Working Paper Series
5/2017

CRIMEA AND PUNISHMENT: THE IMPACT OF SANCTIONS ON RUSSIAN AND EUROPEAN ECONOMIES

KONSTANTIN A. KHOLODILIN
ALEKSEI NETSUNAJEV

The Working Paper is available on the Eesti Pank web site at:
http://www.eestipank.ee/en/publications/series/working-papers

For information about subscription call: +372 668 0998; Fax: +372 668 0954
e-mail: publications@eestipank.ee

DOI: 10.23656/25045520/52017/0143

ISBN ISBN 978-9949-606-08-5 (hard copy)
ISBN 978-9949-606-09-2 (pdf)

Eesti Pank. Working Paper Series, ISSN 1406-7161; 5/2017 (hard copy)
Eesti Pank. Working Paper Series, ISSN 2504-5520; 5/2017 (pdf)

Crimea and punishment: The impact of sanctions on Russian and European economies

Konstantin A. Kholodilin and Aleksei Netšunajev*

Abstract

The conflict between Russia and Ukraine that started in March 2014 led to bilateral economic sanctions being imposed on each other by Russia and Western countries, including the members of the euro area. The paper investigates the impact of the sanctions on the real side of the economies of Russia and the euro area. The effects of sanctions are analysed with a structural vector autoregression. To pin down the effect we are interested in, we include in the model an index that measures the intensity of the sanctions. The sanction shock is identified and separated from the oil price shock by narrative sign restrictions. We find a very high probability that Russian GDP declined as a result of the sanctions. In contrast to that, the effects of the sanctions on the euro area are limited to real effective exchange rate adjustments.

JEL Codes: C32, F51
Keywords: political conflict; sanctions; economic growth; Russia; euro area; structural vector autoregression

*Konstantin A. Kholodilin (corresponding author): DIW Berlin. E-mail: kkholodilin@diw.de. Aleksei Netšunajev: Eesti Pank. E-mail: aleksei.netsunajev@eestipank.ee. The support from Deutsche Forschungsgemeinschaft (DFG) through SFB649 "Economic Risk" and from the Estonian Research Council through grant MOBTP11 is gratefully acknowledged.

Non-technical summary

The conflict between Russia and Ukraine that started in March 2014 led to economic sanctions being imposed on Russia by Western countries, among them the members of the European Union. In reaction, Russia imposed counter-sanctions. The paper investigates the impact of the sanctions on the Russian and euro area economies at the aggregate level.

Given the recent decisions by the European Union, the Russian Federation, and the United States to prolong the sanctions, it is increasingly more important to understand the price that is being paid for these political decisions. We study the influence of sanctions on real GDP growth in both Russia and the euro area. The aggregate euro area data contain information on all 19 members.

We construct an aggregate index to measure the intensity of economic sanctions between Russia and the rest of the world, encompassing the measures targeting individuals, businesses, and entire industries. This paper is the first towards setting up a structural vector autoregression to evaluate the consequences of the sanctions. We believe the method to be very useful for our purposes as under suitable conditions it allows us to (i) assess the responsiveness of economies to sanctions dynamically; (ii) understand the contribution of sanctions shocks to the variability of key macroeconomic indicators; and (iii) estimate counterfactual GDP growth rates under the assumption of the absence of sanctions. We use the following series in the VAR model: the index of intensity of the sanctions; the GDP of Russia; the GDP of the euro area; the price of oil; and real effective exchange rates for both Russia and the euro area. Sanctions shocks are identified using narrative sign restrictions.

The results suggest that the sanctions have had a more pronounced effect on the GDP of Russia, while the aggregate GDP of the euro area has been affected less. Similar variations in GDP growth in Russia and the euro area are due to the sanctions. Further, we estimate the probabilities of sanctions driven GDP decline. This is done by comparing actual and counterfactual GDP series where the counterfactual data is constructed under the assumption of no sanctions being imposed. The assumption is appealing from our point of view as the index of sanctions is a composite of bans and restrictions imposed on Russia by Western countries and counter-sanctions imposed by Russia. The corresponding probability for Russia is quite high and exceeds 90% in 2015, but it does not exceed 40% for the euro area. The uncertainty around the counterfactual effects is large, making it difficult to arrive at the precise losses of GDP growth that are due to sanctions.

We find that in response to sanction shocks the real effective exchange rate of both currencies depreciates. With trade connections between the European countries and Russia rather tight, not only the loss of GDP growth, but also the depreciation of the real effective exchange rate can play an important role in propagating the sanction shocks.

Contents

1 Introduction

The conflict between Russia and Ukraine that started in March 2014 led to economic sanctions being imposed by Western countries, among them the members of the European Union. In reaction, Russia imposed counter-sanctions. The paper investigates the impact of the sanctions on the Russian and euro area economies at the aggregate level. The study contributes to the debate on whether sanctions are effective, or whether some adverse effects in terms of GDP growth losses can be attributed to the imposition of sanctions and whether these effects, if any, can be separated from the decline in oil prices that occurred around the same time. European businesses, especially those exporting to Russia, fear the negative consequences of sanctions and have called for them to be removed, see Deutsch-Russische Auslandshandelskammer (2016). Their fears are perfectly well grounded, as UN Comtrade data show that the exports of EU countries to Russia were on average 14% lower in 2014 than in 2013. Out of 28 member states, 25 suffered falls in exports. Especially strong deterioration in exports could be observed in the drops of 78% in Malta, 42% in Cyprus, and 27% in Belgium. Large EU economies also had substantial losses of exports as Germany and the UK each experienced an 18% decline, while that in France and Italy was about 12%. In 2015, the decline in exports intensified even more. At the time of writing of this paper, data were not available for all EU countries but exports from the UK to the Russian Federation declined by 51% between 2013 and 2015, for example. In 2015, German exports to Russia were down by 30% from 2014.*

Given the recent decisions by the European Union (Council of the European Union 2015), the Russian Federation (President of Russia 2015), and the USA (Obama 2016) to prolong the sanctions, it is increasingly more important to understand the price that must be paid for these political decisions. We study how the sanctions influence a set of macroeconomic variables for both Russia and the euro area. The euro area contains 19 economies that share the same currency and monetary policy. As discussed above, international trade and financial ties between these countries and Russia were tight prior to the escalation of the conflict.

This is one of the first papers to evaluate the effects on economic growth of the sanctions for Russia and the euro area countries. There is very little literature on the effects of the sanctions against Russia. Pestova and Mamonov (2017) focus on the effects on Russia while this paper evaluates the effects on growth for Russia and the euro area countries. The lack of studies on the topic arises because the sanctions were introduced relatively recently, meaning that there are only a small number of observations within the period when the sanctions have been in force. We make use of the most recent data, which allow us to quantify current effects without making any claims about the long-term perspective.

Following Dreger et al. (2016) we construct an aggregate index to measure the intensity of the economic sanctions between Russia and the rest of the world. In accounting for the intensity of the sanctions it encompasses the measures targeting individuals, businesses, and entire industries. We use the bilateral index to account for the sanctions imposed by Russia on the rest of the world and vice versa. This paper is the first to set up a structural vector autoregression (SVAR) in the spirit of Sims (1980) to evaluate the consequences of sanctions using the sanctions index of Dreger et al. (2016). The magnitude of the index approximates the intensity of sanctions depending on the country imposing the sanctions and the sector on

*According to Volker Treier from DIHK (German Chamber of Commerce and Industry), `http://www.dihk.de/themenfelder/international/news?m=2016-02-18-treier-russland`.

which the sanctions are imposed. A sanction index equal to zero implies that no sanctions are imposed. The method is very useful for analysing the effect we are interested in, as under suitable conditions it allows for (1) assessment of how the economies respond dynamically to the sanctions; (2) understanding of how sanction shocks contribute to the variability of key macroeconomic indicators; and (3) estimation of a counterfactual time series, which in our case is GDP growth rates, under the assumption of the absence of sanctions. In our model we consider GDP growth, oil prices, and the real effective exchange rates (REER) of the Russian rouble and the euro.

We identify the sanction shock using a combination of narrative sign restrictions as proposed by Antolin-Diaz and Rubio-Ramirez (2016). This allows us to separate the effect of the intensified sanctions and the rapid decline in the price of oil that happened nearly simultaneously. The restrictions narrow down the effects of the sanction shocks on the price of oil, meaning that the sanction shock cannot have a strong effect on this variable. As a result the contribution of sanctions to fluctuations in the price of oil does not exceed 3%. Even though we use the most recent data, the sample size is too short to estimate models with time varying parameters, and for that reason, shifts that might have occurred in the structural parameters unfortunately cannot be taken into account.

Our results can be summarised as follows. We estimate the probabilities of sanctions driven GDP decline. This is done by comparing actual and counterfactual GDP series where the counterfactual data is constructed under the assumption of no sanctions being imposed. The assumption is appealing from our point of view as the index of sanctions is a composite of bans and restrictions imposed on Russia by Western countries and counter-sanctions imposed by Russia. The corresponding probability for Russia is quite high and exceeds 90% in 2015 but does not exceed 40% for the euro area. The uncertainty around the counterfactual effects is large, making it difficult to arrive at the precise losses of GDP growth that are due to sanctions. Given that trade connections between the European countries and Russia are rather tight, not only the loss of GDP growth, but also the depreciation of the real effective exchange rate can play an important role in propagating the sanction shocks. We find that in response to the sanction shocks the REER of both the rouble and the euro depreciate.

The rest of the paper is organised as follows. Section 2 discusses the literature on the economic impact of sanctions. Section 3 describes the data used in the study. The econometric model, main results and discussion are presented in Section 4. Finally, Section 5 concludes.

2 Economic impact of sanctions

The empirical evidence on the effects of economic sanctions is mixed. Trade restrictions for instance can raise costs for the target country, but may also harm the sanctioning country. Countries with strong economic ties are hit specifically through reduced perspectives for growth. Using a gravity regression approach, Caruso (2003) reports the negative effects of economic sanctions on trade. Sanctions may cause greater damage if they are implemented multilaterally. Where the sanctions are unilateral, the target might be able to buy or sell goods and raw materials with third, non-sanctioning countries.

Neuenkirch and Neumeier (2015) assess the impact of economic sanctions imposed by the UN and the USA. They use panel data estimation techniques and a sample that contains 68

countries covering the period 1976 to 2012. They find that UN sanctions have a relatively large and statistically significant effect in reducing the target state's real per capita GDP growth rate by 2.3–3.5 percentage points, while the effect of the US sanctions is much smaller, accounting for a 0.5–0.9 point decrease in the GDP growth rate. However the effect from international sanctions imposed through the UN may be quite different from the effect of bilateral sanctions imposed by Western countries and by Russia in this specific case.

Hoffmann and Neuenkirch (2015) investigate the impact of sanctions on Russian stock returns. It is found that the intensification of the conflict reduces Russian stock returns, and the escalation and de-escalation of the conflict in Ukraine accounts for a total variation of 6.5 percentage points in the Russian stock market.

Dreger et al. (2016) examine the effects of the sanctions related to Russia and Ukraine and the fall in the oil price on the daily exchange rate of the rouble. They find that the exchange rate is affected more by oil prices than by the economic sanctions. Pestova and Mamonov (2017) use conditional forecasts to evaluate the effects of the sanctions on the Russian economy but once the statistical uncertainty is taken into account the end effects are quite unclear.

3 Data

We use the following data for our analysis. All the variables are seasonally adjusted. The data are quarterly and run from 1997Q1 through to 2015Q4.

- s_t is the index of intensity for the sanctions imposed by the rest of the world[†] on Russia. The index is developed and thoroughly described in Dreger et al. (2016). For the purposes of the present study it was updated and covers the period between March 2014 and December 2015. Prior to March 2014 the index takes the value zero.

- Δy_t^{RU} first difference of the log of Russian quarterly GDP ($\times 100$) obtained from the Russian Federation Federal State Statistics Service (Rosstat).[‡]

- Δy_t^{EA} first difference of the log of euro area quarterly GDP (based on 19 euro area countries, $\times 100$) obtained from Eurostat.

- Δp_t^{oil} log of the price of oil obtained from Datastream. Given the high share of oil and gas in the total exports of Russia, the dramatic decline in oil prices that began in summer 2014 is accounted for by this variable. The price of oil enters the model as quarter-on-quarter percentage growth.

- e_t^{RU} log of the real effective exchange rate of the Russian rouble obtained from the Bank for International Settlements.

[†]In fact, not all the countries of the world introduced sanctions against Russia, but as the European Union, the USA, Australia, Canada, Japan, and some smaller economies did, it would seem reasonable to denote this group of countries as 'the rest of the world'.

[‡]Due to a switch by the Russian Federal State Statistics Office from the GDP deflator with a 2008 basis to one with a 2011 basis in April 2016, we had to link the two real GDP time series (1995Q1–2015Q3 and 2011Q1–2015Q4) through their growth rates. Up to 2010Q4, the growth rates of the first time series are used, then from 2011Q1, the growth rates of the later time series.

- e_t^{EA} log of the real effective exchange rate of the euro obtained from the Bank for International Settlements.

All the variables are shown in Figure 1. The corresponding descriptive statistics are reported in Table 1.

Table 1: Descriptive statistics of the variables under inspection

Statistic	N	Mean	St. Dev.	Min	Max
s_t	76	0.710	2.348	0.000	9.403
Δy_t^{RU}	76	0.854	1.829	−6.015	3.977
Δy_t^{EA}	76	0.353	0.715	−2.860	2.283
Δp_t^{oil}	76	0.807	16.017	−73.435	30.857
e_t^{RU}	76	4.391	0.236	3.828	4.695
e_t^{EA}	76	4.595	0.068	4.435	4.709

Note: N is the number of observations, while "St.Dev." denotes the standard deviation.

The sanctions index, s_t, varies between 0 and 9.4. The mean log real GDP of Russia is a quarter-on-quarter growth rate of 0.854% and is substantially higher than that of the euro area, where it is 0.353%. This is corroborated by Figure 1, which shows the dynamic growth of the Russian economy between 1999 and 2009. However, the growth rates of Russian GDP vary more strongly than those of the euro area with a standard deviation of 1.829 rather than 0.697. Between 1995Q1 and 2015Q4, oil prices fluctuated wildly between 11 and 121 US dollars per barrel. Finally, Russia's real effective exchange rate shows much greater variation than its euro area counterpart does.

4 Econometric analysis

4.1 The model

The ultimate goal of our analysis is to identify the shock of the sanctions and trace the reaction of the Russian and European economies to it. As briefly discussed in the introduction, the structural VAR model suits our purposes well, but a plausible identification scheme is needed. To analyse the effects of the sanctions we set up a VAR of order p:

$$y_t = \nu + A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t \quad , \tag{1}$$

where $y_t = (y_{1t}, \ldots, y_{Kt})'$ is a vector of observable variables; the A_i's are $(K \times K)$ coefficient matrices; ν is a $(K \times 1)$ constant term; and the u_t's are a K-dimensional serially uncorrelated vector of residuals with mean zero and non-singular covariance matrix Σ_u. Since the reduced-form residuals, u_t, in equation (1) are contemporaneously correlated, they do not allow for an economic interpretation. The structural shocks, ε_t, which do have economic meaning, are obtained from the reduced form residuals by a linear transformation:

$$\varepsilon_t = B^{-1} u_t \quad \text{or} \quad u_t = B\varepsilon_t \quad . \tag{2}$$

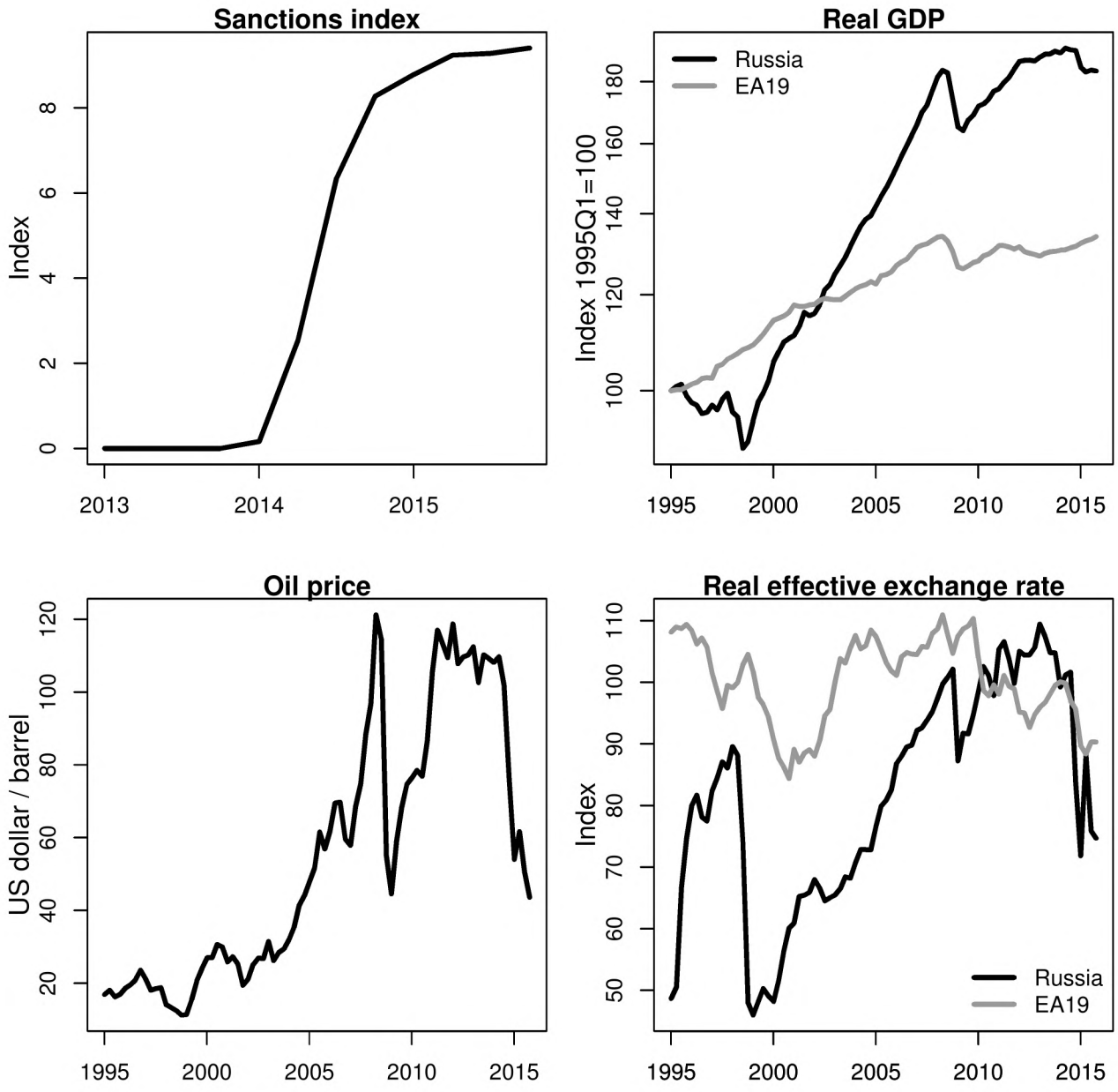


Figure 1: Variables

The matrix B contains the instantaneous effects of the structural shocks on the observed variables and is the object to be identified in some way. There are several types of identifying restrictions prevalent in the empirical literature. These are short-run (Sims 1980), long-run (Blanchard and Quah 1989), and sign restrictions (Canova and De Nicoló 2002). The long-run restrictions are hardly used in the Bayesian context. It may not be easy to come up with the sign pattern of impulse responses that are only for the sanction shock. For that reason we base

the analysis on a single sign restriction that is placed on the impulse response functions together with a new class of sign restrictions that is based on narrative information (Antolin-Diaz and Rubio-Ramirez 2016). These restrictions allow us to remain agnostic about the direct effects of the sanctions on variables of interest like GDP growth. Formally, these restrictions will be placed on the historical decompositions implied by the set of structural parameters.

Let $\Theta = (B, \nu, A_1, ..., A_p)$ collect the values of the structural parameters and VAR coefficients. Then, for any continuous function $F(\Theta)$ that maps the structural parameters to the space of $r \times K$ matrices, with r being a natural number, the sign restrictions take the form

$$S_j F(\Theta) e_{j,K} > 0$$

for $j \in 1, ..., K$, where S_j is an $s_j \times r$ selection matrix of full rank with $s_j \geq 0$ indicating the number of sign restrictions to identify the j-th structural shock and $e_{j,K}$ is the j-th column of I_K. As shown in Antolin-Diaz and Rubio-Ramirez 2016, different definitions of S_j and $F(\Theta)$ imply several alternatives for identifying the shock of interest. These alternatives may be combined to represent the set of identifying restrictions. We apply the restrictions to impulse response functions, signs of shock, and variance decompositions. The counterfactual scenario is where we assume sanction shocks to be zero.

In our application, the set of restrictions consists of four distinct sign restrictions on different functions of the structural parameters. These restrictions are as follows.

R1: The sanction shock is a shock that leads to an increase in the sanctions index at least on impact. Note that by imposing this restriction we avoid prescribing the sign patterns of the other variables.

R2: The sanction shock of one standard deviation may induce a change in the growth rate of oil prices that is not larger than 2.5% on impact. This is approximately one quarter of the average rate of decline in the price of oil in 2014Q1–2015Q4. The restriction is meant to disentangle the effects of the sanction shock and the unexpected drop in the oil price that happened one after another in 2014.

R3: The contribution of the sanction shock to the unexpected change in the sanctions index from 2014Q2 through to 2015Q4 is greater than the absolute value of the contribution of any other structural shock. Using this restriction, we insist that the sanction shock is the driver of the changes in the s_t index for the period when the sanctions are in place.

R4: The sign of the sanction shock at dates from 2014Q2 to 2015Q4 is positive. This restriction is supported by the evidence that the sanctions were intensified from 2014Q2 onwards.

The model is estimated using Bayesian methods. We use an independent normal-Wishart prior on the parameters. The prior hyperparameters for the VAR coefficients are chosen to be centred around zero for the first four variables and around unity for the other variables for lag one, and they are centred around zero for the subsequent lags. The prior scaling matrix for the Wishart distribution is $diag(20, 20, 20, 200, 1000, 2000)$ and it takes scaling of the variables into account. The prior degrees of freedom are set to be $K + 1$.

4.2 Empirical analysis

We estimate VAR(4) to capture the dynamics of the yearly data. The restrictions are imposed incrementally starting with R1 and R2. The final structural model consists of restrictions R1–R4 imposed jointly. We sample 1500 draws that satisfy sign restrictions R1–R4, which amounts to approximately 50,000 draws sampled using the unrestricted model. The proportion of draws that satisfy sign restrictions R1 to R4 is shown in Table 2. It is clear that the number of draws that are in line with the imposed schemes is declining.

Table 2: Proportion of draws that satisfy sign restrictions

	R1 and R2	R1, R2 and R3	R1, R2, R3, and R4
Proportion	0.266	0.039	0.031

The impulse responses to the sanction shock are shown in Figure 2. The sanction shock is scaled to have an impact of two units so as to be close to the changes in the intensity of sanctions between 2014Q1 and 2014Q2. After a shock, the growth rate of GDP does not show any remarkable movements in either region. There is quite a substantial probability mass on both the positive and negative sides and the credible sets cover zero for the entire response horizon. Note that the magnitude of the reaction to a shock is much higher for Russian GDP growth than for that of the euro area.

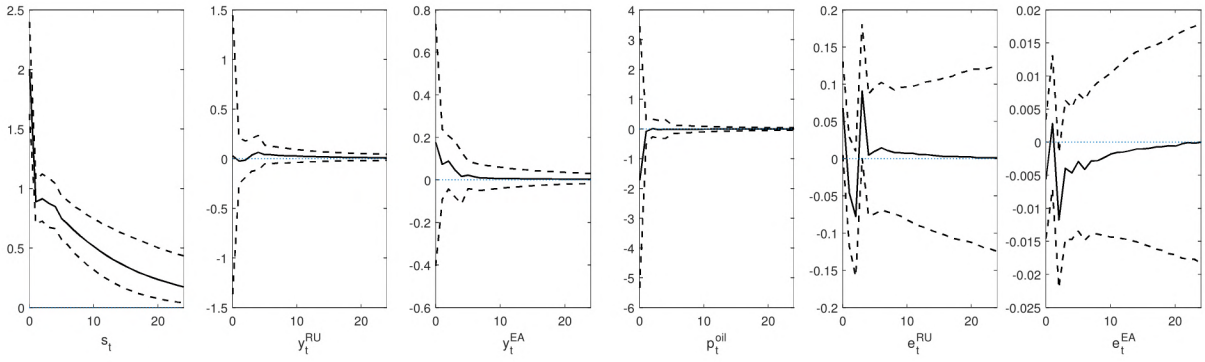


Figure 2: Impulse responses of variables to the sanction shock

Notes: The impulse responses are based on the SVAR(4) model. The solid lines represent the posterior median, while the dashed lines are 68% credible sets.

The reaction of the other variables in the system points toward some indirect effects. The price of oil reacts very marginally because of the identification imposed. The REER of the Russian rouble depreciates for up to five response horizons. This may be an indication of the diversion of trade towards remote and, perhaps, less developed partners. It is possible there

is an effect from sanctions through the adjustment of the exchange rate in the beginning of the response horizon, but it is less pronounced for the euro area countries as its magnitude is approximately one tenth that of the REER of the rouble.

Table 3: Posterior contribution of the sanction shock to forecast error variances, 90% credible sets

Variable	Horizon		
	4	8	24
Δy_t^{RU}	[0.007, 0.136]	[0.009, 0.137]	[0.010, 0.138]
Δy_t^{EA}	[0.023, 0.189]	[0.026, 0.190]	[0.030, 0.191]
Δp_t^{oil}	[0.009, 0.017]	[0.001, 0.017]	[0.001, 0.017]
e_t^{RU}	[0.071, 0.216]	[0.042, 0.181]	[0.027, 0.203]
e_t^{EA}	[0.054, 0.312]	[0.043, 0.265]	[0.032, 0.263]

Another important indicator to consider is whether the sanction shock is an important driver of the variation in GDP growth rates and other variables. The forecast error variance decomposition for several horizons is shown in Table 3. The influence of the sanction shock is quite similar for both economies. At long horizons, the shock contributes up to 13.8% of the variation in GDP growth in Russia and 19.1% in the euro area. The sanctions appear to have some effect through their influence on the REER, which results in up to 20.3% and 26.6% of the variation for Russia and the euro area. The difference becomes more pronounced over long horizons. The variations in the oil prices are mostly eliminated by restrictions imposed on the system.

The impulse responses and variance decomposition show that sanctions have had some effect on Russia and on the euro area. However, it may be interesting to quantify the impact of the sanctions on GDP directly. For that purpose, we deploy our SVAR to perform a counterfactual analysis in the following way. Suppose that all sanction shocks were zero for the entire time span of our data. The moving average representation of the SVAR allows us to calculate values of the time series assuming one or more shocks are set to zero. With the artificial data in hand, the difference between the true and counterfactual data shows the effect of the sanction shocks. The result of setting the sanction shocks to zero is shown in Table 4. The shocks are eliminated for the whole duration of the sample, but for the sake of convenience we report only the last seven quarters. In the preceding period the counterfactual GDP growth rate series are not much different from the true ones, as only the last observations differ.

Table 4: Realised and counterfactual median GDP growth rates

Date	Actual data		Posterior mean		Difference, 90% credible set		Probability of GDP decline	
	Δy_t^{RU}	Δy_t^{EA}	Δy_t^{RU}	Δy_t^{EA}	Δy_t^{RU}	Δy_t^{EA}		
2014Q2	0,922	0.083	–1.425	0.002	[-2.687, 0.022]	[-0.607, 0.594]	0.948	0.491
2014Q3	–0.327	0.365	–1.406	0.203	[–4.347, 1.243]	[–1.059, 1.331]	0.774	0.398
2014Q4	–0.118	0.311	–1.381	0.295	[–3.863, 1.414]	[–0.931, 1.449]	0.781	0.361
2015Q1	–3.197	0.588	–1.428	0.305	[–3.438, 0.081]	[–0.597, 1.330]	0.941	0.293
2015Q2	–0.904	0.402	–1.416	0.247	[–3.127, 0.025]	[–0.663, 1.128]	0.947	0.321
2015Q3	0,371	0.328	–1.180	0.151	[–2.407, 0.044]	[–0.619, 0.933]	0.945	0.371
2015Q4	–0.184	0.516	–1.248	0.153	[–2.428, –0.081]	[–0.613, 0.904]	0.961	0.368
Average over 2014Q2–2015Q4, 90% credible set					[–3.185, 0.339]	[–0.727, 1.096]		

The counterfactual analysis suggests that the effect of the sanctions is more pronounced for the Russian economy than for the aggregate euro area. If judged using credible sets, then the negative effect is largely concentrated in the year 2015, when the differences between the actual and counterfactual GDP growth rates in Russia are shifted into the negative area. In contrast, the effects for the euro area remain concentrated around zero. The posterior probabilities of GDP decline are much higher for Russia than they are for the euro area, where the probability does not exceed 40% for most of the time.

Panel (a) of Figure 3 shows the posterior distribution and contour plot of the difference between the true and counterfactual GDP for Russia. At the beginning of the sanctions period, the GDP difference was pretty much concentrated around zero with the distribution being fairly flat. However, later in 2015Q1–2015Q4 we observe the highest peaks of the distribution and a shift toward adverse effects. In general, there is much more probability mass on the negative side of the GDP difference.

Panel (b) of Figure 3 shows the posterior distribution and contour plot of the difference between the true and counterfactual GDP for the euro area countries. As already mentioned, the effect on the euro area tends to be of lower magnitude. The GDP difference tends to be concentrated with relatively equal probability mass above and below zero.

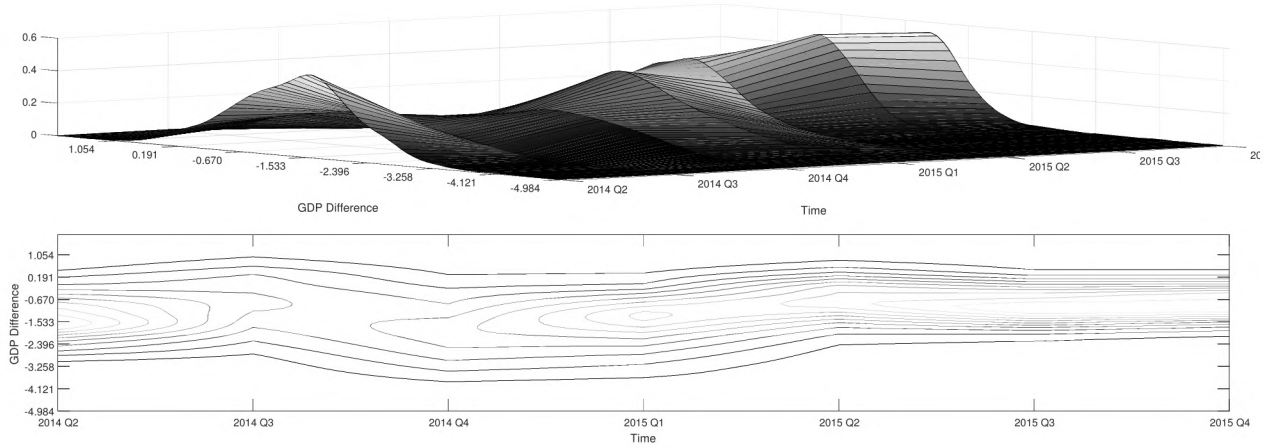
One possible reason why the sanctions have this quite negligible effect on the real GDP of the euro area is a change in the area's net exports. In 2014, exports from the 18 euro area countries[§] to Russia declined by 17.9 billion US dollars, while imports fell by 21.5 billion US dollars. Thus the negative trade balance of the euro area with Russia shrank by 3.6 billion US dollars. This represents a slight increase in the GDP of the euro area, given that net exports to the Russian Federation make up about 16.1% of overall net exports and 0.6% of the GDP of the 18 euro area countries. By contrast, Russian net exports to all its trade partners fell from 212.3 to 211.2 billion US dollars between 2013 and 2014. To some extent, this is due to the fall in the price of oil, which represents a large part of Russia's exports.

5 Conclusions

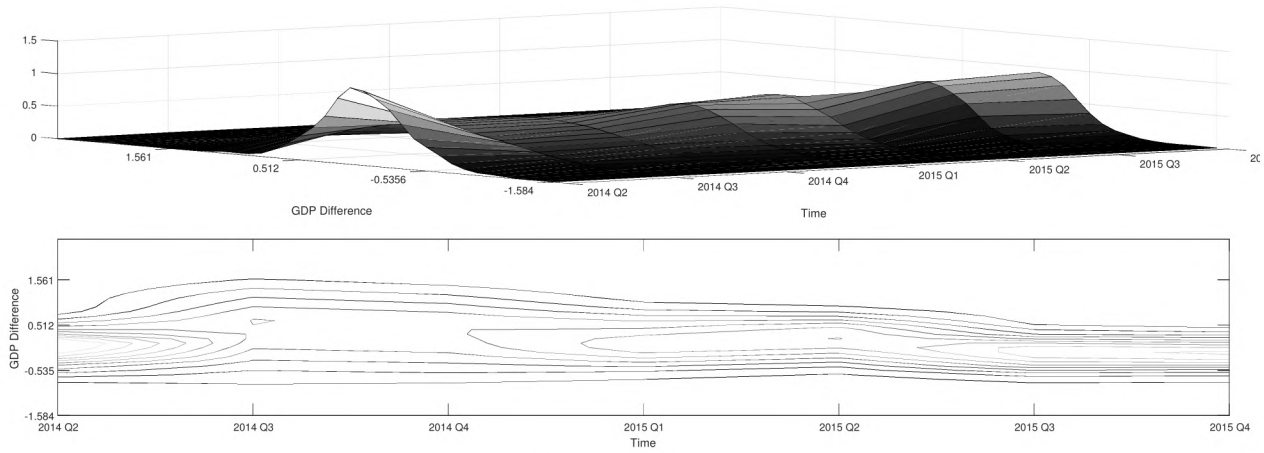
In this paper, we propose using a structural VAR to assess the effects of economic sanctions for the Russian and European economies. We model the interactions between these two regions using a measure for the intensiveness of sanctions introduced in Dreger et al. (2016), real GDP growth, the price of oil, and the real effective exchange rates of the Russian rouble and the euro.

The sanction shock is identified using a set of narrative sign restrictions. The identification is motivated by several features that the sanction shocks should possess, including a very weak effect on the price of oil to disentangle the large drop in the price of oil from the sanctions. There is a stronger evidence in favour of the adverse effect of sanctions on the growth rate of Russian GDP than there is on the growth rate of euro area GDP. Additionally, the real effective exchange rates are exposed to depreciation pressure following the sanction shock. The impact of the sanctions on the exchange rate is to a large extent expected as the sanctions analysed are bans on foreign trade.

[§]Lithuania joined the euro area in 2015.



(a) Russia



(b) Euro area

Figure 3: Simulated difference between true and counterfactual GDP growth

References

Antolin-Diaz, J. and J. Rubio-Ramirez (2016). Narrative sign restrictions for SVARs. CEPR Discussion Paper DP11517, CEPR.

Blanchard, O. J. and D. Quah (1989). The Dynamic Effects of Aggregate Demand and Supply Disturbances. *American Economic Review 79*(4), 655–73.

Canova, F. and G. De Nicoló (2002). Monetary disturbances matter for business fluctuations in the G-7. *Journal of Monetary Economics 49*(6), 1131–1159.

Caruso, R. (2003). The impact of international economic sanctions on trade: An empirical analysis. *Peace Economics, Peace Science, and Public Policy 9*(2), 1–36.

Council of the European Union (2015). Amending Council Decision 2014/512/CFSP concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. Decision 2015/2431, Council of the European Union.

Deutsch-Russische Auslandshandelskammer (2016). Geschäftsklima Russland 2016 — 13. Umfrage des Ost-Ausschusses der Deutschen Wirtschaft und der Deutsch-Russischen Auslandshandelskammer.

Dreger, C., J. Fidrmuc, K. Kholodilin, and D. Ulbricht (2016). Between the hammer and the anvil: The impact of economic sanctions and oil prices on Russia's ruble. *Journal of Comparative Economics* (1488).

Hoffmann, M. and M. Neuenkirch (2015). The pro-Russian conflict and its impact on stock returns in Russia and the Ukraine. University of Trier Research Papers in Economics No. 1/15.

Neuenkirch, M. and F. Neumeier (2015). The impact of UN and US economic sanctions on GDP growth. *European Journal of Political Economy 40*(Part A), 110–125.

Obama, B. (2016). Notice of March 2, 2016 — Continuation of the national emergency with respect to Ukraine. Federal Register, Vol. 81, No. 43.

Pestova, A. and M. Mamonov (2017). On the economic effect of Western sanctions on Russia. Technical Report Forthcoming.

President of Russia (2015). On the prolongation of certain special economic measures to protect the security of the Russian Federation. Presidential Executive Order 320 24.06.2015, President of Russia.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica 48*(1), 1–48.

Working Papers of Eesti Pank 2017

No 1
Barry Eichengreen. Ragnar Nurkse and the international financial architecture

No 2
Juan Carlos Cuestas, Merike Kukk. Asymmetries in the interaction between housing prices and housing credit in Estonia

No 3
Gregory Levieuge, Yannick Lucotte, Florian Pradines-Jobet. Central banks' preferences and banking sector vulnerability

No 4
Jaanika Meriküll, Tairi Rõõm. The financial fragility of estonian households: evidence from stress tests on the HFCS microdata