The ruble between the hammer and the anvil: The impact of economic sanctions and oil price

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Abstract

The exchange rate fluctuations strongly affect the Russian economy, given its heavy dependence on foreign trade and investment. Since January 2014, the ruble lost 50% of its value against the US dollar. The fall of the currency started with the conflict between Russia and Ukraine. The impact of the conflict on Russia may have been amplified by sanctions imposed by Western countries. However, as Russia is heavily dependent on exports of natural resources, the oil price decline starting in summer 2014 could be another factor behind the deterioration. By using high frequency data on nominal exchange and interest rates, oil prices, actual and unanticipated sanctions, we provide evidence on the driving forces of the ruble exchange rate. The analysis is based on cointegrated VAR models, where fundamental long-run relationships are implicitly embedded. The results indicate that the bulk of the depreciation can be related to the decline of oil prices. In addition, unanticipated sanctions matter for the conditional volatility of the variables involved.

Keywords: Military conflict, sanctions, oil prices, ruble depreciation.

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1 Introduction

The exchange rate fluctuations strongly affect the Russian economy, given its heavy dependence on commodity exports, foreign investment and imports of consumer goods. Since January 2014, the currency depreciated from about 33 rubles for 1 US dollar to its lowest value of nearly 70 rubles at the end of January, and it did not appreciate below 50 rubles for 1 US dollar so far. Thus, the ruble lost 50% or more of its value against the US dollar. The evolution of the ruble exchange rate with respect to the euro is similar, see Figure 1 depicting an evolution of the exchange rates over the last 16 years. This fall is unprecedented since 2001. Even the decline in the value of Russian currency during the world economic crisis of 2008-2009 is dwarfed compared to its depreciation in 2014.

In the most recent period, the ruble recovered a bit faster in euro terms, due to the euro depreciation against the US dollar. The fall of the ruble might be related to economic sanctions against Russia implemented by Western countries to force Russia to return to the status quo before the conflict with the Ukraine. The strong linkages to the Russian economy can likely explain the subsequent decline of currencies of most countries belonging to the Commonwealth of Independent States. While these developments are overwhelming, they are more dramatic for the Ukraine. Actually, the hryvnia lost two thirds of its initial value. Dreger and Fidrmuc (2011) discuss the role of the Russian factor in the earlier evolution of the GUS exchange rates.

-Figure 1 about here-

Many politicians argued that the introduction of sanctions are appropriate to dry up the military conflict, as they put high economic pressure on Russia. However, the world prices for oil and other natural resources have also fallen since Autumn 2014, partially because of the modest expansion of demand in main industrial countries and lower growth perspectives in huge emerging markets, such as China and Brazil. Oil supply factors have also been crucial for the development, including the OPEC decision to maintain high production levels and the steady increase in oil production from the non-OPEC states, especially in the US due to technological advances. This paper investigates the relative role of political and economic factors in the deterioration of the ruble. The exchange rate is intimately related to the economic performance of Russia.

Russia is one of the leading suppliers of oil and gas in the world economy. At the same time, industrial diversification is not highly developed. For example, two thirds of total exports and more than 50% of the bud-

get revenues depend on oil and gas. The strong reliance on commodity exports makes the country extremely vulnerable to shifts in global prices. While GDP growth exceeded 7% in most years of accelerating oil prices before the financial crisis, the expansion afterwards was modest, due to lower prices for natural resources and increasing difficulties to attract foreign direct investment. Because of the depreciation of the ruble, growth prospects worsened further. The currency losses led to collapsing government revenues, lower public spending and increasing inflation spurred by higher import prices. Non-oil exports did not benefit much, as the manufacturing sector is still uncompetitive in international markets. Sectoral sanctions may have accelerated the downturn, particularly measures that dry up Russian banks' sources to refinance external debt. This also affects the Russian state, which has already started to tap the reserve funds built up during periods of resource price booms. If the oil price remains low and sanctions are maintained, a serious erosion of reserves is expected, with further consequences on the ability of the government to meet its obligations in a wide range of fields, including pensions and other social securities as well as the military budget. Restrictions on technology transfer in the energy industry endanger the ability of Russian firms to explore new oil fields and expand production. The Russian central bank raised its policy rate several times to fight inflation and capital outflow. This caused further downward pressure on domestic consumption and investment. International confidence that the Russian government can repay its debts eroded, pushing up the sovereign yields to new heights. Against this background, the economic outlook points to a deep recession in Russia for the years ahead. But it is still unclear to what extent the economic sanctions against Russia or the persistent fall in oil prices are the driving forces behind the evolution. Evidence on the relative role of the two factors is highly relevant for policy advice.

Since national accounts data are limited due to publication lags and low reporting frequencies it is difficult to separate the impact of sanctions from the hit due to the slump in oil prices. However, evidence can be built upon exchange rate movements. Due to the daily frequency of the variables, the econometric analysis can refer to a rather short period, i.e. the duration of the conflict without running into degree of freedom problems. Based on impulse response analysis and variance decomposition, the results indicate that the bulk of the exchange rate depreciation can be attributed to declining oil prices. In addition, unanticipated component of sanctions matter for the conditional volatility of the variables involved.

The rest of the paper is organized as follows. In Section 2, the main stages of the political conflict between

Russia and the Ukraine are reviewed. Section 3 discusses the economic impact of sanctions and measures that have been implemented during the recent year. Section 5 presents an overview of the literature applying media in economic analysis. The usage of media data is rather novel in the literature on sanctions. Section 6 describes the data used in the study. Econometric results are presented in Section 7. Finally, Section 8 concludes with some policy implications.

2 Evolution of the political conflict

In the last decades, Ukraine has been suffering from insufficient and protracted economic reforms, high level of corruption, unclear economic policies, rent seeking, oligarchic industrial structure, but also from a disadvantageous geographical location between Russia and European Union. Reflecting a high dependency from Russia especially regarding energy imports, unwillingness of political elites to introduce the *acquis communautaire*, the country stayed out from the EU enlargement process in its several neighboring countries. In addition, the halt of Eastern enlargement of the EU at the Ukrainian border reflected a lack of interests in Western countries to integrate a large and weak economy which was generally seen as a part of the Russian dominance area. These factors have been slowly changing. The EU offered a Stabilization and Association agreement to Ukraine in 2008, which was commonly criticized on the ground that it offered worse conditions to Ukraine than previous association agreements for Central and Eastern European countries. The ratification of the agreement has been delayed by numerous political factors, such as the sentencing of the former prime minister Yulia Tymoshenko.

Finally, the former president Yanukovych refused to sign the agreement. Instead, he agreed on tighter cooperation with Russia, in exchange for financial loans and lower gas prices. These steps have been seen as an ultimate stop to all economic reforms. This prospect caused mass protests by the Ukrainian population, well-known as the *Euromaidan* movement. The protests culminated in the February 2014 revolution which removed the Yanukovych regime and established a pro-Western interim government.

The developments escalated to a new stage in Spring 2014. Russia stopped financial support to Ukraine. At the same time, pro-Russian demonstrations started in East Ukrainian regions with mainly Russian speaking population. During this unrest, the Crimean peninsula was annexed by the Russian Federation in March. Riots escalated into an armed conflict between separatist forces supported by Russia and the pro-Western Ukrainian

government. The areas of Donetsk and Lugansk, in the center of the coal-producing Donbass region, declared their independence and cut ties with the central government in Kiev. In response, the Ukrainian government started a military offensive that was successful only initially. Given a massive Russian assistance, the separatists kept or regained much of the territory they had lost. During the combats in Donbass, a Malaysian passenger flight from Amsterdam was shot down in July 2014, killing all people on board including numerous Western European (especially Dutch) tourists.

The last phase of the conflict can be attributed to attempts to stabilize the situation at the current stage. A deal for a ceasefire, the Minsk agreement, was signed in September, but violations were common. Heavy fighting resumed across the conflict zone, including the Donetsk International Airport and the city of Debaltseve, which was conquered by the separatists. A new ceasefire agreement, called Minsk II, was signed in February 2015. While the Minsk II agreement has been quite successful at least to stop a further escalation of the conflict in East Ukraine, it did not help to solve the political and economic problems. East Ukraine is now becoming a lawless region without international recognition. It is likely that the region will develop to the so called *frozen conflict zone* similar to Transnistria.[1] While the economic future of this area is highly questionable, its existence will most likely impose also significant long-term economic losses to Ukraine and possibly to Russia. This will hamper the prospects for growth in both countries. Multiple elections were held over the course of the crisis. In May 2014, the new Ukranian president Petro Poroshenko came into power. The first post-revolutionary parliamentary elections in Ukraine took place in October and confirmed the Western orientation of the interim government. The separatists conducted their own polls in November. They were supported by Russia, but largely denounced by Western countries.

To increase the incentives to sign a peace agreement, Western governments, most notably the US and the EU imposed sanctions against individuals and firms in Russia and the Ukraine over the whole duration of the crisis. These sanctions started with the annexation of the Crimea and were gradually sharpened as the conflict continued. Initially, Western Sanctions include travel bans and the freezing of assets of individuals. Sectoral sanctions like restrictions on government-owned Russian banks or trade restrictions related to the Russian energy and defense sector have been added at later stages. Russia responded with restrictions to several countries,

[1] Transnistria is a breakaway region located at the Eastern border of Moldavia with Ukraine. Since the War of Transnistria in 1992, it is a stagnating economy, which is fully dependent on aid flows from Russia.

including a ban of food imports from the USA, the EU, Canada, and Australia and travel restrictions for certain Western citizens. More serious measures can be on the agenda on both sides, like the exclusion of Russia from the international payments system or the refusal of overflying rights over Russia for Western airlines. Their implementation depends on the future evolution of the conflict.

3 Economic impact of sanctions

According to Hufbauer et al. (2009), among others, several stages of sanctions can be distinguished. The weakest forms refer to diplomatic sanctions, such as the withdrawal of ambassadors and the suspension of international negotiations. The next stage includes measures targeting individual citizens and companies, such as travel bans, asset freezes, stop of development aid and obstacles to get credit from international organizations. Sanctions against specific industrial sectors, such as trade restrictions and embargoes constitute the strongest form. In any case, sanctions may include a smart component. For example, asset freezes and travel bans only hit a certain group of people or companies. All stages of sanctions have been implemented by Western governments starting from the annexation of the Crimea. As part of the diplomatic measures, Russia was excluded from the G8 meetings, and bilateral talks on cooperation agreements and visa regulations were suspended. With the ongoing conflict, measures against Russian and Ukrainian individuals and legal entities have been implemented. Restrictions to particular industries focus on banking, energy and defense sectors. For example, the USA prohibited any commercial relations between US citizens or firms and the sanctioned companies, most important Bank Rossiya, SMP Bank and Volga Investment. The USA also banned the export of certain technology goods that could be used for military purposes.

The empirical evidence on the effectiveness of economic sanctions is mixed. Trade restrictions, for instance, can raise the costs for the target country, but may also harm the sanctioning country. Countries with strong economic ties are especially hit through lower growth perspectives. Therefore, it is not surprising that the measures actually adopted appear to be ineffective in many cases. While some studies found that smart sanctions are effective (Morgan and Schwebach 1995, Cortright and Lopez 2000), others found that only harsh measures may trigger a significant impact on policies (Lam 1990, Hufbauer and Oegg 2003). In addition, the process of designing sanctions is inherently shaped by powerful groups in the sanctioning countries that serve

their own interest (Kaempfer and Lowenberg 1988). Game-theoretic models suggest that the success of sanctions further depends on conflict expectations and the levels of commitment. Many sanction end as a threat, without actually being implemented (Kaempfer and Lowenberg 2007).

The impact of sanctions can be measured in terms of economic effects, but also in terms of their policy impact, i.e., sanctions are considered to be successful if they have led to the desired policy change. By examining a huge set of sanctions, Hufbauer et al. (2009) concluded that about one third of them have been successful, at least partially. However, this number is likely exaggerated. If one controls for the direct or indirect use of military forces and for the fact that the target country does not make the concessions initially asked for, the share of successful sanctions is significantly lower. In addition, the success rate decreases if the aim of the sanctions is more ambitious, such as a major policy change. Kaempfer and Lowenberg (2007) stressed the role of the target size. Larger and self-sufficient countries are able to absorb sanctions more easily than smaller economies. Using a gravity regression approach, Caruso (2003) reported negative effects of economic sanctions on trade. Sanctions may cause higher damage, if they are implemented multilaterally. In case of unilateral sanctions, the target might be able to sell or buy goods and raw materials from third, non-sanctioning countries. Furthermore, sanctions fail more likely if there is substantial third party assistance to the target (Bonetti 1998). Based on a simultaneous equation approach, Jing et al. (2003) argued that the success of sanctions is positively correlated with the degree of warmth in the relations between sanctioner and target prior to the sanctions, negatively with the size of the sanctioner relative to the target, and negatively with the economic health and political stability of the target.

4 Oil, sanctions, and exchange rate

A short schematic overview over the literature examining the relation between exchange rate, oil price, and sanctions is provided in Table 1. Most papers focus on the effects of oil price fluctuations. There are only two papers examining the impact of sanctions: Torbat (2005) investigates the impact of sanctions on the Iranian economy in a broad sense, while Yahia and Saleh (2008) analyzes the links between economic sanctions, oil price fluctuations, and the employment in Libya. Thus, only the latter paper considers both sanctions and oil price. However, none of them concentrates upon the exchange rate.

The exchange rate of ruble is analyzed in two papers: Lizardo and Mollick (2010) and Rautava (2004). In both cases, only the effects of oil are considered. Lizardo and Mollick (2010) add oil prices to the monetary model of exchange rates and find that oil prices significantly explain movements in the value of the US dollar against Russian from the 1995 to 2008. Rautava (2004) analyzes the impact of oil prices and the real exchange rate on the Russian economy and fiscal policy using vector autoregression and cointegration techniques. He finds that the Russian economy is influenced significantly by fluctuations in oil prices through both long-run equilibrium conditions and short-run direct impacts.

5 Media and the economy

In order to assess the impact of sanctions *vis-à-vis* the oil price on the development of the economy, in addition to the hard data, we are using the evidence based on media information. As these data match the daily frequencies of exchange rates and oil prices, the analysis can be done in rather short time intervals without running into degree of freedom problems. Media information also allows to separate expected from unexpected policy outcomes, i.e., whether sanctions actually implemented were more or less severe than initially expected.

Due to the ever growing body of news and news channels, such as blogs, tweeds, and newsletters it is virtually impossible or at least prohibitively costly to explore the news by human analysts. Therefore, evidence is based on automated text search, i.e., a simple word count. In fact, such methods are widely applied to predict business cycles and financial markets. Most important, the R-word Indicator for the early detection of turning points of business cycles is published by The Economist since 1992. The indicator counts how often the word "recession" appears in the New York Times and the Washington Post. Doms and Morin (2004) created sentiment indicators based on the number of articles that contain certain keywords and phrases in the title or in the first paragraph in large US newspapers. The authors found that news media affect the perceptions of consumers, because they update their expectations about the economy much more frequently during periods of high news coverage than in periods of low news activities. News might cause temporary deviations from the path implied by economic fundamentals and can contribute to self-fulfilling tendencies. Kholodilin and Siliverstovs (2006) reported that media indicators are to some extent useful as predictors of the German GDP growth.

Based on observed psychological patterns, Barberis et al. (1998) developed a theoretical framework to explain

investors' sentiment in asset markets. Tetlock (2007) looked at the interactions between the media and the stock market using daily information from the Abrest of the Market section of the Wall Street Journal. According to the results, high media pessimism can exert downward pressure on stock markets. News sentiment is extracted automatically counting the words in the General Inquirer's Harvard IV-4 Psychological Dictionary. The context of news can be relevant, e.g., negations like not good can invert the indication of a word. In addition, media data have been used in the analysis of exchange rates. By extracting the information from Reuters news wire reports, Dominguez and Panthaki (2006) concluded that news on macroeconomic fundamentals, but also non-fundamental news and order-flows matter for exchange rate returns and volatility. Laakkonen (2007) argued that macroeconomic news increase the volatility of the US dollar *vis-à-vis* the euro. Asymmetric effects are likely, as US news tend to be more important than European news, and negative news seem to be more influential than positive ones. Furthermore, conflicting news increase exchange rate volatility more and faster than consistent news.

6 Data

Our data set consists of three groups of data: macroeconomic variables, sanction indices, and media data. Below each of these groups is considered in detail.

6.1 Macroeconomic data

The macroeconomic data used in this study are daily time series data on nominal bilateral exchange rates (ruble and USD, ruble and euro), Brent oil price, and interest rates for overnight loans in rubles (Ruble OverNight Index Average, RUONIA).

Figure 2 displays the dynamics of the macroeconomic variables.

-Figure 2 about here-

The top right panel of Figure 2 shows the oil price dynamics. After achieving high plateau in the first half of the year, the price dramatically falls in July 2014 and continues falling until the beginning of 2015.

The bottom panel of Figure 2 displays the dynamics of Russian overnight interest rate, RUONIA. It used to be relatively stable at about 8.5%, until December 16th, 2015, when the Central Bank of Russia drastically

raised its policy rate from 10.5 to 17%. In its press release Russian central bank justified the increase by a necessity to combat inflation and devaluation tendencies.

6.2 Sanctions

Based on the information about the sanctions put in action, we constructed two composite sanctions indices: one for sanctions imposed against Russia (S_t^{RoW}) and another one imposed by Russia against those, who sanctioned it (S_t^{RUS}). For this purpose a complete list of sanctions against and by Russia was compiled, see Table 2 and Table 3.

A composite sanctions index (say, for sanctions against Russia) is defined here as a cumulative sum of individual sanction dummies, S_t:

$$S_t^* = \sum_{\tau=1}^{t} \sum_{i=1}^{I} \sum_{j=1}^{J} w_i^* w_j^* s_{\tau ij}^* \tag{1}$$

where $* = \{\text{RoW, RUS}\}$; w_i is the weight of sanction i; w_j is the weight of country j; and s_{tij}^* is an indicator function of individual sanction i by/to country j defined as:

$$s_{tij}^* = \begin{cases} 1 & \text{if sanction } i \text{ is in action in period } \tau \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

Sanctions are different in terms of their harshness. In fact, there are three types of sanctions: 1) those directed against individuals; 2) sanctions against specific entities; and 3) sanctions against entire sectors of economy. The latter may have much greater impact than the former. Therefore, we assign corresponding weights to them:

$$w_i^* = \begin{cases} 1 & \text{if against persons: blocking property/suspension of entry} \\ 2 & \text{if against entities: blocking property/suspension of entry} \\ 3 & \text{if against industries: restricted access to capital market/exports} \end{cases}$$

In addition, the impacts may be different depending on the country imposing them. Indeed, the effect of sanctions imposed by Albania is virtually zero, whereas the EU sanctions can exert a non-negligible impact

on Russian economy. Therefore, we take into account the weight of each country imposing sanctions, w_j. It is equal to the trade share of the country in Russia's external trade over 2009-2013. The trade is defined as a sum of exports from Russia to country j and imports from country j to Russia. The data were taken from the United Nations database Comtrade (http://comtrade.un.org/). In case of the European Union, the total weight of its member countries is computed based on their overall participation in Russian trade.

The resulting cumulative composite sanctions indices are depicted in Figure 3. Two large jumps in the sanctions imposed against Russia can be seen: in March and July 2014 imposed as a reaction to the Crimea's annexation and the Malaysian Airlines MH17 plane crash, respectively. The index of Russian sanctions follows with a small trend that of the rest of the world.

6.3 Media indices

As a measure of the expectations about potential sanctions we intend to use a news index. It should reflect the frequency of the media items containing information on Russia-related sanctions in the international media. The news index is constructed based on the number of daily occurrences of words "Russia" and "sanctions" in the printed media of 8 countries (France, Germany, Italy, Russia, Spain, Ukraine, UK, and USA). A list of media and corresponding search words are reported in Table 4. The data are used to construct a cumulative composite news index, C_t, using the following algorithm:

1. The occurrences in individual media are aggregated at the national level.

2. Then, they are scaled by dividing them by the sum of occurrences in 2014.

3. These scaled country-specific indices are joined to a composite news index as a simple average.

4. Since the combinations of "Russia" and "sanctions" do not necessarily mean the sanctions related to the Ukraine conflict, especially before February 2014, we set the composite news index to 0 from the January 1st, 2013 through February 26th, 2014.

5. Finally, the values of the index are cumulated over time. This is done, because there are peaks in the occurrences series around the time points, when decisions on sanctions are made. After that the media turn to other news and tend to report less and less on Russia and its sanctions. The sanctions and

their impact, however, do not disappear, unless abolished. Therefore, to make comparable the composite sanctions index and composite media index, the latter is defined as a stock variable, where the value in period t is the sum of all the past values.

The news index can be seen as a measure of expectations about future sanctions and opinions about already materialized sanctions. Without having success to the full texts of media items it is impossible to identify the context. Therefore, in order to extract expectations from this complex mess, we regress the news index upon the leads of the two cumulative composite sanctions indices:

$$C_t = \alpha + \sum_{\tau=1}^{L_1} \beta_\tau S_{t+\tau}^{RoW} + \sum_{\tau=1}^{L_2} \gamma_\tau S_{t+\tau}^{RUS} + u_t \tag{3}$$

The composite media indicator, C_t, is regressed on leading values of the indicator for sanctions of the World against Russia, $S_{t+\tau}^{RoW}$, and on leading values of the indicator for sanctions of Russia against the West, $S_{t+\tau}^{RUS}$. Here, τ indicates the lead of the corresponding variable and L_1 and L_2 the maximum lead length employed. The lead lengths are selected such that the combination of L_1 and L_2 minimize the Bayesian information criterion (BIC).

The fit would be perfect in case when the sanctions have been correctly anticipated by the market. Therefore, the regression residuals, $\hat{u}_t$, are interpreted as a measure of the bias introduced by the media. Both anticipated and unanticipated sanctions can exert an impact on the evolution of exchange rates. For instance, if the international press expects more extensive sanctions than decided, an overshooting of the ruble exchange rate might be implied.

7 Econometric analysis

The variables include the ruble exchange rate against the US dollar, the oil price, and composite indicators on sanctions against and from Russia. The unexpected component of the sanctions is constructed from the residuals of equation (3). Since the Central Bank of Russia reacted several times to soften the depreciation of the ruble, the RUONIA (Ruble OverNight Index Average), which is the Russian interbank rate for overnight loans, is also included. The variables are reported at the daily frequency over the period from January 1st, 2014

to March 31st, 2015. Exchange rates and oil prices are transformed in logs. Sanctions are count variables, if they are unweighted and real numbers if weighted. Finally, the RUONIA is given as a percentage.[2]

Inference is based on (generalized) impulse responses and variance decomposition. However, all variables are integrated of order 1, I(1), except for the unexpected component of sanctions, which is stationary (ADF=-7.79, p-value=0.000). To rule out spurious effects, cointegration should hold between the $I(1)$ variables. According to the Johansen (1995) trace test, a single cointegration vector exists, see Table 5. The long-run parameters are well signed. In equilibrium, a rise in the oil price and an increase in the RUONIA will lead to a decline of the ruble value, i.e., an appreciation against the US dollar. The implementation of Western sanctions is accompanied by a ruble depreciation, while Russian sanctions can compensate this effect.

-Table 5 about here-

The exchange rate elasticity with respect to the oil price exceeds unity, underpinning the important role of the oil price. Compared to this effect, the impacts of the other variables appear to be of minor relevance and for sanctions only significant at the margin. This finding suggests that the oil price dominates the sanctions to explain the actual ruble evolution. Tests on weak exogeneity reveal a reasonable adjustment pattern. In particular, the feedback coefficient of the ruble is highly significant, and its negative sign indicates error correction behavior. Hence, the cointegrating relationship might be interpreted as an equation determining the ruble. Neither oil prices nor sanctions move to restore the long run. Oil prices are determined in international commodity markets and sanctions by the political process. The hypothesis of joint exogeneity of the three variables cannot be rejected ($\chi^2(3)$=3.64, p-value 0.303). After implementing the restrictions, the parameter estimates show only small changes.

-Figure 4 about here-

Due to the cointegration result, the VAR can be evaluated in levels. In this setup, the long-run relationship is implicitly embedded (Sims et al. 1990). As a potential drawback, the multipliers are dominated by stochastic trends. Therefore, and to save degrees of freedom, unexpected sanctions are not considered in the impulse responses. But, as discussed below they can be relevant for the stationary VAR component. The impulse responses refer to the five-variables system (Figure 4). Because of multicollinearity, many of the VAR coefficients

[2]The results shown in this section are based on the model version with unweighted sanctions. However, the evidence is very similar if weighted sanctions are used instead. The results can be obtained from the authors upon request.

are insignificant at conventional levels. As suggested by Sims and Zha (1999), one standard error bands are preferred.

While a rise in oil prices and an increase in the RUONIA will trigger an appreciation of the ruble against the US dollar, the currency is quite robust against shocks arising from the sanctions series. There is a minor positive impact stemming from the Russian sanctions. Combined with the cointegration evidence, this might imply some overshooting of the exchange rate in the short run. However, the effect is significant only at the margin. As a response to a ruble depreciation, the oil price is expected to decline for a few weeks, putting less pressure on the ruble. Again, this response might point to some kind of overshooting of the exchange rate and error correction behavior afterwards. In addition, a depreciation of the ruble causes an increase of the RUONIA, which is broadly in line with the policy pursued by the Central Bank of Russia. At least to some extent, the policy was successful, as shown by the response of the ruble to interest rate shocks. Moreover, as higher oil prices put less pressure of the ruble, monetary policy will become less tight.

The sanctions do not to play an important role for the other variables in the system, even if standard errors are less tolerant than usual. Spillovers between different types of sanctions are most striking. Sanctions against Russia will cause the implementation of sanctions against Western economies. An escalation spiral is not visible, as a positive response of Western sanctions is not detected.

-Table 6 about here-

According to the impulse-responses, the oil price is much more relevant than the sanctions to explain the course of exchange rate levels. This finding is consistent with the decomposition of the forecast error variance, see Table 6. Own shocks account for a huge part of the forecast error, especially for the sanctions. As a rule the weight of the own shock declines with the forecasting horizon. For example, oil prices explain 8% of the ruble after a week (5 days), but 12 percent after one month has passed. Only 1% of the variance of the ruble forecast errors can be traced to sanctions, even after one month has passed.

Although the sanctions do not significantly alter the course of the ruble, an impact may exist on exchange rate fluctuations. As the VAR length is optimized by the information criteria, the residuals of the system should fulfill the white noise properties or are at least stationary. Thus, the unconditional variance-covariance matrix is constant. This behavior, however, does not have implications on the development of the conditional moments.

Conditional standard deviations could be related to unexpected sanctions, the latter generated according to equation (3).

Conditional moments can be estimated, if the cointegrated VAR in extended by a multi-variate GARCH process, see Laurent et al. (2006) for a survey of different specifications. Compared to univariate alternatives, the multivariate setup can control for spillovers across the equations. Besides the conditional variances, conditional covariances can be affected by unanticipated policies. However, the basic insights can be derived if the focus is on the variances.[3]

Equations describing the dynamics of the conditional variances of the VAR residuals are exhibited in Table 7. In addition to the GARCH(1,1) structure, the media index is allowed to drive the volatility of the respective variables. In addition to the potential contemporaneous impact of the media, a delay up to one week (five lags) is allowed. To improve the readability, irrelevant coefficients have been omitted. Reported effects are significant, at least at the margin (20% significance level).

-Table 7 about here-

As a principal finding, GARCH effects are relevant in each case. The persistence is particularly striking for the ruble and the oil price errors. In addition, the media do have an impact. While it is hardly significant at conventional levels for the ruble and the RUONIA, the effects are more important for the oil price. If the sanctions turn out to be different than expected, additional volatility will be introduced in international commodity markets. As this might harm real economic growth, policy decisions should be as transparent as possible. Moreover, media affect sanctions positively in the aggregate. Thus, if media expect more (less) severe sanctions than actually decided, policymakers are less (more) reluctant to further sanctions. Therefore, media reports have a self-fulfilling component. The results underpin that sanctions are influenced by past forecast errors regarding the political process. This effect is especially visible for Western sanctions, but also relevant for the Russian sanctions.

[3]Detailed results for the multivariate GARCH(1,1) model and conditional covariances can be obtained from the authors upon request.

8 Conclusions

Due to its relative openness, the Russian economy is heavily exposed to exchange rate fluctuations. Since January 2014, the ruble strongly depreciated against the US dollar. The fall of the currency started with the conflict between Russia and Ukraine. The impact of the conflict on Russia may be amplified by the sanctions imposed by Western countries. However, oil prices also declined since summer 2014. As Russia is heavily dependent on exports of natural resources, the oil price decline can be another factor behind the deterioration. By using high frequency data on nominal exchange and interest rates, oil prices, actual and unanticipated sanctions, we provide evidence on the driving forces of the ruble exchange rate. The analysis is based on cointegrated VAR models, where fundamental long-run relationships are implicitly embedded. The results indicate that the bulk of the depreciation is caused by the decline of oil prices. In addition, unanticipated sanctions matter for the conditional volatility of the variables involved.

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Appendix

Table 1: Literature on exchange rate, oil price, and sanctions

Paper	Effects of		Countries	Period	Frequency
	oil	sanctions			
Akram (2004)	+		Norway	1986m01d01-1998m08m12	daily
Amano and van Norden (1998a)	+		Germany, Japan, USA	1973m01-1993m06	monthly
Amano and van Norden (1998b)	+		OECD	1972m02-1993m01	monthly
Chaudhuri and Daniel (1998)	+		OECD	1973m01-1996m02	monthly
Chen and Chen (2007)	+		G7	1972m01-2005m10	monthly
Golub (1983)	+		OPEC	1972-1980	annual
Huang and Guo (2007)	+		China	?	
Lizardo and Mollick (2010)	+		Canada, Mexico, Russia	1975-2008	annual
Muhammad et al. (2012)	+		Nigeria	2007m01d02-2010m12d31	monthly
Rautava (2004)	+		Russia	1995q1-2002q4	quarterly
Tiwari et al. (2013)	+		India	?	
Torbat (2005)		+	Iran		
Yahia and Saleh (2008)	+	+	Libya	1972-2005	annual

Table 2: Sanctions against Russia

Year	Month	Day	Countries	Sanction description	Sanction type
2014	3	6	USA	blocking property and suspension of entry of not specified persons	1
2014	3	17	USA	blocking property and suspension of entry of specific persons	1
2014	3	17	EU	blocking property and suspension of entry of specific persons	1
2014	3	17	Canada	blocking property and suspension of entry of specific persons	1
2014	3	17	Japan	1) suspension of consultation for relaxing visa regulations and 2) freeze of certain negotiations (new in-vestment, space cooperation, prevention of dangerous military activities)	3
2014	3	19	Canada	blocking property and suspension of entry of specific persons	1
2014	3	19	Australia	blocking property and suspension of entry of specific persons	1
2014	3	20	USA	blocking property and suspension of entry of specific persons and of Rossija Bank	2
2014	3	21	Canada	blocking property and suspension of entry of specific persons/entities	2
2014	3	21	EU	blocking property and suspension of entry of specific persons	1
2014	3	28	Canada	blocking property and suspension of entry of specific persons/entities	2
2014	4	11	Albania, Iceland Montenegro, Ukraine	blocking property and suspension of entry of specific persons	1
2014	4	11	USA	blocking property and suspension of entry of specific persons/entities	2
2014	4	28	USA	additional restrictive measures on defense exports to Russia	3
2014	4	29	Japan	suspension of entry of specific persons	1
2014	4	29	EU	blocking property and suspension of entry of specific persons/entities	2
2014	5	4	Canada	blocking property and suspension of entry of specific entities	2
2014	5	12	Canada	blocking property and suspension of entry of specific persons/entities	2
2014	5	12	EU	blocking property and suspension of entry of specific persons/entities	2
2014	5	21	Australia	blocking property and suspension of entry of specific persons/entities	2
2014	6	21	Canada	blocking property and suspension of entry of specific persons/entities	2
2014	6	24	Canada	blocking property and suspension of entry of specific entities	2
2014	7	12	EU	suspension of entry of specific persons	1
2014	7	16	USA	blocking property and suspension of entry of specific persons/entities	2
2014	7	25	EU	blocking property and suspension of entry of specific persons/entities	2
2014	7	29	USA	additional Treasury sanctions on Russian financial institutions and on a defense technology entity	3
2014	7	30	EU	blocking property and suspension of entry of specific entities	2
2014	7	31	EU	1) restrictions on exports of certain dual-use goods and technology; 2) restrictions on the sale, supply, transfer or export, directly or indirectly, of certain technologies for the oil industry; 3) restrictions on access to the capital market for certain financial institutions	3 2
2014	8	6	Canada	blocking property and suspension of entry of specific persons/entities	
2014	8	14	Ukraine	blocking property and suspension of entry of specific persons/entities	2
2014	9	12	USA	blocking property and suspension of entry of specific persons	2
2014	9	16	Canada	blocking property and suspension of entry of specific persons/entities	2
2014	9	8	EU	blocking property and suspension of entry of specific persons	2
2014	12	19	Canada	1) blocking property and suspension of entry of specific persons/entities; 2) prohibition of exports of oil-related equipment	3 2
2015	2	9	EU	blocking property and suspension of entry of specific persons/entities	
2015	2	17	Canada	blocking property and suspension of entry of specific persons/entities	2
2015	3	31	Australia	restrictions on 1) export to or import from Russia of arms and related materiel; 2) export to Russia of certain items for use in petroleum exploration and production; 3) export to Crimea and Sevastopol of certain items for use in the energy and minerals sector; 4) commercial dealing with certain capital financial market instruments issued by certain Russian state-owned entities; transport, telecommunications, energy, oil, gas and minerals sectors and 5) Australian investment in Crimea and Sevastopol related to infrastructure.	3

Table 3: Sanctions imposed by Russia

Year	Month	Day	Sanction description
2014	3	20	suspension of entry of specific persons (US citizens)
2014	3	24	suspension of entry of specific persons (Canada citizens)
2014	8	6	prohibition of imports of agricultural products from all countries that imposed sanctions against Russia

Table 4: Media and search words

Country	Media	Search words
France	Le Figaro, Le monde, Les echos	Russie, sanctions
Germany	all media from Genios databank, https://www.genios.de/	Rußland, Sanktionen
Italy	Repubblica	Russia, sanzioni
Russia	Gazeta, Kommersant	Rossiya, sankcii
Spain	ABC, La Vanguardia	Rusia, sanciones
Ukraine	Vesti	Rossiya, sankcii
UK	Financial Times, Independent	Russia, sanctions
USA	Washington Post	Russia, sanctions

Table 5: Cointegration properties

	H0: r≤0	H0: r≤1	H0: r≤2	H0: r≤3	H0: r≤4
Trace	71.85 (0.032)	34.08 (0.502)	13.40 (0.871)	4.78 (0.879)	0.81 (0.369)
	Unrestricted model		Restricted model		
	β	α	β	α	
Ruble	1	-0.049 (0.008)	1	-0.045 (0.008)	
Oil price	1.853 (0.297)	0.002 (0.008)	1.937 (0.223)	0	
RUONIA	0.072 (0.013)	-0.503 (0.293)	0.079 (0.014)	-0.515 (0.271)	
Sanctions RoW	-0.006 (0.003)	0.379 (0.248)	-0.005 (0.003)	0	
Sanctions Russia	0.018 (0.009)	-0.295 (0.268)	0.019 (0.010)	0	

Note: Western (Russian) sanctions are unweighted indices. Lag selection in VAR model with unrestricted constant determined by the AIC and equal to 3. Bartlett corrected trace statistic, p-values in parentheses. β is the cointegration vector, α are the feedback coefficients in the equations of the respective differenced variables. Cointegration vector normalized to the ruble. Numbers in parentheses denote standard errors.

Table 6: Variance decomposition of forecast errors

Steps	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
5	77.8	8.1	13.7	0.1	0.3
10	61.5	11	27.1	0.2	0.2
20	49.2	12	37.9	0.2	0.8
			Oil price shock		
Steps	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
5	6.7	93	0.2	0.1	0
10	6.6	92.8	0.3	0.1	0.3
20	5.7	92.3	0.2	0	1.7
			RUONIA shock		
Steps	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
5	44.3	0.8	54.8	0	0.1
10	50.5	4	44.2	0	1.2
20	49.4	8.7	39.4	0.1	2.5
			Western sanctions shock		
Steps	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
5	0.1	0	0.9	98.7	0.2
10	0.6	0	1.7	96.9	0.7
20	1	0.1	2.3	94.3	2.4
			Russian sanctions shock		
Steps	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
5	0.1	0	0.4	1.8	97.8
10	0.5	0.1	1.6	2.7	95.1
20	1.2	0.1	2.7	5.6	90.5

Note: See Figure 4. Numbers in %.

Table 7: Conditional variances of VAR errors

	Ruble	Oil price	RUONIA	Sanctions West	Sanctions Russia
Constant	0.002 (0.001)	0.001 (0.001)	0.005 (0.042)	0.090 (0.061)	0.000 (0.001)
GARCH Lag	0.922 (0.013)	0.916 (0.022)	0.447 (0.047)	0.433 (0.034)	0.435 (0.025)
ARCH Lag	0.338 (0.031)	0.109 (0.043)	-0.584 (0.055)	1.284 (0.098)	1.699 (0.084)
Media		0.009 (0.003)		0.827 (0.080)	
Media(-1)	-0.005 (0.004)	-0.011 (0.004)			
Media(-2)	0.005 (0.004)	0.008 (0.004)	-0.254 (0.160)	-0.267 (0.114)	0.034 (0.027)
Media(-3)		-0.014 (0.004)	0.235 (0.169)	-0.737 (0.083)	
Media(-4)		0.014 (0.004)		0.716 (0.103)	0.053 (0.028)
Media(-5)				-0.371 (0.123)	0.133 (0.023)

Note: Conditional variances obtained from multivariate GARCH(1,1) model. Conditional covariance matrix estimated by BEKK method (Engle and Kroner 1995). To foster convergence, preliminary simplex iterations are performed. Numbers in parentheses denote standard errors.

Figure 1: Exchange rates of ruble with respect to US dollar and euro, 01.01.2001-09.09.2015

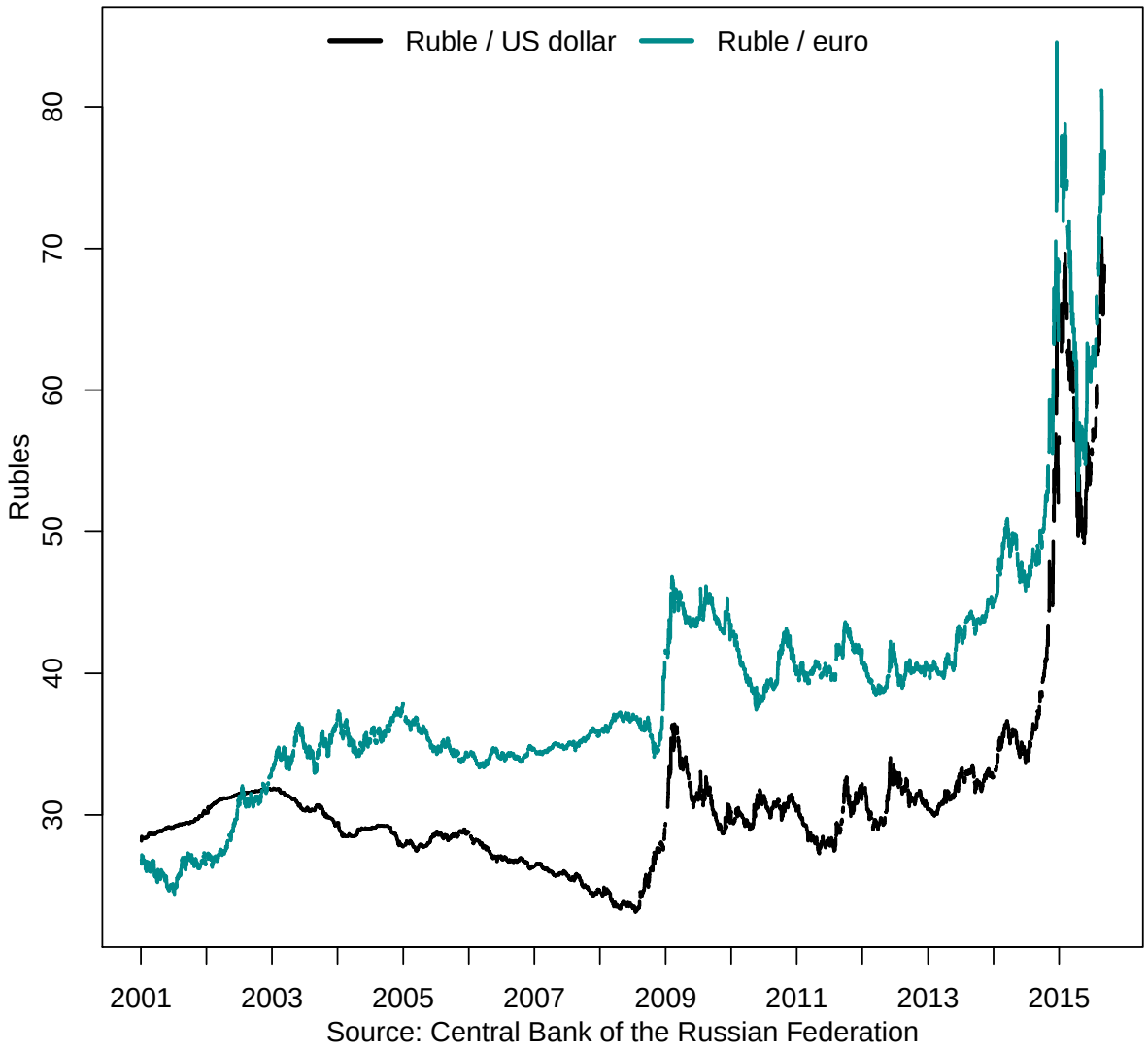


Figure 2: Macroeconomic variables

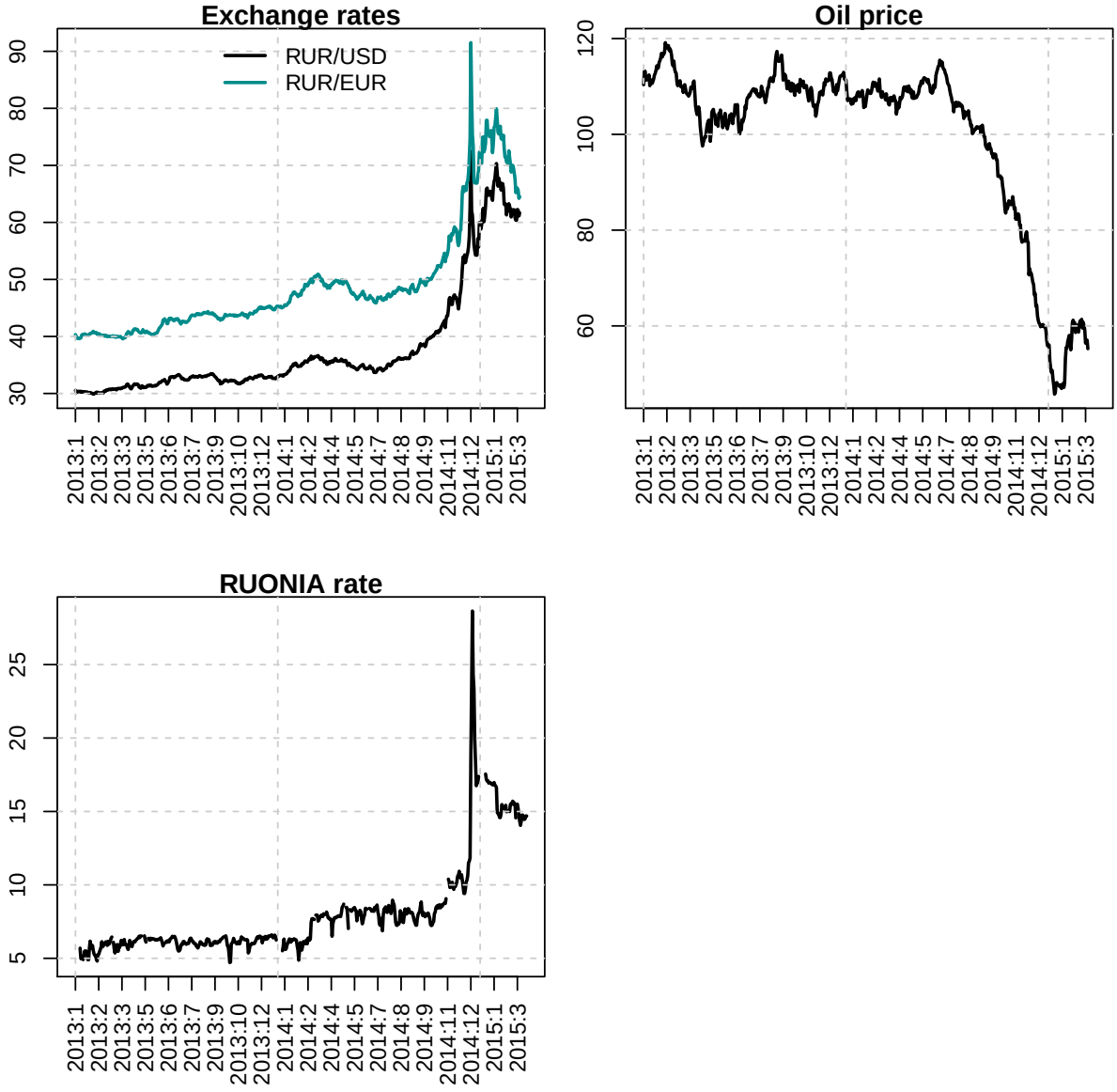
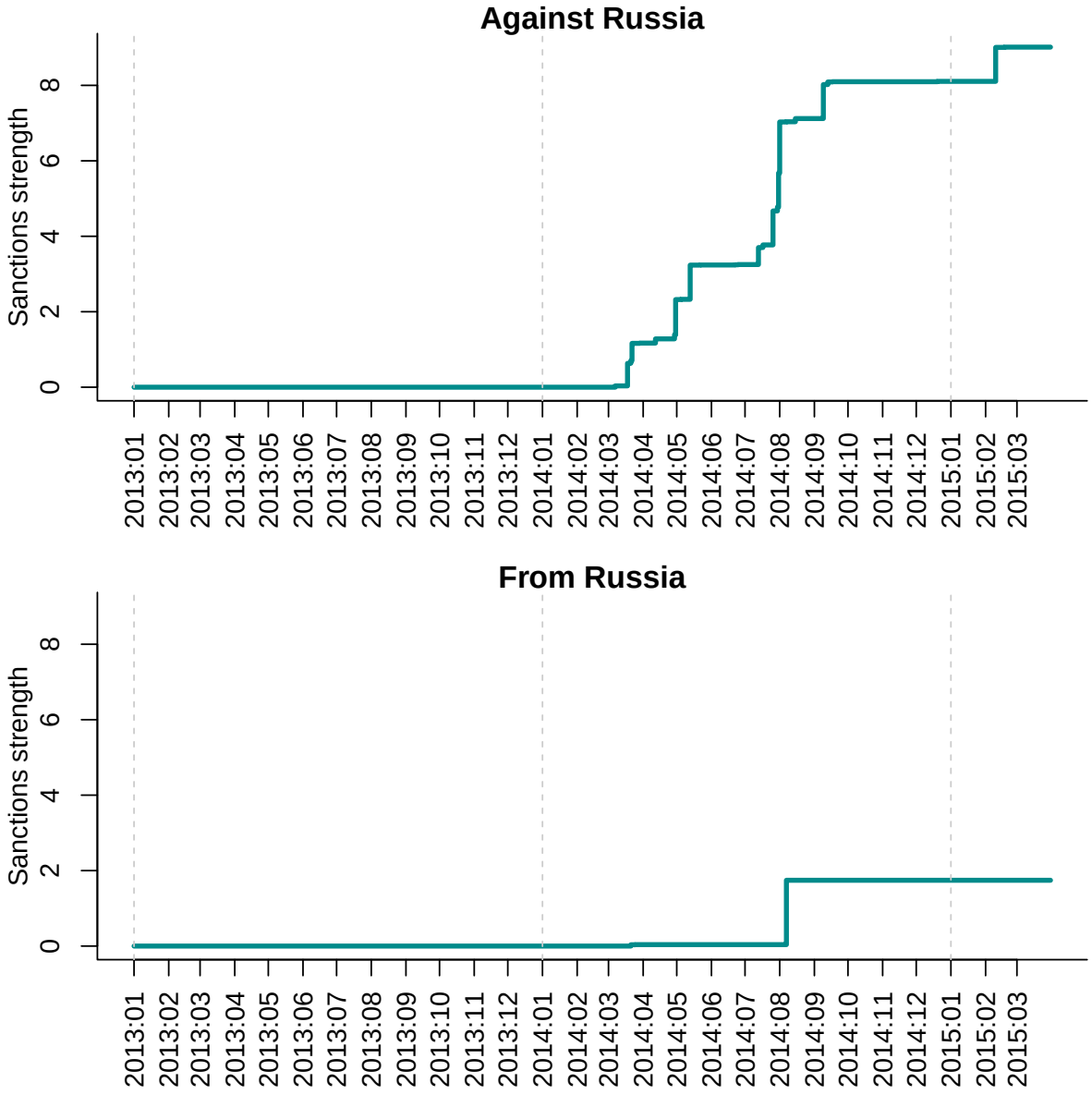


Figure 3: Cumulative composite sanctions indices



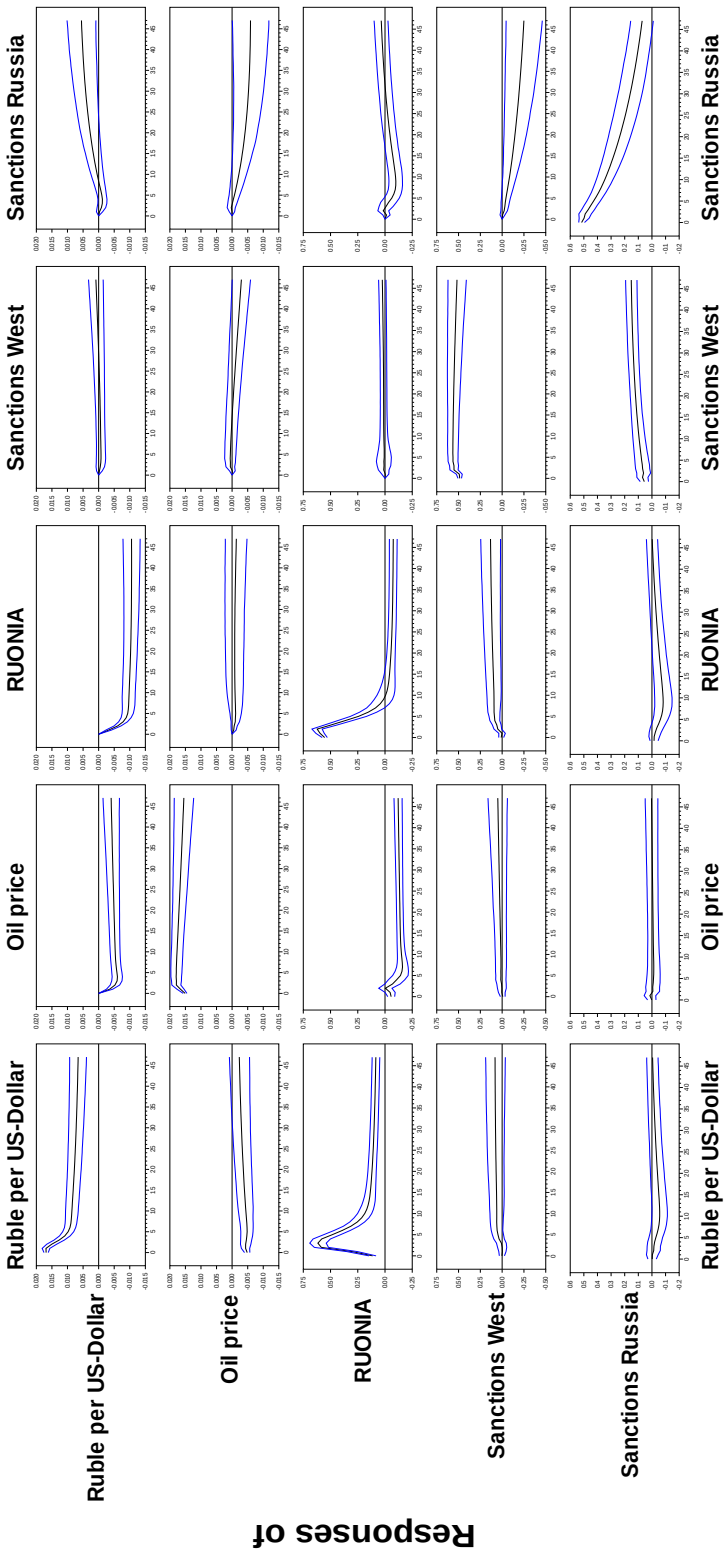


Figure 4: Impulse-response analysis