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Energy sanctions and Russia's democracy – autocracy: a dynamic VAR analysis

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Abstract

Our focus is the interplay of macroeconomic and political variables following a boycott of Russian oil and gas and on how these factors codetermine the result of sanctions. This paper uses an innovative approach to sanction success that provides a dynamic, forward-looking, perspective and deals with both the economic and the political outcome of economic sanctions simultaneously. We report the main results of a comprehensive set of 14 unrestricted VAR models that we use to analyse how negative oil and gas shocks impact on the Russian economy and Russian politics. A similar approach has been used before to analyse sanctions against Iran (Dizaji and van Bergeijk in *Journal of Peace Research* 2013) and offers us the possibility to investigate the dynamics of the economic-political interactions. The impact of an energy boycott is considerable, and economic costs act as powerful incentives.

Keywords

Energy boycott, Russia, VAR, sanction success.

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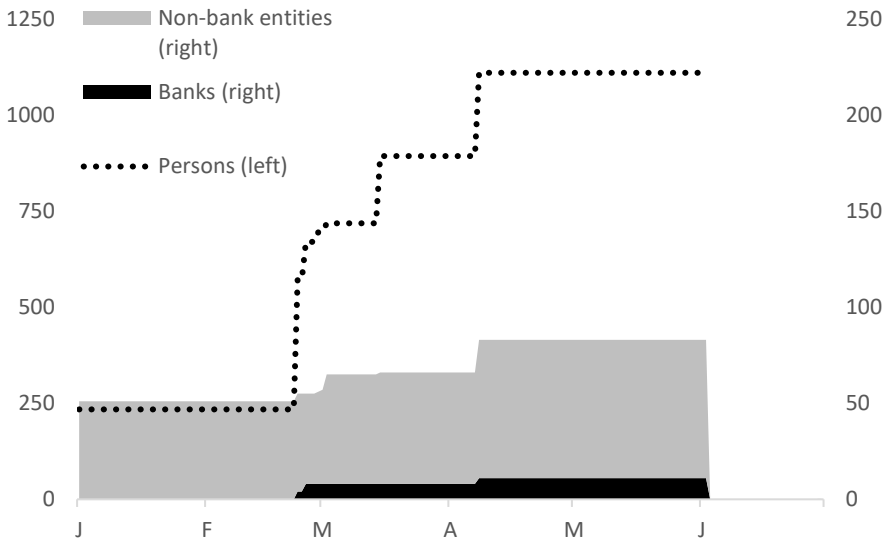
Energy sanctions and Russia's democracy – autocracy: a dynamic VAR analysis

1 Introduction

The Russian invasion of the Ukraine on 24 February 2022 marked a military escalation of a war that started in 2014 with the Russian annexation of the Crimea. The Western response was to escalate the set of targeted sanctions and five comprehensive packages were launched in the months that followed (Figure 1). Most of these sanctions were micro sanctions targeted at individuals and individual firms and banks and could not be expected to be effective also in view of the failure of the 2014 sanctions (Van Bergeijk 2014, 2022).

FIGURE 1
EU targeted sanctions regarding War on Ukraine



Notes: Banks includes Bank of Russia (Central Bank). At the time of writing agreement on a sixth package was underway, but details were not yet available (cut-off date June 2, 2022)

Sources: Council Implementation Regulation (EU) 2014/269, 2022/260 2022/261, 2022/332 2022/336 2022/353 2022/427 and 2022/581

Ostensibly, the European Union reacted with enormous vigour in taking economic punitive measures. In less than 6 weeks, the Commission has already announced five sanctions packages (and some interim tightening occurred as well). However, appearances are deceiving.

Firstly, it is remarkable that it takes so long to scale up a legal framework that has existed since the annexation of Crimea in 2014. In comparison, the sanctions following the Iraqi invasion of Kuwait were taken within 4 days, Switzerland joined for the first time and the oil boycott was complete and militarily enforced. Speed is required, because the step-by-step introduction of economic sanctions does not work as the target then has the opportunity to

adjust the economy and prepare for new measures (van Bergeijk 2010). In the past decade, other sanction senders learned new things about policy, streamlined procedures and tightened their supervisory instruments (see, for example, Early 2021 for the US). However, Europe has so far lacked the decisiveness necessary to prevent its sanctions from being doomed to failure.

Secondly, to justify this slowness of the European Union, it is argued that it is important to have the possibility to further escalate sanctions. This argument to start with light sanctions that are then expanded further is not supported by empirical evidence (van Bergeijk and Siddiquee, 2017). The argument has also become less relevant precisely because Russia has been able to prepare. The potential for escalation had significantly increased economic weight in 2014, when bilateral trade between the EU and Russia amounted to roughly one-fifth of Russia's GDP, down from just 14% before the war with Ukraine broke out. Russia in addition reduced its dependence on the West in other areas, for example its dependence on SWIFT was reduced by developing the System for Transfer of Financial Messages (SPFS). Russia reduced its dependence on foreign countries thus increasing sanction resilience. Moreover, with the passage of time, the credibility of sanctions escalation continued to decline. The annexation of Crimea continued without significant strengthening of the EU sanctions package. The European sanctions were also apparently designed with the intention of causing as little damage as possible to European business. It is an economic law that sanctions that do not affect the sanction taker cannot affect the sanction target. It is illustrative, for example, that the European sanctions resulted in a loss of one billion euros for the Russians; the Russian countersanctions have cost Europe tenfold (Bělín and Hanousek 2021a, b).

Third, the focus on individuals and companies is a burden rather than a strength of the European Union's sanctioning practice. It is a burden because, as will be seen below, it is much more difficult to organize and enforce such micro-sanctions than to implement macro-sanctions. Such targeted sanctions are called intelligent ('smart') because they hit the target's decision-makers and elite and spare the population that often has little to do with the conflict. Broad economic sanctions do indeed affect people at the bottom of society (Afesorgbor and Mahadevan, 2016), undermine public health and lead to higher infant mortality (Ha and Nam, 2022), and can lead to a deterioration of the human rights situation and to more political violence (Peksen 2021). The intelligent sanctions seem to prevent those problems; the problem with these kinds of targeted measures is that the failure rate is very high: ninety percent of intelligent sanctions fail because the target is not affected (Biersteker and Hudáková 2021). Intelligent sanctions are mainly symbolic sanctions; on a battlefield, such symbols don't matter.

Sanctions are never watertight and that is not necessary to be able to score an economic effect. There are three broad-grained sanction strategies, and it is sufficient to apply one of these options.

- a high import tariff on Russian energy carriers. Such a rate drives a wedge between the price that a Russian supplier receives and the price that European buyers pay. This partly transfers the costs of the higher price to the supplier who is in a near-monopoly position and is an incentive for adjustment via the market (Gross 2022).

- a quantity restriction: stopping energy imports from Russia. The control burden is comparatively small: gas is supplied via a small number of pipelines and coal and oil have a geological fingerprint and are easily identifiable, as was shown in the Iraq oil boycott in 1990.
- the complete cut-off of Russia from the SWIFT system *à la* the sanctions against Iran in 2012. This has the direct consequence that imports and exports stall, because it is no longer possible to settle.

Each of these broad and comprehensive sanctions entails significant costs for Europe (Table 1) and this is one of the reasons why Europe is slow to implement comprehensive sanctions. Given these costs an important question is whether sanctions against Russia can succeed. Economists so far have restricted themselves to the economic domain, but the analysis is in the end not only about the costs to Russia versus the costs to Europe and its allies, but of course also about the political benefits of the sanctions.

TABLE 1
Predicted GDP loss of energy boycott

Study	Russia	Germany (G)/ Europe (EU)	Method
Baquee et al.		-0.3% to -2.2% (G)	Input Output/ multi-sector multi-country
Chepeliev et al		-0.3% to -0.6% (EU)	ENVISAGE*
Evenett and Muendler	-1.1%		cModel
Felbermayr et al.	-7% to -10%	-2.5% (Baltics)	CGE GTAP** model
IMF	-11%	-1.1%	implied***
Langot et al.	-6% to -11%	-0.7% to -0.9% (	Input Output/ multi-sector multi-country
Mahlstein et al.	-15% to -28%	-0.3% to -1.4% (G)	CGE GTAP Model
OECD		-1.4% (EU)	NiGEM****
Pestova et al.	-13% to -15%		VAR
WTO	At least -5%	-1.5% (EU)	WTO Global Trade Model

Notes:

* The Environmental Impact and Sustainability Applied General Equilibrium model is a computable general equilibrium (CGE) model designed to analyse interactions between economies and the global environment in which the energy sector plays an important role

** CGE model used in the Global Trade Analysis Project (GTAP)

*** difference with *World Economic Outlook* forecast before the conflict and current outlook

**** The National Institute Global Econometric Model maintained by the UK's National Institute of Economic and Social Research (NIESR) is a structural global macroeconomic model.

History can provide some guidance, both qualitatively as well as quantitatively since econometric analyses of earlier sanction cases may be used to identify the

conditions for success, and from this perspective the sanctions against Russia do not look like an *a priori* failure case (van Bergeijk, 2010, 2022). It is, moreover, important to note that historical empirical evidence on the determinants of the effectivity of sanctions is not as strong as many seem to think.[1] A second caveat is that country specific characteristics of the sanction target and the time profile of sanction impact need more explicit considerations than possible with the existing data sets (van Bergeijk 2021). Thirdly, the economic and political processes need to be analyzed simultaneously.

In this paper we therefore follow a different strategy and develop a comprehensive set of 14 VAR models to analyze how negative energy shocks impact on the Russian economy and Russian politics. We build on and extend a similar approach has been used before to analyze sanctions against Iran (Dizaji and van Bergeijk 2013). The contribution of this paper is that it provides an analysis of the dynamics of the economic-political interactions for a set of considered sanction measures. We cover oil and gas sanctions separately reflecting the current ambiguity of the future sanction regime against Russia and distinguish between the short-run and long-run impact of considered measures.

The organization of this paper is as follows. Section 2 explains our research strategy and includes a discussion of data, method and econometric concerns. As to the econometric details we discuss detailed tests and solutions for our preferred VAR model, but it should be noted that these tests of course also have been used for the other 13 specifications. Section 3 then provides the results for our referred VAR model that are most relevant in the context of our research topic, namely the impulse response functions and the variance decomposition. Section 4 reports our findings for two additional specifications, that cover gas sanctions, investigate the role of military expenditures and (for the purpose of checking robustness) an alternative measure for democratic intensity and quality. These different specifications of the VAR model set the tone for an extensive robustness check in section 5 that reports the main findings for the 14 specifications that we have run for this article. The final section summarizes and discusses the main findings.

2 Research strategy

Our focus is the interaction between macroeconomic and political variables following a boycott of Russian energy and on how these factors codetermine the political impact of sanctions. Rather than imposing a theoretical structure we let the data speak by means of a Vector Autoregressive (VAR) model, consider all variables to be (potentially) jointly endogenous and do not impose *a priori* restrictions on structural equations. We run 14 different specifications of the VAR model in order to test for robustness of our findings. In these specifications we distinguish between gas and oil shocks, consider the impacts on and of Russian defence spending and several indicators for movements along the autocracy-democracy spectrum. Table 5 provides the summary of the

[1] Demena et al. (2021) meta-analysing the impact of trade, pre-sanctions relations, and sanction duration on sanction success report significant publication bias in the sanction literature.

findings for the 14 specifications. In the main text we provide detailed findings for three of these specifications:

- a first VAR that assumes that a negative shock in oil rents reduces public consumption expenditures, imports and investment and depreciates the currency and ultimately these variations in the economic variables affect the quality and intensity of democracy,
- a second VAR where we study the impact of a negative shock in gas rents with the same economic variables but an alternative indicator for the quality and intensity of democracy, and
- a third VAR where we replace public consumption by military expenditure.

The main tools in the VAR approach are the impulse response functions (IRFs) and the variance decomposition analyses (VDC). IRFs are reported as graphs and allow us to examine the dynamic effects of shocks to energy (oil and/or gas) rents per capita on the other variables. The dynamic response of macroeconomic and political variables to innovations in a particular variable can be traced out by using the simulated responses of the estimated VAR system. Through the IRF graphs, we can observe the magnitude and statistical significance of such responses to one standard deviation decrease in energy rents per capita.[2]

An examination of the entire system is possible by studying the VDC of the system. Technically a VDC shows how much information each variable contributes to the other variables in the VAR – that is: we can indicate the importance of each variable for the economic and political outcomes of this sanctions case.

2.1 Data description

Our time series are shorter than we would like. Eastern European data during the Cold War period were to a large extent manipulated (van Bergeijk 1995) and given the political and economic break of the demise of the Union of Soviet Socialist Republics (USSR) our data series start for practical reasons in 1990 and our data series end in 2020. This also has implications for the lag structure of our VAR model.[3]

To examine the dynamic interconnections between oil and gas rents, economic variables and the political system in Russia we collect the following variables for potential inclusion in our model: oil rents per capita (*oilrentpc*), gas rents per capita (*gasrentpc*), government consumption expenditures per capita (*govconspc*), imports of goods and services per capita (*importpc*), gross capital

[2] Stock and Watson 2001 provide a good discussion of Impulse Response Functions.

[3] Determining an optimum lag length for a VAR model is of course quite important. Economic theory usually neither provides guidance on the appropriate level of lag length nor on how long changes in a variable should be considered in a VAR model. There are some statistical criteria which may help to find the optimal lag length such as LR, FPE (final prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion), and HQ (Hannan–Quinn information criterion). We use a lag length of 1 supported by satisfactory stability properties as well as the results of cointegration tests.

formation per capita (*capitalpc*), GDP per capita (*GDPpc*), consumer price index (*CPI*), official exchange rate (*exchange*) and defence expenditures per capita (*defencepc*). The data on economic variables are collected from World Bank's World Development Indicators (WDI) online database (World Bank, 2022).[4]

We utilise a new and novel data set on democracy emanating from the varieties of democracy project (V-Dem data base, version 12). V-Dem analyses many of the complex processes underlying democratic development, including electoral democracy (*elecdem*), liberal democracy (*liberdem*), deliberative democracy (*delibdem*), egalitarian democracy (*egalitdem*), and participatory democracy (*participdem*)). All of these democracy measures range between 0 and 1; a larger value indicates a better quality of democracy. The V-Dem data set is highly dynamic as it captures changes in politics and the quality of various aspects of democracy from year to year. Alternatively, we also apply Polity2 index (*polity*) that has customarily been used in sanctions research (Marshall et al., 2017). The index represents combinations of autocratic and democratic features of institutions and ranges from −10 (full autocracy) to 10 (full democracy).

2.2 Methodology

This paper applies VAR modelling to estimate the interrelationships among economic variables and democracy indices. A VAR provides a multivariate framework relating changes in a particular variable to changes in its own lags and to changes in (the lags of) other variables:

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + B x_t + \varepsilon_t \qquad (1)$$

y_t is a vector of *k* endogenous variables, x_t is a vector of *d* exogenous variables, A_1,…, A_p and B are matrices of estimated coefficients, and ε_t is a vector of unexpected shocks that may be concurrently correlated but are uncorrelated both with their own lagged values and with all of the right-hand side variables. The VAR treats all variables as jointly endogenous and does not impose *a priori* restrictions on structural relationships. Since the VAR expresses the dependent variables in terms of predetermined lagged variables, it is a reduced-form model.

2.3 Econometric concerns

Simultaneity is not a problem and OLS will thus yield consistent estimates, because only lagged values of the endogenous variables appear as explanatory variables. The Augmented Dikey Fuller unit root tests (Table 2) reveals that all variables are *I*(1) except CPI and per capita GDP. Therefore, we decided to exclude GDP per capita and CPI and apply an unrestricted VAR model in levels with the other economic variables only.

[4] The economic variables are in logarithmic form (see also Dizaji and Bergeijk, 2013).

TABLE 2
ADF and Phillips–Perron unit root tests

Variable	ADF	
	Level	1st diff
oilrentpc	-1.86	-5.61**
gasrentpc	-1.86	-4.88**
govconspc	-0.91	-4.95**
capitalpc	-1.48	-4.51**
impportpc	-1.24	-7.61**
ecxhange	-2.94	-3.07*
GDPpc	-1.26	-2.49
defencepc	-0.75	-4.91**
cpi	-13.37**	-7.02**
polity	-1.92	-5.47**
elcdem	-2.18	-5.12**
egaldem	-0.97	-5.25**
libdem	-1.71	-4.35**
delibdem	-0.7	-5.20**
partibdem	-2.44	-4.23**

*Null hypothesis rejection at 5%.
**Null hypothesis rejection at 1%

Three points are relevant for our modelling strategy. Firstly, structural VAR models are "very often misspecified" (Tijerina-Guajardo and Pagán 2003) and thus we opt for an unrestricted VAR approach. Secondly, since the remaining variables are non-stationary, it is better to use a VAR in levels (Fuller 1976). Thirdly, in the short term (so, the immediate effects of sanctions), an unrestricted VAR performs better than a cointegrated VAR or a vector error correction model.[5]

In the unrestricted VAR model, the vector of endogenous variables is as follows:

$$y_t = [oilrentpc, govconspc, importpc, capitalpc, exchange, elecdem] \quad (2)$$

Oil rents impact directly on public consumption expenditures and later on all other variables. Oil revenues basically depend on world market conditions, so its behaviour is the most exogenous among the variables included in the model. The negative development in oil rents due to the economic sanctions decrease firstly imports and secondly investment. The variations in these economic

[5] Naka and Tufte (1997) demonstrate that the loss of efficiency from VAR estimation is not critical for the short horizon. Engle and Yoo (1987), Clements and Hendry (1995) and Hoffman and Rasche (1996) show that an unrestricted VAR is superior in terms of forecast variance to a restricted VEC model on short horizons. Also see Farzanegan and Markwardt (2009), Farzanegan (2011), Dizaji and Bergeijk (2013), Dizaji (2014) and Dizaji et al. (2016) for the same approach.

variables impact on the exchange rate and ultimately the economic variables codetermine the democracy index.

TABLE 3
Tests for cointegration

	Maximum eigenvalue statistic		Trace statistic	
Hypothesized no.of CE(s)	Max-eigenvalue statistic	0.05 critical value	Trace statistic	0.05 critical value
None	96.56*	40.08	198.07#	95.75
At most 1	48.04*	33.88	101.51#	69.82
At most 2	25.51	27.58	53.47#	47.86
At most 3	17.26	21.13	27.96	29.79
At most 4	7.61	14.26	10.69	15.49

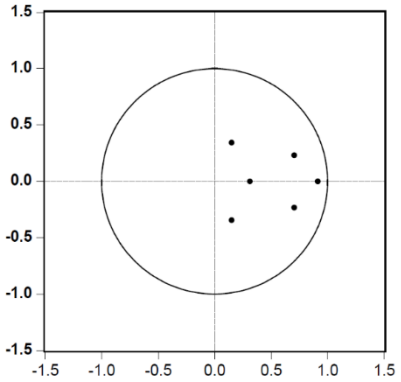
* Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level.

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level.

The results of ADF unit root test in Table 3 show that the applied variables in our VAR model are non-stationary and integrated of order 1. A vector of variables integrated of order one can be cointegrated if there exists linear combination of the variables, which are stationary. Following the approach of Johansen and Juselius (1990), two likelihood ratio test statistics, namely the maximal eigenvalue and the trace statistics, are utilized to determine the number of cointegrating vectors. The results of the maximal eigenvalues and trace test statistics are presented in Table 3. The test statistics indicate that the hypothesis of no cointegration among the variables can be rejected for the case of Russia. The results reveal that two cointegrating vectors exists among the variables of interest according to maximal eigenvalue test statistic (Note that this is three according to the trace test statistic).

Finally, Figure 2 reports an important aspect of the quality of our model, namely the inverse roots of the characteristic AR polynomial (see Lütkepohl 1991). This figure shows that in the VAR model all roots have modulus smaller than one and lie inside the unit circle and therefore we can conclude that our VAR model is stable.

FIGURE 2
Inverse roots of AR characteristic polynomial



3 Findings

We first report IRFs and then provide the variance decomposition.

3.1 Impulse response functions

An impulse response function (IRF) traces the effects of a one-time shock to one of the innovations on current and future values of the endogenous variables. If the innovations ε_t are contemporaneously uncorrelated, the interpretation of the impulse response is straightforward.

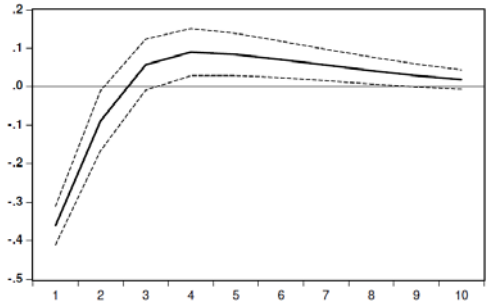
The i-th innovation $\varepsilon_{i,t}$ is simply a shock to the i-th endogenous variable $y_{i,t}$. Runkle (1987) emphasizes the construction and reporting of confidence bands around the impulse responses in the VAR models. As an indication of significance, we have estimated 68% confidence intervals for the IRFs (see Sims and Zha 1999). In this study, the middle line in IRFs displays the response of the interest variables to a one standard deviation shock in oil rents per capita. The dotted lines represent confidence bands. When the horizontal line in the IRFs falls between confidence bands, the impulse responses are not statistically significant. In other words, the null hypothesis of "no effects oil rents per capita" on the specific variable cannot be rejected (Berument et al. 2010). The horizontal line in IRFs shows the time period after the initial shock. The vertical line in IRFs shows the magnitude of response to shocks.

Figure 3 reports the impulse response functions for the model of equation (2). The IRFs trace out the response of current and future values of the variables in the system to a one standard deviation decrease in the current value of real oil rents per capita. Figure 2 shows that a decrease in the oil rents per capita initially has negative and statistically significant impacts on the government consumption per capita (panel b), imports per capita (panel c) and gross capital formation per capita (panel d) but as time passes by the Russian economy, according to our VAR model adjusts, and these impacts turn positive in the long run. Panel e shows the impact on the exchange rate: initially a depreciation but in the long run insignificant. As illustrated in panel f, the short run responses of electoral democracy index to negative shocks in oil rents per capita is positive and statistically significant while its long run response is negative to these shocks.

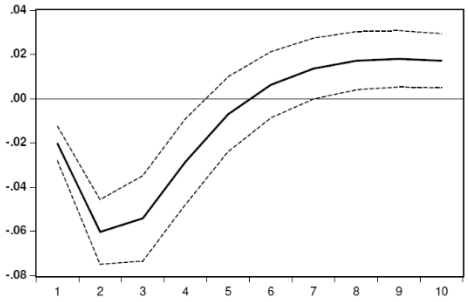
Taken together, these findings show that economic sanctions have significant impact on both key economic variables (government consumption per capita, imports per capita, capital formation per capita, exchange rate) and the political situation (electoral democracy). A reduction of oil rents creates economic costs that act as incentives to move towards a more democratic setting. However, this effect is only significant in the short run and turns negative in the long run, as adjustment of economic structures mitigates the economic and political impact of the sanctions.

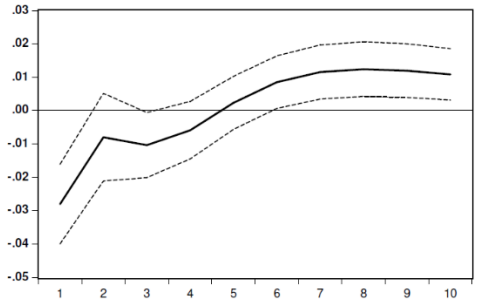
FIGURE 3
Inpulse Response Functions: The responses of economic variables and electoral democracy to a one standard deviation decrease in oil rents per capita (equation 2)

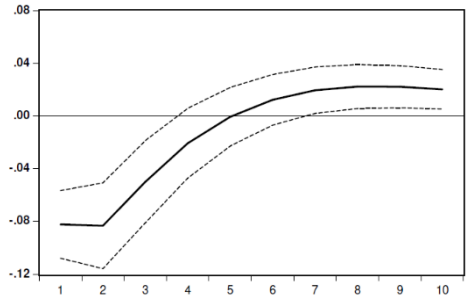
a) Response of *oilrentpc* to *oilrentpc*

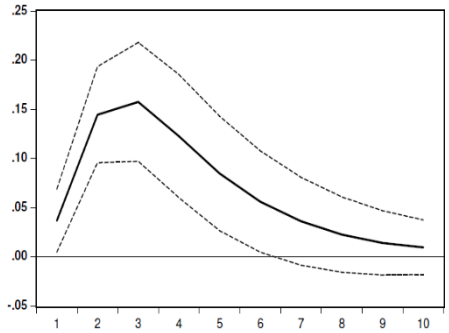


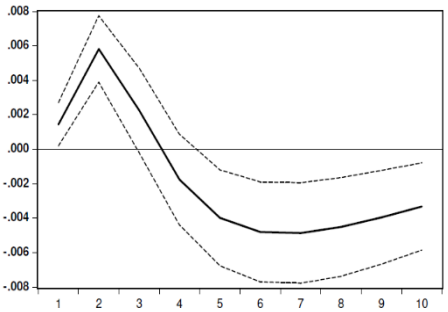
b) Response of g*ovconspc* to *oilrentpc*











3.2 Variance decomposition analysis

We also examine the forecasting error variance decomposition to determine the proportion of the movements in the time series that are due to shocks in their own series as opposed to shocks in other variables. Table 4 shows that for all of the variables the largest portion of variations are typically explained by the variables' own trend in the first year. Hence at the start of the simulations the historical trend of these variables explains a large part of their own variations. The exceptions are for government consumption expenditures per capita, capital formation per capita and exchange rate where the biggest portion of their variations in the first year are explained by oil rents per capita reflecting high dependency of these variables on oil rents in Russia.

TABLE 4
Variance decomposition (equation 2)

	oilrentpc	govconspc	importpc	capitalpc	exchange	elecdem
Variance Decomposition of *oilrentpc*						
1 year	100	0.00	0.00	0.00	0.00	0.00
4 years	71.67	10.33	1.47	12.95	0.55	3.02
8 years	70.55	10.06	1.32	12.35	2.81	2.90
10 years	70.26	9.99	1.32	12.22	3.29	2.90
Variance Decomposition of *govconspc*						
1 year	23.13	76.87	0.00	0.00	0.00	0.00
4 years	60.92	19.18	8.67	8.07	2.71	0.47
8 years	50.96	16.87	9.83	8.83	11.65	1.86
10 years	49.58	15.42	9.38	8.31	15.57	1.74
Variance Decomposition of *importpc*						
1 year	19.19	0.00	80.81	0.00	0.00	0.00
4 years	19.11	0.22	70.67	1.04	6.39	2.57
8 years	1929	1.44	55.13	2.59	18.74	2.79
10 years	20.75	1.34	50.32	2.49	22.57	2.54
Variance Decomposition of *capitalpc*						
1 year	33.08	8.54	11.76	46.62	0.00	0.00
4 years	46.31	6.10	15.72	30.42	0.54	0.91
8 years	42.79	6.84	14.86	28.19	5.49	1.81
10 years	42.64	6.56	14.30	26.88	7.88	1.74
Variance Decomposition of *exchange*						
1 year	4.84	9.03	0.97	18.09	67.05	0.00
4 years	45.41	4.66	0.79	10.45	38.54	0.13
8 years	43.57	4.60	1.24	8.66	41.33	0.60
10 years	42.61	4.74	1.49	8.53	41.95	0.67
Variance Decomposition of *elecdem*						
1 year	5.01	2.14	3.78	13.96	1.56	73.54
4 years	19.09	8.86	19.39	9.29	20.02	23.34
8 years	26.44	7.10	12.01	8.27	33.54	12.63
10 years	27.72	6.17	11.08	7.24	36.83	10.95

The variance decomposition analysis finds that a considerable portion of variations of economic variables and electoral democracy index in the long run (after 10 years) is explained by the variations in oil rents per capita. This implies the important role of oil rents in explaining the variations in Russian macroeconomic variables and political system.

The contribution of oil rents shocks to changes in electoral democracy was almost 5% in the first year rising to 19% and 27% in the 4th and 10th years, respectively. In addition, the shocks to the exchange rate and imports per capita

explain respectively 36% and 11% of variations in democracy index after 10 years illustrating the importance of foreign trade as a determinant of changes in the political system. In combination these findings suggest that sanctions that bite into the oil rents can affect the Russian key macroeconomic variables and political system.

4 Two alternative specifications

Having set out the detailed results for the first VAR model, this section discusses two specifications that are particularly relevant in the current context. Our second model analyses the impact of gas sanctions and uses an alternative measure for authority characteristics of states, namely Polity. The third model focusses on military expenditure rather than public consumption.

4.1 The impact of shocks to gas rents per capita on economic variables and polity 2 index

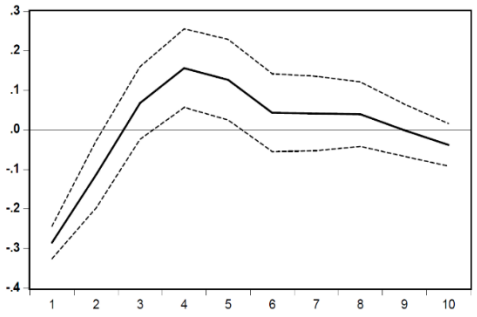
In order to examine the effects of gas rents restrictions on economic variables and political institutions, we substitute gas rents per capita for oil rents per capita in Figure 4. This measure shows the relative importance of the gas sector (rent) for the economy. Moreover, we replace the electoral democracy index (*elecdem*) with *polity 2* index in order to test robustness with respect to the way the quality of democracy is operationalised. The VAR model thus becomes:

$$y_t = [gasrentpc, govconspc, importpc, capitalpc, exchange, \ polity] \quad (3)$$

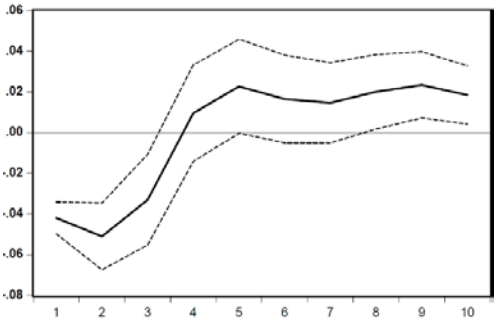
Figure 4 reports the IRFs. The short-run and long-run responses of economic variables and political system are similar to those which we obtained before for equation (2). The responses of the government consumption expenditures per capita (panel b), imports per capita (panel c) and capital formation per capita (panel d) to the negative shocks in gas rents are negative in the short run and positive in the long run (although the short run response of imports per capita are not significant for this specification). The positive response of exchange rate in the short run indicates that the Russian currency will depreciate within the first 3 years after the gas restrictions. Finally, the short run positive response of polity 2 index to the negative shocks in gas rents per capita show that the political system will initially improve in response to the decreases in gas rents. However, the response of polity 2 index is not significant in the long run.

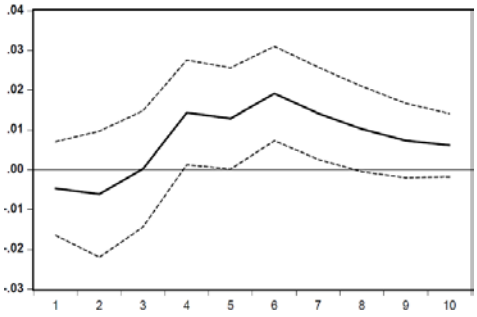
FIGURE 4
Impulse response functions: The responses of economic variables and polity 2 index to a one standard deviation decrease in oil rents per capita (equation 3)

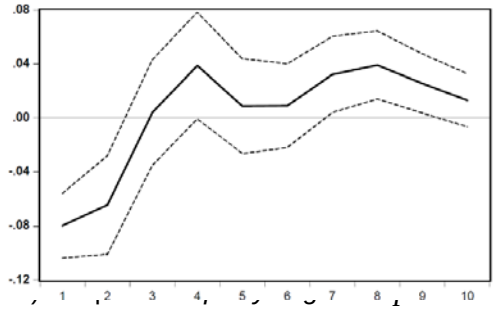
a) Response of *gasrentpc* to *gasrentpc*

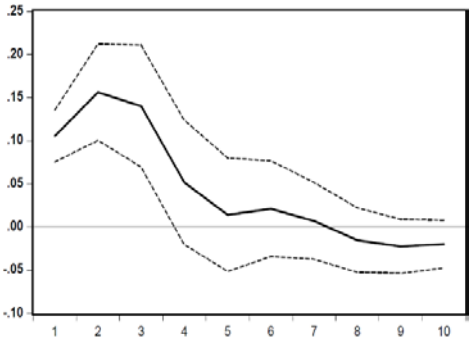


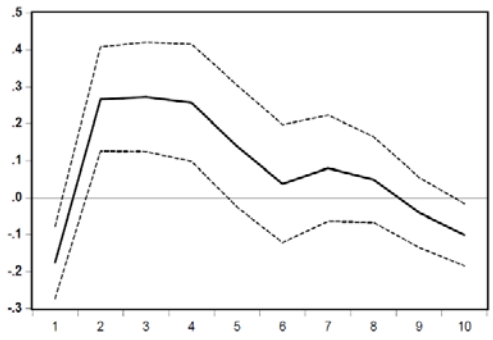
b) Response of *govconspc* to *gasrentpc*











4.2 The impact of defence expenditures

The USA and EU sanctions against the Russian energy industry aim to control Russian military ambitions as well. We therefore reformulate equation 2 and replace public expenditures by military expenditures:

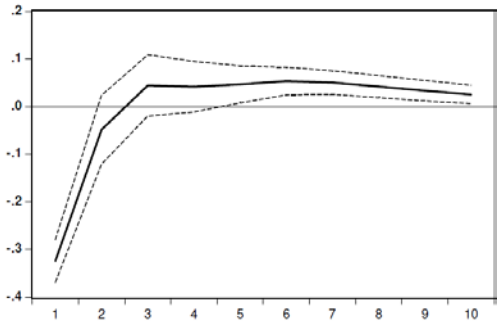
$$y_t = [oilrentpc, defencepc, importpc, capitalpc, exchange, elecdem] \quad (4)$$

Figure 5 reports the IRFs for the VAR when we use defence expenditures instead of government consumption expenditures. According to the results, sanctions reduce defence expenditures in the short run, but they increase military expenditures in the long run. The patterns for electoral democracy index are

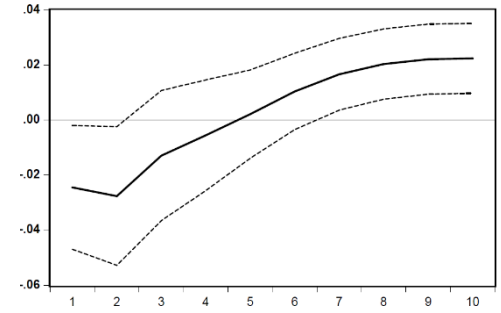
similar to the earlier estimated models, the short-run impact of sanctions on democracy is positive and significant – although their long run impact on democracy is negative.

FIGURE 5
Impulse response functions: The responses of military expenditures, economic variables and electoral democracy to a one standard deviation decrease in oil rents per capita (equation 4)

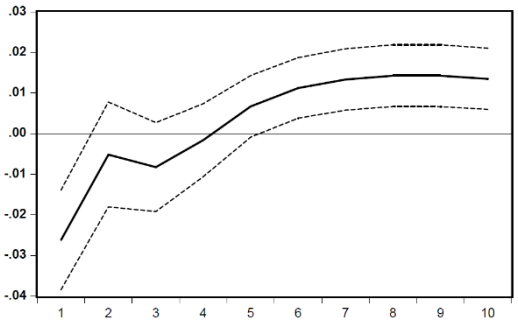
a) Response of *oilrentpc* to *oilrentpc*



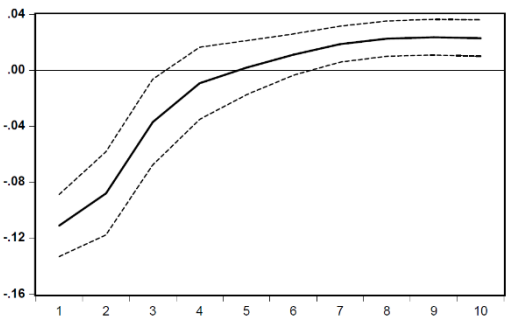
b) Response of *defencepc* to *oilrentpc*



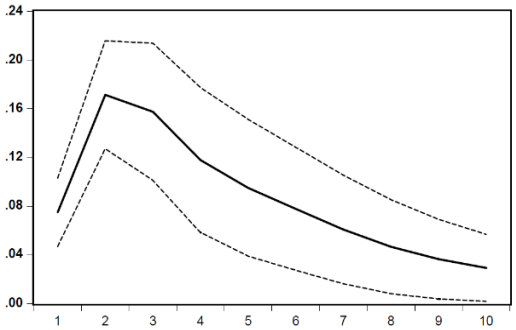
c) Response of *importpc* to *oilrentpc*



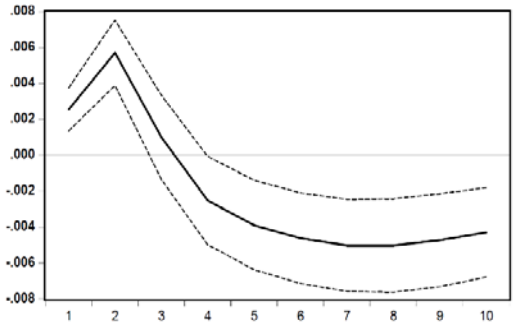
d) Response of *capitalpc* to *oilrentpc*



e) Response of *exchange* to *oilrentpc*



f) Response of *elecdem* to *oilrentpc*



5 Robustness analyses with respect to oil/gas sanctions, government consumption/military expenditures and different measures of democratic intensity and quality

In order to further examine the effects of oil and gas restrictions on democracy, we use other indices of democracy. Holding the elections in itself is inadequate and countries may also feign 'democratic features' without being electorally democratic (Coppedge et al., 2015). We focus on other components of democracy that propose different concepts and aspects of democracy, namely liberal, participatory, deliberative, and egalitarian democracy. We estimate the IRFs of the above-mentioned democracy indices and our selected economic variables to a one standard deviation negative shock in oil/gas rents per capita.

TABLE 5
The results of IRFs using different oil and gas rents shocks and different democracy indices

	Shock variable	**Impact on economic variables**				**Impact on democracy indices**
	oilrentpc/ gasrentpc	govconspc/ defencepc	importpc	capitalpc	exchange	elecdem/egaldem/ libdem/delibdem elecdem/polity
1	*oilrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-nil	*elecdem* (**pos**-**neg**)
2	*oilrentpc*	*govconspc* (**neg**-pos)	**neg**-pos	**neg**-pos	**pos**-nil	*delibdem* (**pos**-neg)
3	*oilrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*egaldem* (**pos**-**neg**)
4	*oilrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-nil	*libdem* (**pos**-**neg**)
5	*oilrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-nil	*partibdem* (**pos**-**neg**)
6	*oilrentpc*	*govconspc* (**neg**-pos)	**neg**-nil	**neg**-nil	**pos**-neg	*polity* (**pos**-neg)
7	*oilrentpc*	*defencepc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-**pos**	*elecdem* (**pos**-**neg**)
8	*gasrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*elecdem* (**pos**-**neg**)
9	*gasrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*delibdem* (neg-**neg**)
10	*gasrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*egaldem* (**pos**-**neg**)
11	*gasrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*libdem* (**pos**-**neg**)
12	*gasrentpc*	*govconspc* (**neg**-**pos**)	**neg**-**pos**	**neg**-**pos**	**pos**-pos	*partibdem* (**pos**-**neg**)
13	*gasrentpc*	*govconspc* (**neg**-**pos**)	neg-pos	**neg**-**pos**	**pos**-neg	*polity* (**pos**-neg)
14	*gasrentpc*	*defencepc* (**neg**-**pos**)	neg-pos	**neg**-**pos**	**pos**-neg	*elecdem* (**pos**-**neg**)

Notes:'pos' stands for positive and 'neg' stands for negative.

The short-run effect is indicated first, and the long-run effect is indicated second in each cell.

Significant responses are in bold.

The variables are: oilrentpc (oil rents per capita), gasrentpc (gas rents per capita), govconspc (government consumption expenditures per capita), defencepc (military expenditures per capita), importpc (imports per capita) capitalpc (gross capital formation per capita), exchange (official exchange rate), polity (polity 2 index), elecdem, egaldem, libdem, delibdem, partibdem (electoral, egalitarian, liberal, deliberative and participatory democracy indices).

Table 5 summarizes alternative specifications. The first column reports the shock variable; that is: the distinction between oil sanctions (first seven lines) and gas sanctions (second seven lines). Column 2 distinguishes between public consumption and military expenditure and reports the short term (first term) and long term (second term) impact of the shock variable as well as its

significance (**bold** indicates significance). The results are always that sanctions reduce government spending in the short term, but not in the long term. Colum 3 to 5 in the same vein reports the results for the three economic variables that are always included in the different specifications: imports, investment and the exchange rate. For imports we find somewhat more ambiguous results (especially in view of the findings for gas shocks), for investment both the short term and the long-term effects are robust and the same is true for the exchange rate in the short term where we find a significant deprecation while for the long term the signs differ, but these effects are insignificant.

By way of reference, lines 1, 6 and 10 report the results of Figure 3, Figure 4 and Figure 5 that we discussed earlier. Lines 1-5 represents the impact of per capita oil rents shocks on the economic variables and different indices of democracy while lines 8-12 represents the impact of per capita gas rents shocks on Russian economic variables and political system. The lines 6 and 13 show the response of polity 2 index to the shocks in oil rents and gas rents respectively. The lines 7 and 14 include the responses of military expenditures per capita to the shocks in oil rents per capita and gas rents per capita respectively.

6 Concluding remarks

The overall results by and large agree indicating that oil and gas restrictions dampen the economic system in the sort run and improve the democracy indices. However, the long run responses are reverse. By implication then, sanctions would seem to open a space for behavioural change and negotiation but at the same time our results indicate that this window of opportunity would start to close in the third to fourth year that sanctions have been imposed. This result is in line with the general finding that successful sanctions typical achieve their result in the first years of imposition (Biersteker and van Bergeijk 2015) Moreover, Demena et al. (2021) report a significant negative true effect on sanction success for sanction duration in their recent meta-analysis.

These findings fit in an emerging literature that challenges the policy prescriptions of the Liberal Peace where it argues that intensified economic relationships reduce conflict and enhance democracy. It is increasingly being recognized that the Liberal Peace breaks down in situations where the Resource Curse dominates political dynamics (see De Mesquita & Smith 2010, and Smith 2008). If so, more trade in natural resources would not strengthen peaceful coexistence and democracy but reduce the conflict-reducing potential of international trade relationships as is suggested by recent research that links the development of gas export hubs to increases in autocracy Gallea et al. 2020) and energy rents to larger defense expenditures (Dizaji 2022). And as yet unresolved question is whether these processes are symmetric – an issue that is of course also highly relevant for our modelling exercise where the VAR reflects to a large extent that increasing gas and oil rents are associated with a deteriorating democratic quality.

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