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Global oil glut and sanctions: The impact on Putin's Russia

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HIGHLIGHTS

- The impact of the recent decline in oil prices and western sanctions is analyzed.
- A vector autoregression model is used to do the forecast for Russia.
- The real GDP is likely to contract by 19 percent over the next two years.

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ABSTRACT

The Russian economy is highly responsive to oil price fluctuations. At the start of 2014, the country was already suffering from the weak economic growth, partly due to the ongoing crisis in Ukraine and Western sanctions. The recent plunge in global oil prices put even further strain on the Russian economy. This paper analyzes the dynamic relationship between oil price shocks, economic sanctions, and leading macroeconomic indicators in Russia. We apply a vector autoregression (VAR) to quantify the effects of oil price shocks as well as western economic sanctions on real GDP, real effective exchange rate, inflation, real fiscal expenditures, real consumption expenditures, and external trade using quarterly data from 1999:1 until 2015:1. Our results show a significant impact of oil prices on the Russian economy. We predict that Russia's economic outlook is not very optimistic. If sanctions remain until the end of 2017, the quarter-to-quarter real GDP will contract on average by 19 percent over the next two years.

1. Introduction

For much of the past decade, oil prices have been high – bouncing around $100 per barrel since 2010 – due to soaring oil consumption in countries like China and conflicts in key oil nations like Iraq. Oil production in conventional fields could not keep up with demand, so prices spiked. High prices benefited oil exporters like Russia at the expense of oil importers. Soaring oil prices spurred companies in the US and Canada to start drilling for new, hard-to-extract crude in North Dakota's shale formations and Alberta's oil sands. Then, over the last year, demand for oil in places like Europe, Asia, and the US began tapering off, thanks to weakening economies and new efficiency measures. Added to this is the fact that the oil cartel OPEC decided not to cut production as a way to prop up prices. By late 2014, world oil supply was on track to rise much higher than actual demand, as shown in Fig. 1. Since summer of 2014, the price of crude oil has declined by more than half. If back in June 2014, the price of Brent crude oil was up around $111 per barrel, in January 2015, it had fallen down to $48 per barrel, as can be seen in Fig. 2.

At the start of 2014, Russia was already suffering from weak economic growth due to the ongoing crisis in Ukraine. In November 2013 Ukraine's President Viktor Yanukovych refused to sign a European Union Association Agreement (EUAS), which meant to create a framework for cooperation between Ukraine and the European Union (EU). Viktor Yanukovych's rejection sparked mass protests on the streets of Kiev. Russia backed ousted Yanukovych, annexed Crimea in March of 2014 and invaded eastern Ukraine. In response, the US and Europe levied sanctions on Russian government officials through assets freezes, visa bans, and controls on exports of energy technology that would have helped Russia develop its Arctic. Countering such actions Russia banned food imports from the West. Fig. 3 shows a detailed timeline for Ukraine-related sanctions.

The Ukraine crisis with several waves of Western economic sanctions imposed on Russia combined with a 50-percent drop in the global oil prices, Russia's key commodity, put even further strain on the Russian economy. After the country's 1998 financial crisis, most of the oil produced has come from drilling and re-drilling old Soviet oil fields, squeezing more black gold out of the

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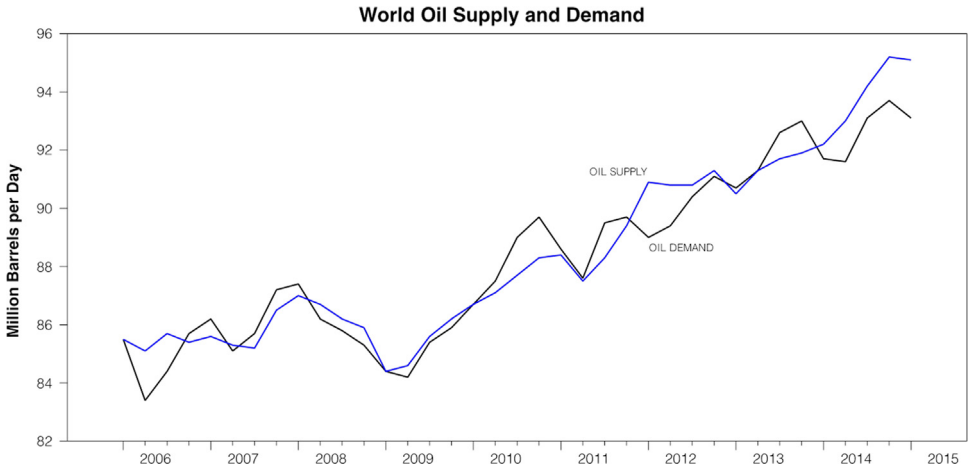


Fig. 1. World oil supply and demand. *Source*: International Energy Agency.

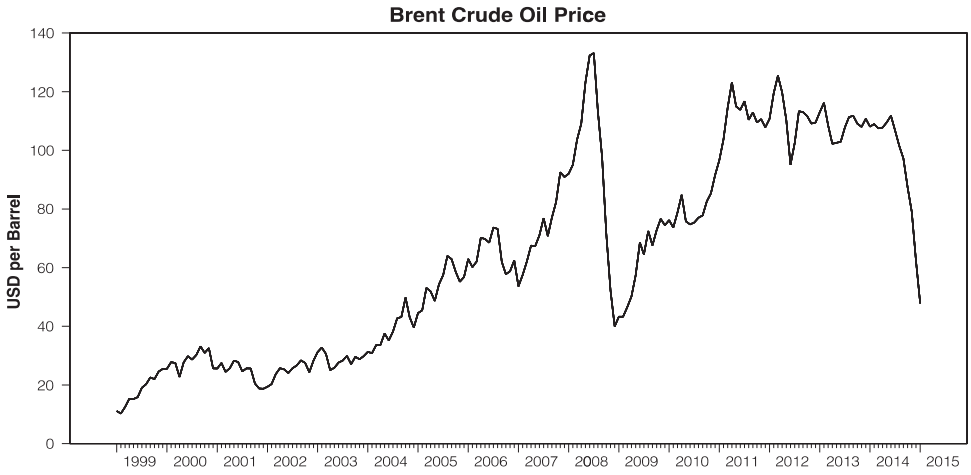


Fig. 2. Brent crude oil price. *Source*: Global Financial Data.

same ground. Over many years, almost no efforts were made to develop new fields. The oil wealth is drying up. In response to falling oil prices, the Russian economy started to fall into recession. Official data shows that in 2014 the real GDP grew by only 0.4 percent. Over the last year, the official annual inflation rate increased from 6 percent to 9 percent. Food prices climbed by 25 percent. Between June and December 2014, the Russian ruble declined in value by 59 percent relative to the U.S. dollar. If in 2009–2013 private-sector net capital outflows averaged $57 billion annually, in 2014 it increased sharply to $152 billion, according to

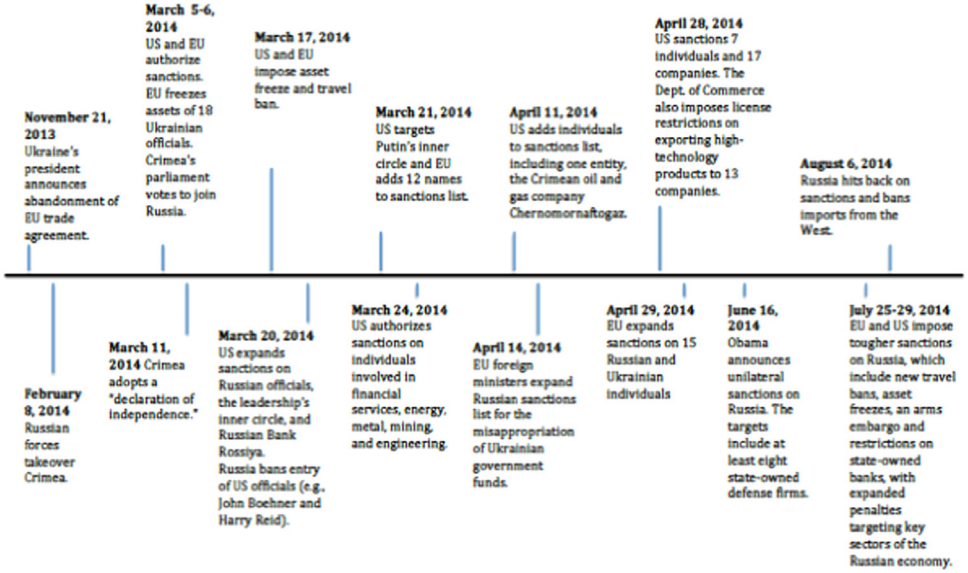


Fig. 3. Timeline for Ukraine-related sanctions. *Source*: Peterson Institute for International Economics.

Standard & Poor's. In December last year, the Central Bank of Russia (CBR) pushed interest rates all the way up to 17 percent. Apparently, a big drop in the price of oil and geopolitical problems have been very devastating to the Russian economy.

Falling oil prices paired with international sanctions imposed on Russia have drawn considerable attention of politicians and economists over the last year. But despite the general recognition of the importance of both issues, no empirical studies exist that numerically quantify the effects of both the oil price shock and the imposition of economic sanctions on Russian macroeconomic dynamics. To some extent, data problems partly explain the lack of empirical macroeconomic work on Russia's economy. The time series for Russia are at times either missing or inconsistent. Although we were able to find a few papers that study the relationship between oil prices and Russia's macroeconomic performance, all of them cover the time when energy prices had a tendency to grow, leaving the macroeconomic effects of falling oil prices outside the analysis. The economic sanctions literature is not more optimistic either. To the best of our knowledge, most research on sanctions is policy-oriented and primarily discusses the effectiveness and usefulness of sanctions as a substitute for war. But none of the papers we have seen provides a theoretical model that allows us to numerically estimate the impact of sanctions on economic growth in Russia.

The contribution of this paper is to propose a tractable, quantitative, macroeconomic framework that quantifies the impact of the most recent decline of oil prices together with the imposition of economic sanctions on the Russian economy. Identifying and simultaneously estimating the effects of falling oil prices and Western sanctions is crucial since it would help us measure its effects on GDP and its main components and possibly prescribe better policies to prevent future economic crises. We use a vector autoregression methodology (VAR) and employ the most recent quarterly data sets for Brent oil prices, Russian GDP, household and government consumption expenditures, investment, exports and imports of goods and services, inflation and real effective exchange rate that became available in late spring 2015. We use a dummy variable to represent economic sanctions, assuming a value of 1 after 2014:2 and 0 otherwise.[1] The results indicate that the Russian economy is highly responsive to both oil price fluctuations, which confirms the common perception of Russia's dependence on oil, and economic sanctions. In the end, we provide a two-year economic forecast for 2015–2017.

The remainder of the paper is organized as follows. Section 2 discusses previous literature relevant to our study. Section 3 deals with the data issues and describes a VAR methodology. Section 4 outlines the forecast for Russia for 2015–2017. Section 5 contains the concluding remarks.

2. Literature review

There exists a plethora of economic studies investigating the impact of oil price fluctuations on macroeconomic performance in industrialized countries and emerging economies. Most of these studies concentrate on the effect of oil prices on the economic growth, inflation dynamics, investment, current account balance, and the exchange rate. Since the oil crisis of the 1970s, economists have been trying to estimate the effects of oil price volatility in oil importing as well as oil exporting economies, both small and large. As it is well understood, the findings differ depending on whether the economy is an oil-exporter or oil-importer. In addition, since oil prices had a tendency to rise for much of the last decade, most of the existing literature analyzed the high oil price phenomenon. Let us review some of the work before we proceed to the model.

Small oil importing countries are price takers in the international market due to their size. Their demand is not of a significant magnitude, which does not empower them to exert influence on the international market. Thus, they take oil prices as given. For such countries, high oil prices are undoubtedly associated with low economic growth. High energy prices adversely affect consumer spending through disposable income, fuel the higher costs of production, lower profits, and, as a result, cause the growth rate to fall (see, e.g., Hamilton, 1983, 1996, 2003; Burbidge and Harrison, 1984; Mork, 1989; Mork et al., 1994; Federer, 1996; Finn, 2000; Jiménez-Rodriguez and Sánchez, 2005; Prasad et al., 2007; Jayaraman and Choong, 2009; Korhonen and Ledyaeva, 2010; Bjornland, 2000; Farzanegan and Markwardt, 2009; Özlale and Pekkurnaz, 2010). As an example, Aydin and Acar (2011) analyzed the economic effects of oil price shocks in Turkey and confirmed that high oil prices cause reduction in output and consumption. According to Özlale and Pekkurnaz (2010), most of the small open oil importing economies do not succeed in generating enough savings, which is necessary to ensure high investment levels and sustainable growth. The increased dependency on energy imports destabilizes these economies and results into high ratios of current account deficits. Furthermore, with the increase in oil prices, money demand also increases, which causes inflation to rise and investments to fall (see, e.g., Eryiğit, 2012; Tang et al., 2010).

Unlike small economies, large oil importing economies – the economies that have the market power to affect world oil markets – are less sensitive to oil price shocks. Research shows that in countries like the U.S., Europe and China, while the impact of oil price fluctuations is still present, the negative effects of rising oil prices pale in comparison to small oil importing economies. It is true that any shift in oil price results in substantial revisions in these countries' national budgets, but, as shown in Zaouali (2007), the negative effect is not as severe due to strong investment and foreign capital inflows that can offset the adverse effects of high oil prices.

On the other hand, oil exporting countries, like OPEC, Russia, Norway, and Canada, benefit from high oil price. High oil prices help net oil exporters generate high profits (see, e.g., Mork et al., 1994; Bjornland, 2000; Korhonen and Ledyaeva, 2010; Rautava, 2004; Ross DeVol, 2015). In this regard, Mork et al. (1994) and Bjornland (2000) showed a positive effect of oil price volatility on the Norwegian economy. Rautava (2004) reported a positive effect of oil price increase on the Russian economy. He found that a 10 percent increase in oil prices leads to a 2.2 percent growth in Russia's GDP. Ito (2010) also studied the impact of the rising oil prices on the Russian economy and reported a 0.46 percent growth in Russia's GDP in response to a 1 percent increase in oil prices. According to Beck et al. (2007), the positive effect of rising oil prices on Russia's GDP growth increases over time, but it can be hampered by the real effective exchange rate appreciation, which stimulates imports. On the contrary, negative oil price shocks adversely affect output growth. For instance, Cukrowski (2004) argued that for Russia low oil prices have the potential to destabilize the overall economy through a setback to output and fiscal revenue. In addition, Mehrara (2008) found that in heavily oil-dependent countries, oil revenue shocks affect output asymmetrically, that is, output growth is adversely affected by the negative oil shocks whereas positive oil shocks play a limited role in economic growth. Farzanegan and Markwardt (2009) also found an asymmetric relationship between oil price shocks and industrial production.

[1] The authors consider three scenarios. The first scenario assumes that the US and EU sanctions will be in place throughout 2017. That is, the dummy variable takes on a value of 1 from 2014:2 until 2017:4. In the second scenario, the sanctions are valid until 2016:4. The third and last scenario is when sanctions are removed at the end of 2015:4.

Some research suggests that oil prices tend to influence the exchange rates. As an example, Akram (2004) and Rautava (2004) studied the cases of Norway and Russia and found that for oil exporting economies, an increase in oil price results in an exchange rate appreciation. Farzanegan and Markwardt (2009) found that an increase (decrease) in oil prices appreciates (depreciates) the real effective exchange rate in Iran. On the other hand, Ito (2010) found that a rise in oil price causes the Russian currency to depreciate both in the short run and long run. Méndez-Carbajo (2011) found that for small open economies like that of the Dominican Republic, the rise in oil prices causes depreciation of the local currency.

There are a few economic studies that concentrate on the indirect effects of oil price rise from both the exporters' and importers' perspectives. For example, high oil prices lower aggregate income in oil importing countries and reduce the export demand of oil supplied by oil producing countries. At the same time, households and firms start consuming more oil produced domestically and by doing so help local producers generate higher earnings (see, e.g., Abeysinghe 2001; Korhonen and Ledyaeva 2010).

Our analysis is closely related to Rautava (2004)'s and Ito (2008, 2010)'s research but has several innovations. For instance, using a VAR model and a cointegration framework, Rautava (2004) examines the effect of oil price and real exchange rate changes on GDP and fiscal revenues. He uses quarterly data on real GDP, federal government revenue, the real effective exchange rate and oil prices from 1995:1 until 2001:3. Real GDP, federal government revenue, and the real effective exchange rate are modeled as endogenous variables whereas international oil prices are treated as an exogenous variable. All are expressed in logarithmic form. Ito (2008) uses the co-integrated VAR to investigate the effects of oil price on real GDP, inflation, and interest rate. He also uses quarterly data that spans from 1995:3 until 2007:4. Ito (2010) extends his previous work on the impact of oil prices on the macroeconomic performance in Russia and now includes real oil prices, real GDP, inflation and real effective exchange rate from 1994:1 until 2009:3. Compared to the previous research done on Russia, our analysis covers the period from 1991:1 until 2015:1. We use quarterly data on real GDP and all major GDP components (seasonally adjusted) expressed in real terms and model them as the first difference. International oil prices are treated as an endogenous variable in our model. We also introduce a new dummy variable for sanctions. We select these variables because they are the most commonly used in the business cycle theory.

Since we attempt to model sanctions, let us briefly describe some research work done on economic sanctions. Many scholars argue that sanctions are largely ineffective (see, e.g. Galtung, 1967; Knorr, 1975; Bienen and Gilpin, 1980; Von Amerongen, 1980; Lindsay, 1986; Doxey, 1987; Pape, 1997; Haass, 1997). The success rate of sanctions ranges from less than 5 percent historically to approximately 34–38 percent at best (see, e.g., Hufbauer et al., 1990; Pape, 1997; Drezner, 1999). Politicians and policy makers largely consider them as a substitute for war but always debate about their effectiveness. Drezner (1999) uses game theory to predict whether to impose sanctions or not, and if implemented, how effective those sanctions are. He argues that the imposition of sanctions causes a deadweight loss of utility for both the sender country and target country, and thus both countries try to find a compromise and make an agreement before imposition. He suggests that if the sender country incurs small economic costs in relation to GDP in imposing sanctions, while the target country incurs tremendous losses, the large gap in opportunity costs makes both the sender more likely to impose sanctions and the target country more likely to concede.

Now, what are the incurring costs of economic sanctions for Russia? The multilateral economic sanctions due to the Russia–Ukraine geopolitical tensions have hit the Russian economy through three main channels. First, these tensions led to massive capital outflows, deteriorating Russia's capital and financial account balance. Further, falling oil prices caused the ruble to lose half of its value against the US dollar. The depreciation of the ruble increased inflationary pressures, resulting in a significant tightening of monetary conditions. This increased costs to borrowing, further restricting access to domestic credit for both investors and consumers. Second, the sanctions restricted Russia's access to international financial markets, as most Western financial markets were closed to Russian banks and companies. Third, business and consumer confidence deteriorated as a result of increased uncertainty. further contracting consumption and investment activities. Lastly, foreign direct investment into Russia fell significantly in the first three quarters of 2014. Compared to the same quarters in 2011–2013, foreign direct investment decreased by 47 percent (World Bank Group, 2015). The sanctions have also had substantial impact on trade flows. Russia's ban on food imports from Western countries and the weakening exchange rate resulted in a plunge in imports.

3. Econometrics analysis

To quantify the impact of a recent fall in oil prices on the Russian economy, we collect quarterly data for the period of 1999:1 to 2015:1. The variables used in the model include: inflation rate (INFL), measured by the percentage changes of consumer price index (CPI, 2010=100); real effective exchange rate (REER, 2010=100); real oil prices (ROP); real GDP at constant 2010 prices (RGDP_2010), real household consumption expenditure (RCP), real government consumption expenditure (RCG), real investment (RI), real exports (RX), and real imports (RM). The consumer price index is used as a deflator to obtain real figures. Identifiable seasonality is present in almost all variables, except real oil prices, real effective exchange rate and inflation. As such, they are seasonally adjusted (SA) using a moving-average multiplicative decomposition. Thus, there is no need to include seasonal dummies in the model.

For oil prices, we use quarterly Brent crude oil prices, provided by the International Energy Agency (IEA), and then deflate them by CPI. It could well be argued that West Texas Intermediate oil prices or Urals oil prices could also be employed. Since these three oil price measures are highly correlated, utilizing Brent crude oil does not change the main findings of the paper. The rest of the data is taken from the IMF International Financial Statistic (IFS) and Global Financial Data (GFD) online portals.

We have chosen the vector autoregression (VAR henceforth), developed by Sims (1980), to analyze the relationship of selected variables with each other. In general, a VAR is an n-equation, n-variable model in which each variable is in turn explained by its own lagged values, plus (current) and past values of the remaining $n-1$ variables. The multivariate generalization of an autoregressive process can be written as

$$Z_t = A_0 + \sum_{i=1}^{p-1} A_i Z_{(t-i)} + \gamma SANC_t + \epsilon_t, \quad \epsilon_t \sim i.i.d.(0, \Omega)$$

where Z_t is an $n \times 1$ vector containing each of the n variables included in the VAR; A_0 is an $n \times 1$ vector of intercept terms; A_i, $i = 1, \ldots, p-1$, is an $n \times n$ matrices of coefficients; and ε_t is an $n \times 1$ vector of error terms for $t = 1,2, \ldots, T$. In addition, ε_t is an independently and identically distributed (*i.i.d.*) with zero mean, $E(\varepsilon_t)=0$ and an $n \times n$ symmetric variance–covariance matrix Ω, $E(\epsilon_t \epsilon_t') = \Omega$. The variable $SANC_t$ is the sanction variable used as

Table 1
Dickey–Fuller unit root test.

Variables	Constant+Trend
REALBRT_R	−3.27456
DREALBRT_R	−6.69103**
RGDPSA_2010	−1.57442
DRGDPSA_2010	−7.72990**
RCPSA	−0.69865
DRCPSA	−4.62250**
RCGSA	−0.71368
DRCGSA	−7.43639**
RISA	−1.83076
DRISA	−8.74126**
RXSA	−2.78860
DRXSA	−6.09431**
RMSA	−2.73976
DRMSA	−6.77091**
REER	1.58758
DREER	−6.39567**
INFL	−4.26737**

Note: Unit-root computations are made using RATS 8.2, which computes the Dickey–Fuller *t*-test. The regression includes a time-trend and a constant with zero lags.
*Significant at the 5% level.
** Significant at the 1% level.

dummies in the empirical specification. It takes on a value of 1 from 2014:2, which is the time when the US and EU imposed the first round of sanctions on Russia.

Macroeconomic time series are often non-stationary. To do proper forecasts, all series must be stationary. Considering the small sample size, we apply the Dickey–Fuller *t-test* to check for stationarity. Assuming the null hypothesis of unit root is adopted, if the *t-statistic* in absolute value is smaller than all the critical values, the data are non-stationary. On the other hand, if the *t-statistic* is larger than the critical values at 1%, 5% and 10% significance levels, then the data are stationary. Test results are shown in Table 1.

The results of the Dickey–Fuller *t-test* indicate that the series are non-stationary when the variables are defined in levels, except inflation (INFL). All non-stationary series are expressed in the first-difference form.

The number of coefficients in each equation of a VAR is proportional to the number of variables in the VAR. We have to acknowledge the fact that the more variables we select, the more lags we use and the higher the amount of estimation error, which can result in a deterioration of the accuracy of the forecast. We select nine (endogenous) variables for the VAR model. A constant term and a dummy variable are treated as exogenous. Compact form of the system of equations becomes

$$Z_t = A_0 + A_1 Z_{t-1} + \gamma SANC_t + \epsilon_t,$$

where $Z_t = \begin{bmatrix} DREALBRT\_R_t \\ DRGDPSA\_2010_t \\ DRCPSA_t \\ DRCGSA_t \\ DRISA_t \\ DRXSA_t \\ DRMSA_t \\ INF_t \\ DREER_t \end{bmatrix}$.

To determine the optimal lag selection, we have used Akaike information criterion (AIC). In this study, the optimal lag is one.

Table 2
VAR lag selection.

Lags	AIC criterion
0	14,689.4715
1	14,602.5515[a]
2	14,701.9951
3	15,036.7172
4	15,840.4248

[a] Indicates lag order selected by the criterion.

The results are shown in Table 2.

After estimating the model over the sample period from 1999:2 to 2015:1, we obtain impulse response functions for periods 1 through 10 for each of the nine shocks. Table 3 provides the impulse responses of selected variables to shocks in the real Brent crude oil (*DREALBRT_R*) price. Note that all variables are expressed in the first difference.

Table 3 shows that the effect of one-standard-deviation shock in the first difference of real price of oil (*DREALBRT_R*) on eight variables used in the model. As shown in Table 3, *DREALBRT_R* (equal to 2.73 units) induces a contemporaneous increase in *DRGDPSA_2010* of 2,023,233,465.72 units and a contemporaneous increase in *DRXSA* of 1,287,261,821.77 units. After one period, *DREALBRT_R* is still 0.40 units above its mean, while *DRGDPSA_2010* is still 1,990,564,828.35 units higher. But after two periods *DRGDPSA_2010* drops significantly to 29,727,966.21. This can be clearly seen in Fig. 4(a).

One difficulty with the impulse responses reported above is that they are not standardized to account for differences in the units of measure. Thus, we adapt our program segment and divide each response by the standard deviation of the appropriate residual variance. The standardized impulse responses are plotted in Fig. 4(b). We can see that once the real price of oil falls, all of the variables, excluding inflation, also decrease.

In Table 4, the first column in the output is the standard error of forecast for this variable in the model. The remaining columns provide the variance decomposition. In each row, they add up to 100 percent. In our sample, 30.51 percent of the variance of the one-step forecast error of the first difference of real GDP (*DRGDPSA_2010*) is due to the oil price fluctuations (*DREALBRT_R*) and 69.5 percent is due to the innovation in the first difference of real GDP itself (*DRGDPSA_2010*). However, the more interesting information is at the longer steps, where the interactions among the variables start to become felt. We have truncated this table to 10 lags to keep its size manageable, but ordinarily one should examine at least four year's worth of steps. According to Table 4, the four principal factors driving real GDP (*DRGDPSA_2010*) are GDP itself (*DRGDPSA_2010*), real oil prices (*DREALBRT_R*), real consumption (*DRCPSA*), real investment (*DRISA*), and real imports (*DRMSA*). As Table 4 shows, the *DRGDPSA* explains 50.1 percent of its 10-step ahead forecast error variance, *DREALBRT_R* explains 35.5 percent, *DRCPSA* explains 4.9 percent, *DRISA* explains 3.1 percent, and finally *DRMSA* explains 3.1 percent of the forecast error variance in *DRGDPSA_2010*. The other variables have negligible explanatory power for *DRGDPSA_2010*.

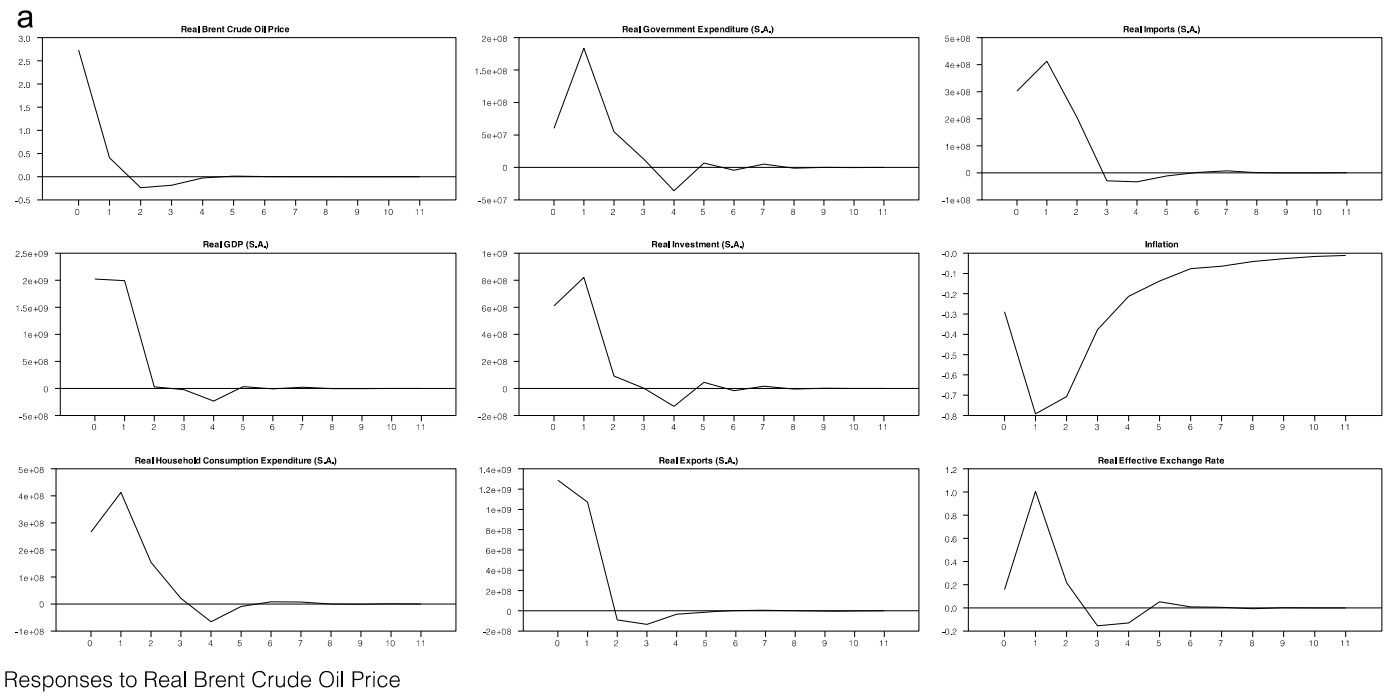
4. Economic forecasting

We use our nine-variable VAR model to do forecasting for 2015–2017. Sanctions are treated as an exogenous variable. Table 5 provides the forecast for the selected variables under different scenarios. In Table 5(a) we show the numerical estimates of the

Table 3
Impulse responses of selected variables to the shocks in the real crude oil and real GDP.

Entry	*DREALBRT_R*	*DRGDPSA_2010*	*DRCPSA*	*DRCGSA*	*DRISA*	*DRXSA*	*DRMSA*	*INFL*	*DREER*
Responses to shock in *DREALBRT_R*									
1	2.73027138	2,023,233,465.722774	266,073,643	60,140,048	609,914,343	1,287,261,821.766380	302,075,229	−0.28870282	0.15747918
2	0.40897450	1,990,564,828.346367	413,101,822	183,652,103	820,832,100	1,071,935,591.824393	412,917,771	−0.79227807	1.00455772
3	−0.23930261	29,727,966.212621	154,320,833	54,978,095	92,055,019	−88,717,943.631890	204,666,216	−0.70740403	0.21770700
4	−0.18301081	−24,165,269.039806	21,355,558	12,431,314	1,306,116	−133,029,393.351509	−29,177,471	−0.37680297	−0.15510611
5	−0.02906369	−232,308,714.258568	−65,475,526	−36,049,638	−133,071,915	−32,465,444.049045	−33,609,067	−0.21240715	−0.13045393
6	0.01387325	31,779,482.646454	−9,169,118	6,551,658	45,027,953	−12,829,504.097800	−11,032,479	−0.13751743	0.05222322
7	0.00438291	−7,968,163.435865	8,525,682	−4,423,573	−16,074,980	4,114,813.496807	1,154,205	−0.07646555	0.00798352
8	0.00048017	22,911,265.185820	7,279,399	5,128,967	16,832,810	2,708,994.663106	7,473,572	−0.06450937	0.00575156
9	−0.00222638	−1,793,724.804574	−114,304	−1,038,472	−3,933,628	1,624,012.267901	802,411	−0.04086011	−0.00759604
10	−0.00270838	−2,535,470.766582	−1,017,087	61,689	1,023,888	−1,968,291.390965	−149,386	−0.02719712	0.00297373
Responses to shock in *DRGDPSA_2010*									
1	0.00000000	3,053,216,134.011144	456,183,744	285,946,575	1,993,216,284.285092	831,563,487	292,978,110	0.069082366	0.31447761
2	0.13381359	−1,105,545,801.875696	−143,270,599	−171,184,790	−663,190,637.658722	93,833,319	263,413,320	0.159486164	−0.12527412
3	−0.16411145	830,967,952.913152	149,519,768	164,496,349	652,172,016.055992	−145,803,174	−26,081,669	0.151428257	0.48842956
4	−0.04876871	−561,627,235.380180	−40,454,776	−104,210,127	−457,352,551.220062	−20,850,837	−24,207,680	0.236968109	−0.33163584
5	0.02827048	216,741,831.695320	−4,135,408	51,442,491	208,050,065.790845	−4,076,864	9,049,981	0.046598114	0.07315162
6	0.00822688	−101,416,633.051128	−17,026,988	−30,399,918	−107,617,664.543601	17,927,849	−17,912,975	0.096699187	−0.05330242
7	−0.00029524	38,734,365.757877	4,861,048	12,990,570	49,635,550.339819	−7,635,412	6,250,490	0.033845749	0.05383231
8	0.00283138	−4,933,846.083888	4,342,105	−3,470,974	−16,374,800.338876	1,898,807	−1,277,002	0.035878303	−0.02033096
9	0.00046001	2,387,727.910251	−2,161,328	1,108,306	3,938,899.843218	3,384,195	1,355,336	0.015149347	0.00032342
10	0.00051934	−983,341.447877	−831,535	−406,280	−841,530.971709	−736,921	−941,180	0.012302762	0.00005704

Note: All variables are expressed in first differences. Sanctions are imposed throughout 2017:04.



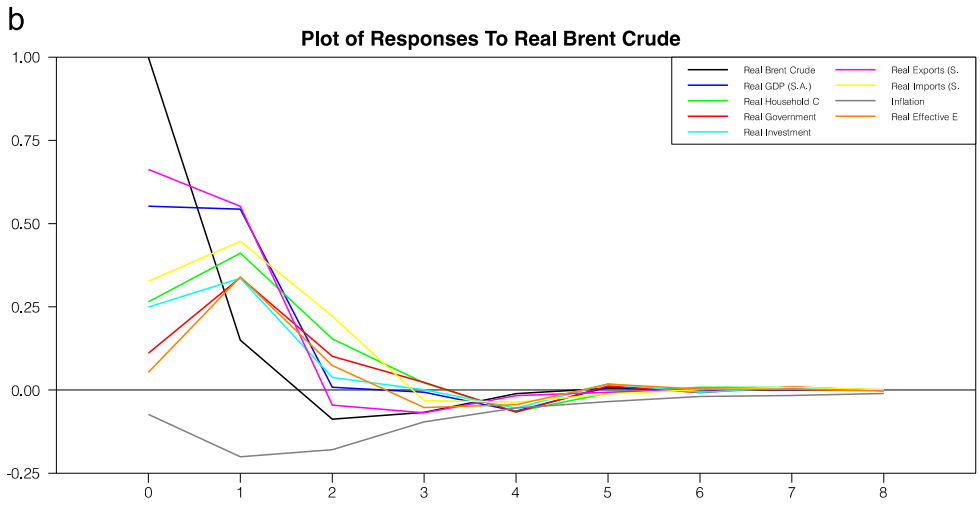


Fig. 4. (a) Impulse responses to shocks in the Brent crude oil. *Note:* All variables are expressed in first differences. (b). Standardized impulse responses to shocks in the Brent crude oil. *Note:* All variables are expressed in first differences.

forecast for the first difference of the selected macroeconomic variables when sanctions are imposed throughout 2017:4. Table 5 (b) and Table 5(c) show the forecasts when sanctions are imposed until 2016:4 and 2015:4, respectively.

Every variable, except inflation, is expressed in terms of the first differences and listed in the corresponding column. To get a better idea of how each macroeconomic variable will respond to the shock of oil prices and economic sanctions, we have expressed

Table 4
Decomposition of variance for series *DRGDPSA_2010*.

Step	Std. error	*DREALBRT_R*	*DRGDPSA_2010*	*DRCPSA*	*DRCGSA*	*DRISA*	*DRXSA*	*DRMSA*	*INFL*	*DREER*
1	3,662,731,551.425322	30.513	69.487	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	4,444,387,346.025604	40.784	53.382	3.367	0.281	0.662	0.610	0.527	0.009	0.379
3	4,710,318,918.611965	36.313	50.637	4.881	0.515	2.939	1.333	2.788	0.014	0.582
4	4,761,715,278.036043	35.535	50.941	4.803	0.696	3.060	1.310	3.052	0.014	0.589
5	4,775,792,802.937173	35.563	50.847	4.806	0.709	3.042	1.313	3.057	0.013	0.650
6	4,779,645,623.589170	35.510	50.810	4.850	0.719	3.052	1.312	3.075	0.014	0.659
7	4,780,078,196.240484	35.504	50.807	4.851	0.721	3.054	1.311	3.078	0.014	0.659
8	4,780,169,721.516589	35.505	50.806	4.851	0.721	3.054	1.312	3.079	0.014	0.659
9	4,780,187,733.477399	35.505	50.805	4.851	0.721	3.054	1.312	3.079	0.014	0.660
10	4,780,190,144.225545	35.505	50.805	4.851	0.721	3.054	1.312	3.079	0.014	0.660

Note: All variables are expressed in first differences. Sanctions are imposed throughout 2017:04.

Table 5
Russia's forecast for 2015–2017.

Entry	*DREALBRT_R*	*DRGDPSA_2010*	*DRCPSA*	*DRCGSA*	*DRISA*	*DRXSA*	*DRMSA*	*INFL*	*DREER*
(a)									
2015:02	−7.44260926	−5,447,462,294.105593	−2,103,801,338.228843	42,275,928.249365	1,499,878,256.162802	−6,137,156,675.920204	−2,687,434,870.561536	20.87139504	5.66561882
2015:03	−2.64877117	−8,513,485,117.918602	−774,614,938.937302	−1,326,609,256.012073	−6,002,703,918.270302	−2,188,958,917.390739	−1,178,141,915.001744	22.73587185	−8.17128731
2015:04	−1.23054989	−2,070,590,506.559486	−1,815,423,628.353830	−377,224,590.718124	−1,302,364,010.766618	1,043,623,324.131592	−317,560,024.337248	19.73425351	−6.86757481
2016:01	−2.05222139	−4,784,149,025.978889	−2,235,784,082.574301	−914,778,684.612624	−2,885,712,153.786951	272,640,620.413795	−760,407,997.463221	19.58585247	−5.22415433
2016:02	−2.53176228	−4,314,288,835.379646	−1,704,923,297.377430	−646,683,745.828699	−2,139,363,591.552138	−562,247,709.038651	−745,015,152.746771	19.54964058	−4.21889518
2016:03	−2.34327452	−4,434,138,873.681705	−1,631,450,413.521368	−720,954,412.090546	−2,598,569,002.273516	−342,978,226.751355	−684,613,775.159366	19.51115066	−5.38479128
2016:04	−2.26610126	−4,303,279,358.982455	−1,795,126,179.026073	−706,683,303.319217	−2,449,377,804.115297	−153,563,702.218105	−667,958,258.167885	19.24814771	−5.38449084
2017:01	−2.31090784	−4,416,943,234.674351	−1,816,879,947.343030	−727,517,147.458624	−2,479,678,297.454096	−234,121,418.263431	−710,439,599.652244	19.20804783	−5.17519189
2017:02	−2.33466580	−4,402,484,828.580368	−1,768,797,572.204194	−716,550,460.554144	−2,463,251,634.884093	−280,034,261.519112	−706,053,781.190586	19.19983757	−5.12725143
2017:03	−2.31762248	−4,378,456,458.446338	−1,760,169,010.434468	−714,736,416.873584	−2,470,119,203.003137	−257,080,873.599083	−693,585,329.072257	19.17003770	−5.20354348
2017:04	−2.31468178	−4,377,345,789.731367	−1,773,722,378.557308	−716,276,502.498826	−2,468,150,074.009276	−242,997,244.102967	−693,761,084.634377	19.14025092	−5.20925137

Note: All variables are expressed in first differences. Sanctions are imposed throughout 2017:04.

(b)

2015:02	−7.44260926	−5,447,462,294.105593	−2,103,801,338.228843	42,275,928.249365	1,499,878,256.162802	−6,137,156,675.920204	−2,687,434,870.561536	20.87139504	5.66561882
2015:03	−2.64877117	−8,513,485,117.918602	−774,614,938.937302	−1,326,609,256.012073	−6,002,703,918.270302	−2,188,958,917.390739	−1,178,141,915.001744	22.73587185	−8.17128731
2015:04	−1.23054989	−2,070,590,506.559486	−1,815,423,628.353830	−377,224,590.718124	−1,302,364,010.766618	1043,623,324.131592	−317,560,024.337248	19.73425351	−6.86757481
2016:01	−2.05222139	−4,784,149,025.978889	−2,235,784,082.574301	−914,778,684.612624	−2,885,712,153.786951	272,640,620.413795	−760,407,997.463221	19.58585247	−5.22415433
2016:02	−2.53176228	−4,314,288,835.379646	−1,704,923,297.377430	−646,683,745.828699	−2,139,363,591.552138	−562,247,709.038651	−745,015,152.746771	19.54964058	−4.21889518
2016:03	−2.34327452	−4,434,138,873.681705	−1,631,450,413.521368	−720,954,412.090546	−2,598,569,002.273516	−342978,226.751355	−684,613,775.159366	19.51115066	−5.38479128
2016:04	−2.26610126	−4,303,279,358.982455	−1,795,126,179.026073	−706,683,303.319217	−2,449,377,804.115297	−153,563,702.218105	−667,958,258.167885	19.24814771	−5.38449084
2017:01	0.47046801	−1,049,248,841.873494	−549,427,473.283015	53,703,211.173034	139,319,204.344126	−867,987,966.397836	−493,366,471.028275	17.44400143	2.48473261
2017:02	0.43050711	2,050,649,101.974288	1,222,070,420.355390	349,092,231.383311	492,296,736.279352	98,281,884.570170	51,150,148.186564	15.87942908	2.03898316
2017:03	0.46927319	1,884,443,036.688169	1,063,443,829.770251	391,821,264.710449	369,055,755.284581	645,294,588.953555	584,505,583.248454	13.51408982	0.60744420
2017:04	0.23780890	1,947,482,927.771046	799,215,233.608767	383,901,902.805882	579,221,445.521476	521,764,235.384573	406,651,411.320090	12.20284453	0.80731778

Note: All variables are expressed in first differences. Sanctions are imposed throughout 2016:04.

(c)

2015:02	−7.44260926	−5,447,462,294.105593	−2,103,801,338.228843	42,275,928.249365	1,499,878,256.162802	−6,137,156,675.920204	−2,687,434,870.561536	20.87139504	5.66561882
2015:03	−2.64877117	−8,513,485,117.918602	−774,614,938.937302	−1,326,609,256.012073	−6,002,703,918.270302	−2,188,958,917.390739	−1,178,141,915.001744	22.73587185	−8.17128731
2015:04	−1.23054989	−2,070,590,506.559486	−1,815,423,628.353830	−377,224,590.718124	−1,302,364,010.766618	1,043,623,324.131592	−317,560,024.337248	19.73425351	−6.86757481
2016:01	0.72915445	−1,416,454,633.178031	−968,331,608.514285	−133,558,325.980967	−266,714,651.988729	−361,225,927.720610	−543,334,868.839252	17.82180606	2.43577017
2016:02	0.23341063	2,138,845,095.175009	1,285,944,695.182153	418,958,946.108756	816,184,779.611308	−183,931,562.949369	12,188,776.630379	16.22923209	2.94733940
2016:03	0.44362115	1,828,760,621.452805	1,192,162,426.683353	385,603,269.493487	240,605,956.014203	559,397,235.801284	593,477,137.161345	13.85520278	0.42619640
2016:04	0.28638942	2,021,549,358.519957	777,811,433.140002	393,495,101.985491	597,993,715.415455	611,197,777.269437	432,454,237.786582	12.31074133	0.63207831
2017:01	0.06140676	1,268,684,386.183923	715,916,723.154845	286,379,591.739295	261,603,924.556316	274,654,162.951124	286,184,460.550059	11.72036357	1.08526187
2017:02	0.07192420	1,509,547,897.947765	865,739,584.565195	350,512,107.488358	439,628,762.734651	177,686,542.732506	323,240,005.573094	11.29626926	1.15069423
2017:03	0.12280268	1,533,148,199.323487	868,680,686.299200	335,252,700.145074	364,544,034.793390	286,064,187.138597	354,462,827.068396	10.97098746	0.92436904
2017:04	0.11457556	1,554,921,859.024626	839,518,305.684831	341,111,548.646016	412,154,748.184806	300,981,488.851411	360,936,509.036645	10.71644247	0.97941184

Note: All variables are expressed in first differences. Sanctions are imposed throughout 2015:04.

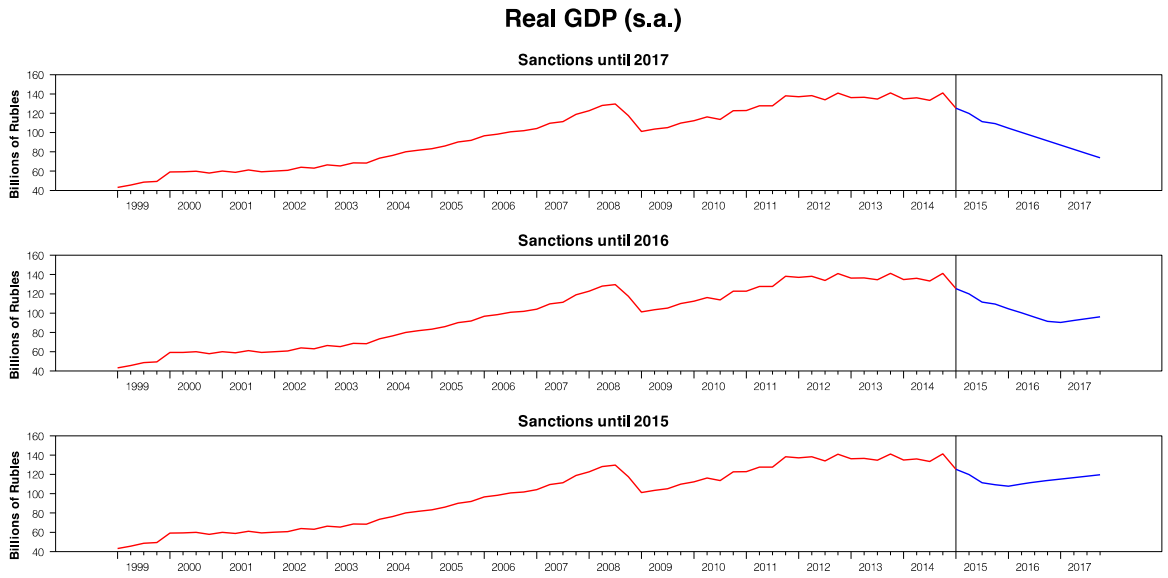


Fig. 5. Forecast of real GDP (seasonally adjusted) for 2015–2017.

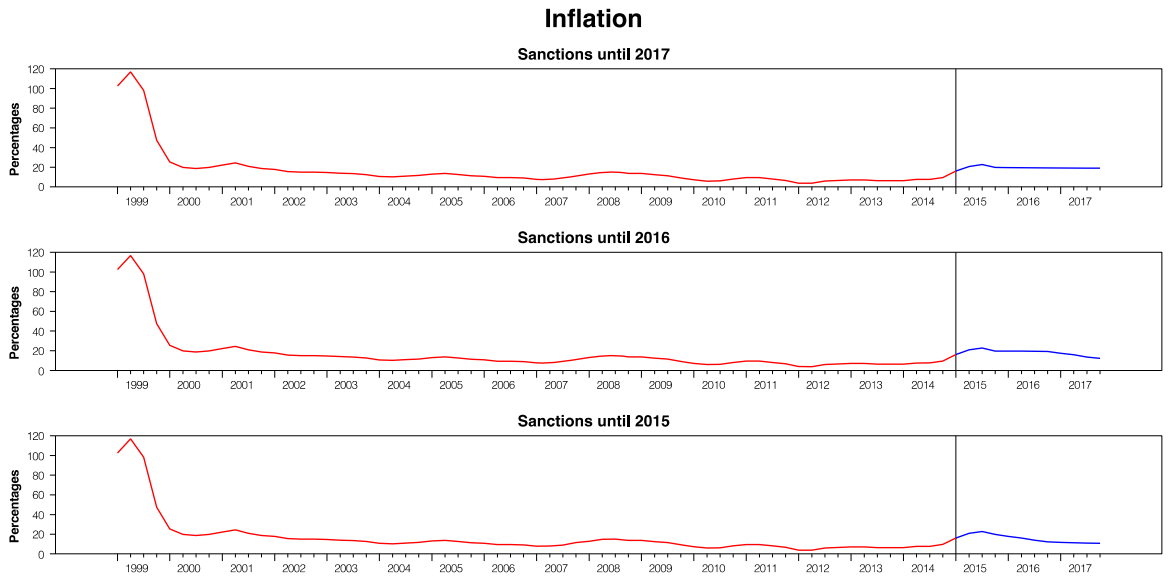


Fig. 6. Forecast of inflation (seasonally adjusted) for 2015–2017.

all variables in terms of their actual levels. Figs. 5–7 show a graphical representation of our forecast for real GDP, inflation, and the main GDP components for 2015–2017.

As shown in Fig. 5, the Russian economy is currently experiencing a slowdown due to the fall in the price of oil and Western sanctions. From 2014:4 to 2015:1, the real GDP (seasonally adjusted) fell from 2014:4 to 2015:1 by 37.92 percent at an annual rate. If sanctions continue to be implemented throughout 2017, our model predicts that on average the quarter-to-quarter real GDP (at 2010 prices) will fall at an annual rate of 21.74 percent in 2015, 16.32 in 2016, and 19.21 in 2017. If sanctions are to be removed at the end of 2016, the year of 2017 will look much better. The quarter-to-quarter real GDP may grow on average at a 5.45 percent annual rate in 2017. Finally, if the US and EU agree to remove the sanctions at the end of 2015 (which is highly unlikely), we predict that on average in 2016 we may see a quarter-to-quarter real GDP growth at a 4.33 percent annual rate and a 5.15 percent annual rate in 2017.

In retaliation to financial and trade sanctions brought by the EU, US and other countries, Russia banned imports of a wide range of U.S. and European foods (beef, pork, poultry, fish, fruit, vegetables, cheese, milk and other dairy products). Moreover, the decline in the value of the Russian ruble, beginning in the second half of 2014, sparked fears of a new wave of financial crisis. As the ruble plunged at the end of last year, millions of Russian consumers made panic purchases. People rushed out to buy imported cars, refrigerators, washing machines, TV sets and other major home appliances before they became even more expensive. The weaker ruble and Western sanctions on food imports pushed up inflation. According to IFS, inflation rate in Russia jumped from 7.68 percent to 9.58 percent in the last quarter of 2014 and to 16.2 percent in the first quarter of 2015, as shown in Fig. 6. We predict that the inflation will be around 19.5 percent over the next two years, which will certainly be above Russian Central Bank's 4.5 percent inflation target. We think that the Central Bank of Russia will try to keep inflation low and slow down consumer price growth. To earn market participants' confidence and attract investment, the CBR is likely to lower the discount rate by switching to a floating exchange rate regime and abandoning interventions. This is exactly what happened at the beginning of

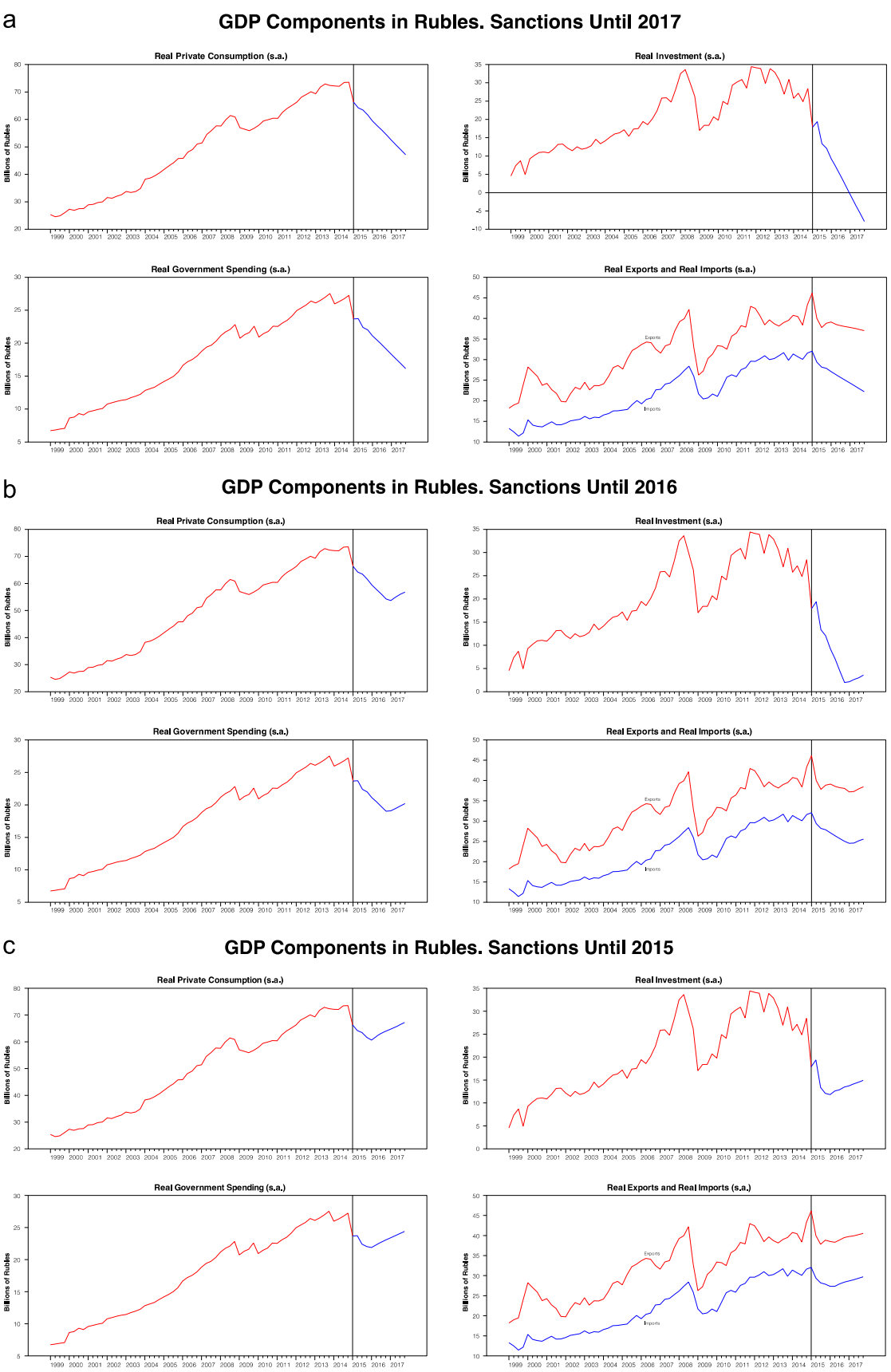


Fig. 7. (a) GDP components in rubles (seasonally adjusted) for 2015–2017 with sanctions imposed until 2017. (b) GDP components in rubles (seasonally adjusted) for 2015–2017 with sanctions imposed until 2016. (c) GDP components in rubles (seasonally adjusted) for 2015–2017 with sanctions imposed until 2015.

2015, when the CBR lowered the discount rate from 17 percent to 12.5 percent.

High prices caused a big decline in household consumption, personal savings, investment, and government spending. Imports were reduced by the contracting domestic demand and European sanctions. Due to a big depreciation of the ruble, we expect the prices of current imports to double in the future. This is likely to mean a shift from high-quality goods from Europe to lower quality goods from China, India, and Indonesia. Russia's export income declined due to the fall in oil prices. As for investment, the fact that the EU froze five state-controlled banks out of its capital market made it nearly impossible to send money overseas. The economy continues to grapple with serious inefficiencies in factor allocation, ruble depreciation, monetary tightening, capital flight, extinguished investment and a heightened perception of risk. In Fig. 7(a)–(c) we show the dynamic response of inflation, real household consumption, real investment, government spending and real exports and imports under different scenarios. Our model shows that if sanctions remain, in the first quarter of 2016 the real consumption will fall at a 13.7 percent annual rate, the real investment will fall at a 66.5 percent annual rate, real government spending will decrease by 15.6 percent annual rate, exports will rise at a 2.84 percent annual rate, and imports will contract at a 10.5 percent annual rate. The real effective exchange rate will drop at a 28 percent annual rate. In the face of increased uncertainty, it is hard to predict for sure the long-term behavior of GDP and its main components. Thus, we advise the reader to treat these forecasts with caution. We also think that as long as the Kremlin continues its aggression in eastern Ukraine, there is no reason to anticipate that the West will ease its financial and trade sanctions against Russia. As so, the economic future does not look too good.

5. Conclusions and policy implications

Before the global financial crisis of 2008–2009, Russia was among the fastest growing emerging countries due to high oil prices. However, the shale oil boom in the US and Canada, low demand in China, and petroleum efficiency in the advanced countries caused the global crude oil prices to fall by more than 50 percent last year. The decline in oil prices severely hurt Russia's economy. Using the vector autoregression analysis, we construct impulse response functions and variance decomposition to estimate the effect of oil prices and sanctions on Russia's macroeconomic variables. The results confirm that Russia is heavily affected by oil price fluctuations and economic restrictions as most of its export revenues come from petroleum products. We conclude that over the next two years, Russia's economy will not grow at all due to the harm caused by sanctions and a sharp decline in oil prices.

What should Russia do to grow back again? Following the principle consequences of a natural resource curse, Russia should not entirely depend upon its natural resources. Recall that the abundance of natural resources can harm the resource rich countries through the so-called Dutch disease and lead to an increase in corruption and deterioration of institutions. As Kalcheva and Oomes (2007) suggest, the symptoms of the Dutch disease are certainly present in Russia. Russia is a resource dependent economy and has little incentives to expand alternative industries especially while oil prices are high. The relatively high oil prices make prices of other goods relatively more expensive, which weaken consumer demand and make alternative sectors uncompetitive. Further, high wages in the resource extraction industry, and the difficult living conditions in the remote regions make those regions unattractive for alternative industry workers. Russia would not have been so adversely affected by the falling oil prices if it had developed a successful diversification plan. But, as Esanov (2012) and Gelb and Grasmann (2010) emphasized, a successful diversification plan requires political commitment, consistent policies, financial resources, and investment in human capital. Misaligned economic policies, inadequate diversification strategies, and weak institutions always hold back private investment and discourage economic growth. As the World Bank suggested, in order to secure future growth, Russia will have to find the way to expand other tradable industries. Otherwise, the long-run perspective of the Russian economy will not be very optimistic.

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