87	1.88	1.88	1.89	1.90	1.91	1.93	1.94
The nickel price (thousand $ a ton)	7.76	7.81	7.83	7.89	7.93	7.97	8.01	8.05	8.10
The copper price (thousand $ a ton)	16.6	17.7	18.3	18.6	18.6	18.7	18.7	18.7	18.6
The monetary base (trillion Rb)	13.3	13.8	13.6	13.7	13.8	14.0	14.1	14.2	14.3
M_2 (trillion Rb)	56.1	58.7	58.4	58.7	58.4	58.7	58.4	58.7	58.4
Gold and foreign exchange reserves (billion $)	0.58	0.60	0.59	0.59	0.59	0.59	0.59	0.60	0.60
The RUR/USD exchange rate (rubles per one USD)	73.88	76.25	74.52	74.87	74.79	75.27	75.36	75.75	75.97

MODEL CALCULATIONS OF SHORT-TERM FORECASTS...

Index	2020	2021							
	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
The USD/EUR exchange rate (USD per one Euro)	**1.23**	**1.22**	**1.21**	1.21	1.21	1.21	1.21	1.21	1.21
Real accrued wages (growth rate, %)*	**4.6**	4.7	4.8	4.8	4.9	5.0	5.0	5.0	5.1
Employment (million people)	**70.8**	69.7	69.7	69.7	68.7	68.6	68.8	68.8	69.1
Unemployment (million people)	**4.4**	4.4	4.3	4.3	4.3	4.2	4.2	4.2	4.2

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