Analyzing Oil Prices Impact on Russian Foreign Trade

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Abstract. Among the paramount drivers of globalization and the world economy, global oil prices are traditionally named. Most significantly they influence the economy of the countries with export oriented for raw materials. The Russian Federation is among those ones. This study aims at analyzing the impact of global oil prices on the RF’s foreign trade statistical indicators. General scientific methodology and statistical and econometric methods are applied in this research. Statistical data demonstrate the coincident changes in global oil prices, foreign trade turnover and the volume of the Russian commodities export. Herein, oil is not affected by the law of demand, since it belongs to the strategical goods with an inert demand. Thus, the indicator of Russian foreign trade turnover, that was forecasted adjusted for oil prices dynamics, demonstrates a further downturn.

Keywords: Econometric modeling · Export · Foreign trade · Globalization · Oil prices

1 Introduction

COVID-19 and the OPEC conflict were the two major events that have affected the situation in the world in 2020. Those events caused a decrease in business activity and a drop in oil prices. The consequences, such as unemployment growth, GDP falling, closed businesses, and broken supply chains are already visible. The entire system of foreign economic relations is entering a crisis that threatens the process of globalization of the world economy. In regard to quantitative indicators, this can be expressed by a decrease in the share of certain countries in trade turnover, in the volume of exports and imports.

The purpose of this study is to assess the ability of the Russian economy to adapt to such crises and the ability of Russia to remain a major player in the world market. At the same time, it is necessary to take into account the specific character of the production specialization of the Russian economy. Its exports are highly commodity-based, which is typical for many developing economies. The main barometer of the state of the Russian economy is the world oil prices. In this regard, it is important to identify the relationship between oil prices and indicators of foreign trade statistics in Russia.
2 Methodology

This study is aimed at analyzing the impact of global oil prices on the Russian foreign trade statistical indicators. It is hypothesized that the situation in the foreign trade of such an export-focused country as Russia is closely interconnected with the state of the global oil market, in general, and oil prices in particular. In the context of globalization, this factor directly affects the level of socio-economic development of the country. The study was based on the data of the Federal State Statistics Service [3] and the World Trade Organization (WTO) [13]. The primary data is represented by a time series from 1998 to 2019.

The combination of general scientific methodology and statistical and econometric methods are applied for the purposes of this study. The historical method was used to justify the regularities of changes in macroeconomic indicators depending on the phase of the economic cycle. The following statistical and econometric methods were used in the study:

- the method of structural and dynamic analysis (calculation of the Ryabtsev index) allowed quantifying changes in the structure of Russian exports,

- the graphical and tabular methods are a convenient form of displaying analytical data,

- absolute, relative and average values determine the quantitative characteristics of an economic phenomenon,

- time series analysis and forecasting allowed characterizing the dynamics of indicators and making assumptions about their changes in the future.

The use of econometric methods in similar studies has recently become widespread, as it provides means for mathematical expression of the identified qualitative patterns for development of foreign trade in countries. Econometric analysis based on cointegrated vector auto regression (VAR) models to describe the influence of various factors on foreign trade indicators was used in the works [2, 11, 12]; econometric methods for constructing a model of simultaneous equations was applied in [1]. The data were processed using the “Gretl” econometric package.

3 Results

The system of statistical indicators, that characterize oil market and foreign trade, was developed within the framework of this study:

1. Average annual oil price, US $/bbl.
2. Foreign trade turnover, mln. US $.
3. Export turnover, mln. US $.

Graphs and charts are the easiest and most visual way to display time series data. Fig. 1 shows time series graphs of world oil prices and Russia’s foreign trade turnover.
The line graphs demonstrate the synchronous changes of both indicators. Thus, the period of cheap oil was accompanied by a decline in Russia’s foreign trade activity in 2009 and 2011–2016. To forecast the turnover of Russia’s foreign trade, taking into account the dynamics of oil prices, the econometric modeling of time series was conducted. A linear model is constructed. It is based on the first differences of the indicators under study, which are stationary ones. The forecast for the first differences in foreign trade turnover is shown in Fig. 2.

As it can be seen from the graph, the increase in the turnover of foreign trade of the Russian Federation is a negative one; therefore, the turnover of foreign trade itself will decrease in the next three years. Due to the unstable economic situation in the world related to COVID-19 and the OPEC conflict, the most reliable numerical forecast of foreign trade turnover will only be as of 2020. It was calculated that, Russia’s foreign
trade turnover in 2020 will amount to 592784 million dollars. Next, the impact of world oil prices on the volume and structure of Russia’s commodity exports was considered. It was found that the dynamics of both indicators are generally identical. Table 1 shows statistics on total exports and exports of fuel resources.

### Table 1. The RF’s export indicators

| Year   | Total export | Export of fuel resources | The share of fuel resources % in export |
|--------|--------------|--------------------------|----------------------------------------|
| 2013   | 521836       | 372036                   | 71.3                                   |
| 2014   | 496807       | 346119                   | 69.7                                   |
| 2015   | 341419       | 216101                   | 63.3                                   |
| 2016   | 281710       | 134703                   | 47.8                                   |
| 2017   | 353104       | 211993                   | 60.0                                   |
| 2018   | 443129       | 237851                   | 53.7                                   |
| 2019   | 418796       | ...                      | ...                                    |

Source: authors

The 2014–2015 crises, combined with the anti-Russian sanctions, led to the loss of foreign markets. Thus, in 2016, the total volume of exports decreased by 46.0% compared to 2013, and the volume of exports of fuel resources fell by 63.8%. In the next two years, these indicators increased by 57.3% and 76.6%, respectively. This is due to the policy of import substitution and the adaptation of the Russian economy to the new reality. Due to the limited data on exports, econometric models has not been built, but the focus instead was set on analyzing changes in the structure of exports during periods of high and low oil prices. We used the Ryabtsev index [10] to analyze the structural shifts for three years: 2013 (high oil prices), 2016 (low oil prices), and 2018 (high oil prices). The results are shown in Table 2.

### Table 2. The Ryabtsev index values used to analyze the structural shifts in Russian exports

| Years     | 2016/2013 | 2018/2016 | 2018/2013 |
|-----------|-----------|-----------|-----------|
| Value     | 0.228     | 0.065     | 0.164     |
| Explanation | Significant difference | Relatively low difference | Significant difference |

Source: authors

Interestingly, the Rybtsev index values demonstrated that the decline in oil prices led to a significant change in the structure of exports, while the increase in the price had little effect on the change in the structure. The most significant changes were observed in fuel resources. Their share decreased from 71.3% in 2013 to 47.8% in 2018, while the share of food exports almost doubled from 3.1% to 6.0%.
4 Discussion

The hypothesis about the correlation between the state of foreign trade of an export-oriented country and the world oil market, in particular, oil prices, is generally confirmed. Studies of the impact of oil prices on foreign trade and the economy as a whole are quite common. Conventionally each of them is dedicated to a particular aspect. Touitou, Djellit, and Boudeghdeg analyzed the causal relationship between exports, oil prices, terms of trade, and economic growth for a resource-dependent economy [11]. As it is stated by Dreger, Kholodilin, Ulbricht, and Fidrmuc, Russia is a country highly dependent on resource export [2].

Gorokhova argues that since 2014, the structure, geography and volume of foreign trade have changed significantly due to the difficult international situation, the introduction of economic sanctions against Russia, fluctuations in oil prices [4]. It is noted by Obolenskii, that these changes significantly worsen the conditions of Russian foreign economic activity and hinder its development in the upcoming time period [7]. Therefore, often the problem of the dependence of key macroeconomic indicators on the dynamics of energy prices, especially oil prices, relevant to the modern Russian economy is chosen as the subject for a research. The example of such a study I represented by the research of Derunova, Ustinova, Derunov, and Semenov [1].

Polbin, Andreyev, and Zubarev address the task of assessing the impact of commodity prices on the main macroeconomic indicators of the EAEU member states [8]. Khmelevskaya considers the quality of development issues based on mutual trade in the BRICS countries [5]. The dynamics of indicators of foreign trade activity of the Russian Federation for the period 2012–2015 are analyzed by Makhmudova and Koroleva [6].

In her paper Ruzhinskaya studies the current problems of Russian foreign trade, the reasons for the decline in the export revenue, differentiation of the commodity structure of exports in 2014–2016, the impact of changes in oil prices on the export volumes of various commodity items, as well as changes in the commodity structure of imports of the country [9].

Ushkalova and Nikitina econometrically investigate the influence of key external factors on Russian foreign trade indicators. The researchers analyze the nature and extent of the relationship between Russian exports and imports and the dynamics of GDP and individual countries (EU, Germany, and China), world prices for oil and metals. A quantitative assessment of the impact of German and Chinese GDP and world oil prices on Russian exports is given in the paper [12]. Thus, this research was carried out within the framework of the current academic direction and does not contradict the results of similar studies in general.

5 Conclusion

1. The Russian economy, which is focused on the export of hydrocarbon raw materials, depends significantly on its prices. Statistical data confirm the synchronicity of changes in world oil prices, foreign trade turnover and the volume of Russia’s commodity exports,
2. The forecast value of Russia’s foreign trade turnover in 2020 was obtained. The forecast was based on econometric modeling of time series, taking into account changes in oil prices. The turnover amounted to 592,784 million dollars. This marks a decline in this indicator.

3. Although the increase in oil prices had not led to a change in the structure of Russian commodity exports, the decline in prices had a significant impact on its change. Contrary to the law of demand, lower prices for fuel resources lead to a reduction in their share in exports from 71.3% in 2013 to 47.8% in 2016. This is due to the specifics of oil as a commodity that has an inertial demand.

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