



## The Effects of Russian Sanctions on Global Commodity and Financial Markets: A GVAR Analysis

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*We use a GVAR model to forecast the response of the global economy to Russian sanctions, and a continuation of the Russia-Ukraine War. We find that the effects of sanctions on Russia and the unintended consequences for Saudi Arabia and European allies depend on the type of sanctions, i.e., whether they are trade sanctions targeting Russian oil production or financial sanctions targeting Russian GDP. We find that sanctions targeting Russian oil flows are inflationary but have fewer unintended consequences for global equity markets. Financial sanctions are more effective, with fewer adverse implications for global inflation levels. Our analyses also indicate that possible Russian measures to preempt further Western sanctions by implementing trade embargoes of products including natural gas and oil of their own will be counterproductive for the Russian economy.*

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### Introduction

On February 24, 2022, Russia began a “special military operation” in Ukraine, which quickly has escalated into a militarized conflict occurring across multiple fronts. The act drew immediate disapproval from the United Nations and led most members of the Western alliance to impose sanctions on Russia with negative spillover effects for the world economy.

We investigate how various types of sanctions on Russia (imposed, or under design) may impact global economy, oil markets and inventories with a special focus on regional impacts. Russia plays a critical role in the global economy; it produces 14% of the world’s oil with exports averaging 4.7 MMB/d before the onset of the Ukraine conflict. Russian gas also plays a critical role for the global economy, especially for European manufacturing and services industries. The European Union has obtained 40% of its annual gas demand from Russia, most of which had been transported via pipelines with little opportunity for seamless substitution of Russia as a supplier (IEA, 2022).

Since the escalation of the Russia-Ukraine conflict, Western countries have threatened or imposed various types of sanctions. Some of these sanctions included trade sanctions, i.e., embargoes and other types of mechanisms to prevent the flow of certain commodities into and from Russia. For instance, the U.S. prevented the export of U.S. made construction equipment that was critical to finish the remaining Nord Stream 2 project. (After this article was written, Russia’s Nord Stream 1 and Nord Stream 2 pipelines suffered suspected sabotage on September 26, 2022, and the G7 and Australia have agreed on a \$60.00/Bbl price cap on seaborne Russian crude oil flows.) Similarly, the EU has banned imports of Russian coal to Europe. Others featured restrictions in the financial sector, such as restriction of certain Russian banks’ access to primary and secondary capital markets in EU markets, or the prevention of the extension of any loan or financial assistance by international financial institutions to Russia, enforced by the United States International Financial Institutions Act.<sup>1</sup>

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Accordingly, we simulate a series of trade and financial shocks to various aspects of the Russian economy. For trade sanctions, we simulate a shock to Russian oil production and GDP. For financial sanctions, we shock short-term interest rates, inflation, and equity prices. Then, we assess the effects these sanctions may have on Russia in the short- and medium-term. We also trace the (unintended) spillover effects these simulated sanctions may have on the global economy.

In doing so, we employ KAPSARC's Global Vector Autoregression (GVAR) model (Considine *et al.*, 2021). Our model simulations suggest three critical insights:

1. Asia seems to benefit notably from oil sanctions on Russia.
2. The slowdown in the European economy due to Russian sanctions spills negatively over to macroeconomic indicators of Middle Eastern oil exporters.
3. Oil sanctions on Russia will cause a small but notable bump (5% per annum from its baseline equilibrium price of oil) over the course of next two years.

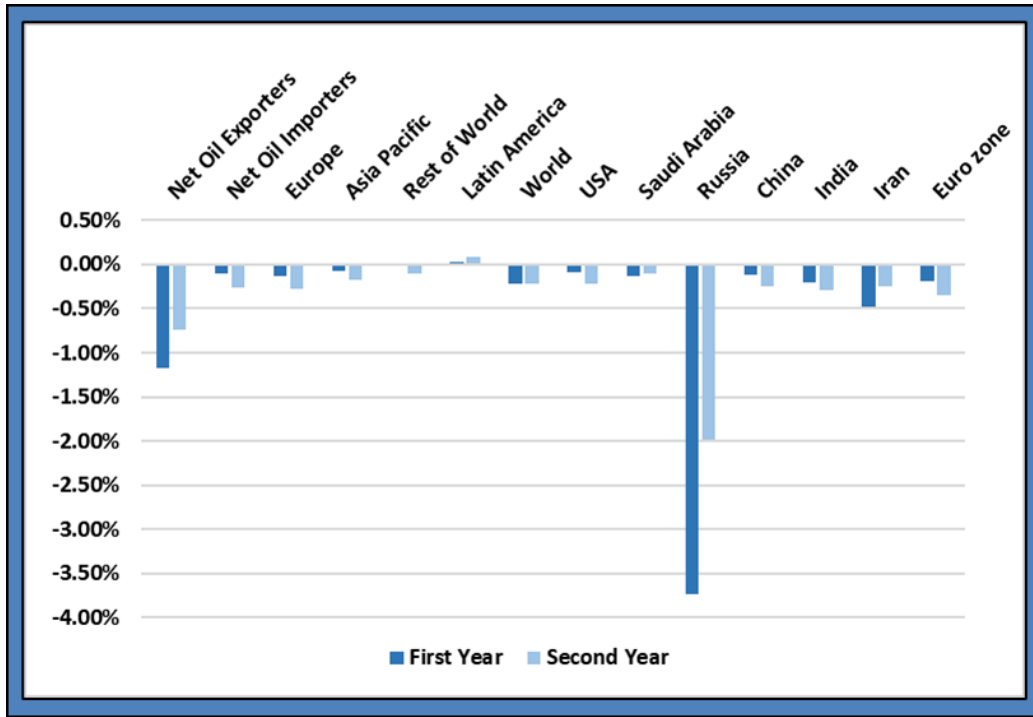
### **GVAR Simulation Results: Effects of Sanctions on Global GDP, Oil Price, Inflation, Equity Prices, and Exchange Rates**

#### Real GDP

*Economic sanctions:* The initial imposition of “economic sanctions” results in an immediate reduction in real Russian GDP of approximately 0.8%. The effects are long-lived and Russian GDP continues to fall throughout the forecast period. The total shock to the Russian GDP is equal to a 12% with sanctions triggering a recession that lasts for 25 quarters before a gradual recovery begins in just over 5 years. India and the Eurozone are most effected by the sanctions as their real GDP relative to the baseline falls by approximately 0.5% in the first two years of the sanctions. The U.S., Latin America and the Asia Pacific are the least affected regions by the sanctions, with Latin American experiencing a slight increase in GDP.



**Figure 1**  
Effect of Sanctions on Russian GDP on Real Global GDP



Note: The shock represents a single—one standard deviation shock from a baseline, and not a sustained sanction regime lasting for more than one quarter. As a result, the simulation is likely to underestimate the effects of sanctions.

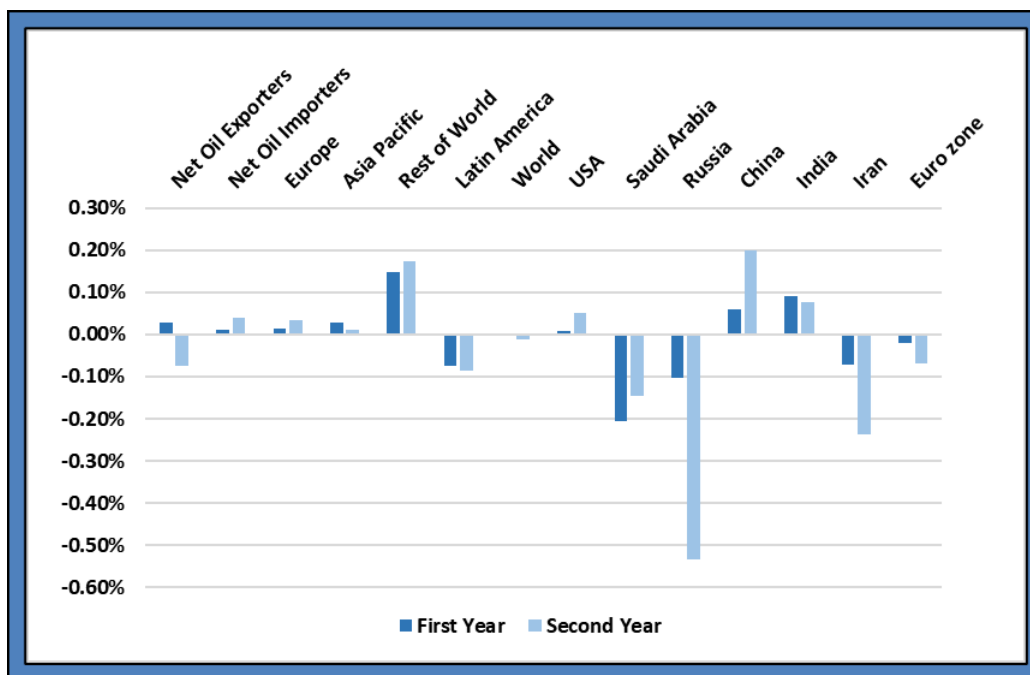
Source: KAPSARC Global oil market simulation, June 2022.

*Oil Sanctions:* We simulate “oil sanctions” by imposing an exogenous negative shock (approximately 1%) on real Russian oil production. The shock is long-lasting and severe, and Russian crude oil flows continue to fall relative to the baseline, resulting in a significant 27% shortfall over 25 quarters.

Russia, and Saudi Arabia are most effected by the sanctions as their real GDP relative to the baseline falls significantly in the first two years of the sanctions. The net importers, China, India, Europe, and the rest of the world benefit from the sanctions experiencing increases in real GDP.



**Figure 2**  
Effect of Sanctions on Russian Oil on Real Global GDP



Source: KAPSARC Global oil market simulation, June 2022.

**Table 1**  
Effect of Financial Sanctions in Tight Market Conditions

Impact	Russian Financial Sanctions					
	GDP		Inflation		Exchange Rate	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Net Oil Exporters	-1.18%	-0.74%	0.51%	-0.67%	-3.17%	-3.26%
Net Oil Importers	-0.10%	-0.26%	-0.09%	-0.12%	0.13%	1.51%
Europe	-0.13%	-0.27%	0.00%	-0.06%	-0.13%	0.18%
Asia Pacific	-0.08%	-0.18%	0.03%	0.00%	-0.42%	-0.15%
Rest of World	0.01%	-0.11%	-0.24%	-0.13%	-0.61%	0.01%
Latin America	0.02%	0.08%	0.03%	-0.10%	-0.07%	-0.27%
World	-0.22%	-0.22%	0.06%	-0.17%	-0.79%	-0.63%
USA	-0.09%	-0.21%	0.00%	-0.03%		
Saudi Arabia	-0.14%	-0.10%	0.03%	0.01%	-0.10%	-0.17%
Russia	-3.73%	-1.98%	1.68%	-2.65%	-12.81%	-13.52%
China	-0.12%	-0.25%	0.05%	-0.06%	-0.40%	-0.65%
India	-0.21%	-0.30%	0.04%	0.01%	-0.50%	-0.38%
Iran	-0.48%	-0.24%	-0.07%	-0.15%	-0.04%	0.26%
Euro zone	-0.20%	-0.35%	-0.01%	-0.03%	-0.86%	0.05%

Source: KAPSARC Global oil market simulation, June 2022.



**Table 2**  
**Effect of Oil Sanctions in Tight Market Conditions**

Impact	Russian Oil Sanctions					
	GDP		Inflation		Exchange Rate	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Net Oil Exporters	0.03%	-0.07%	0.38%	0.31%	-3.54%	-4.69%
Net Oil Importers	0.01%	0.04%	0.10%	0.04%	-0.21%	0.20%
Europe	0.01%	0.04%	0.00%	0.01%	0.62%	0.77%
Asia Pacific	0.03%	0.01%	0.04%	0.03%	-0.09%	-0.13%
Rest of World	0.15%	0.18%	0.05%	0.01%	-0.22%	-0.30%
Latin America	-0.07%	-0.09%	0.01%	-0.01%	0.07%	0.20%
World	0.00%	-0.01%	0.10%	0.07%	-0.71%	-0.87%
USA	0.01%	0.05%	-0.02%	0.02%		
Saudi Arabia	-0.20%	-0.15%	-0.04%	0.01%	-0.16%	-0.24%
Russia	-0.10%	-0.53%	-1.43%	1.18%	-13.12%	-17.11%
China	0.06%	0.20%	0.09%	0.01%	-0.21%	-0.14%
India	0.09%	0.08%	-0.07%	0.04%	-0.21%	-0.28%
Iran	-0.07%	-0.24%	0.13%	-0.07%	-0.67%	-0.82%
Euro zone	-0.02%	-0.07%	0.01%	-0.01%	0.50%	0.79%

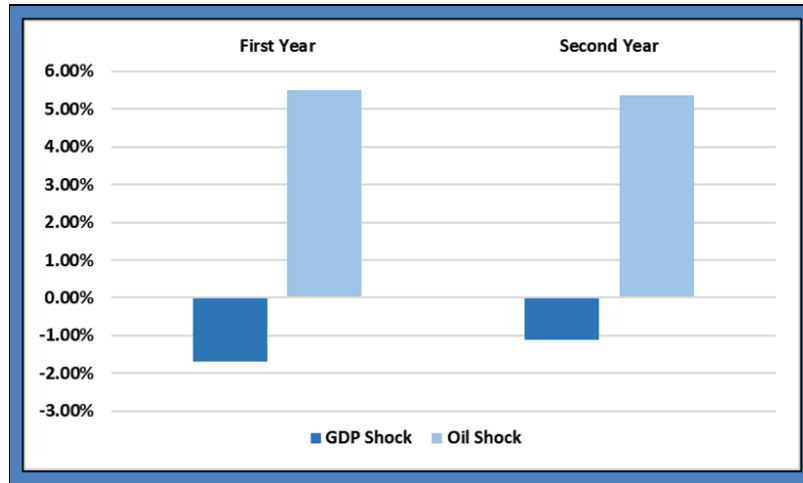
Source: KAPSARC Global oil market simulation, June 2022.

## Oil Price

The implications for global oil prices are significantly different according to the nature of sanctions. As expected, a GDP shock results in a reduction in world oil prices of approximately 1%, due to the reduction in Russian oil demand. Oil markets enter a period of backwardation and are expected to decline relative to the baseline throughout the forecast period. Sanctions on Russian oil production on the other hand result in a significant 5% increase in Brent oil prices.



**Figure 3**  
Effect of Sanctions on Brent Oil Price

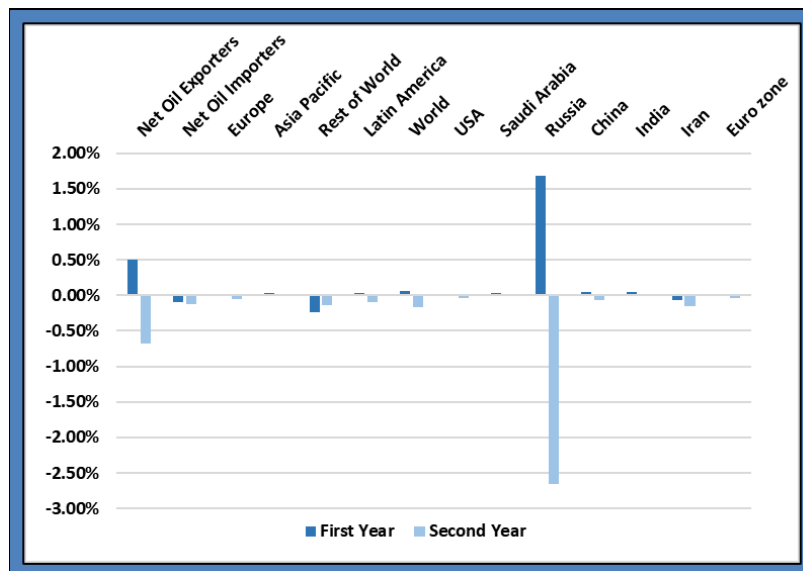


Source: KAPSARC Global oil market simulation, June 2022.

## Inflation

The imposition of economic sanctions on Russian GDP result in an immediate increase in domestic inflation followed by a sustained period of deflation and economic contraction. The effects on the global inflation rate are minimal, with the world registering only a slight increase in inflationary pressures from the baseline throughout the forecast period.

**Figure 4**  
Effect of Sanctions on Russian GDP on Inflation



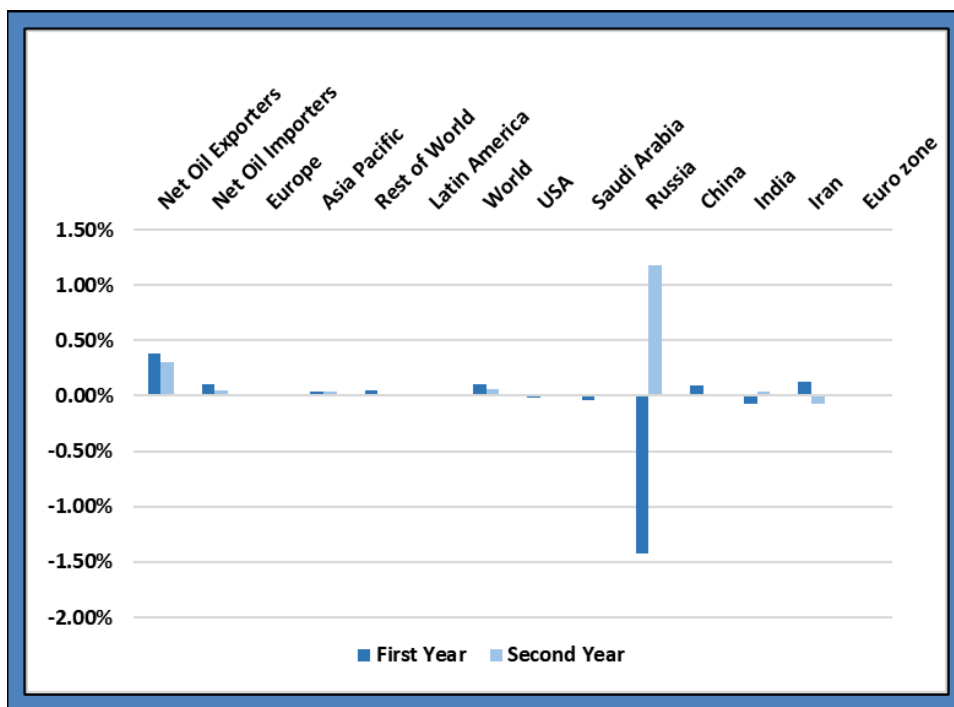
Source: KAPSARC Global oil market simulation, June 2022.



Sanctions on Russian oil production, on the other hand, have the opposite effect. In this case Russia experiences an initial deflationary period, followed by years in which inflation is elevated by a full percent above baseline levels. As expected, the increase in world oil prices leads to a slight and sustained increase in inflationary pressures for net oil exporting countries, and globally.

*There are clear signs of deflation in the Russian economy, as the Russian State Statistics Service (Rosstat) reports that the rate of increase in prices has fallen to zero in mid-May 2022 (Rosstat, 2022). Deflation is generally attributed to reduced demand in an economy and is often followed by recession or even depression in the months and years to come (Latypova, 2022).*

**Figure 5**  
Effect of Sanctions on Russian Oil on Inflation



Note: Aggregate response over 8 quarters.

Source: KAPSARC Global oil market simulation, June 2022.

### Exchange Rates

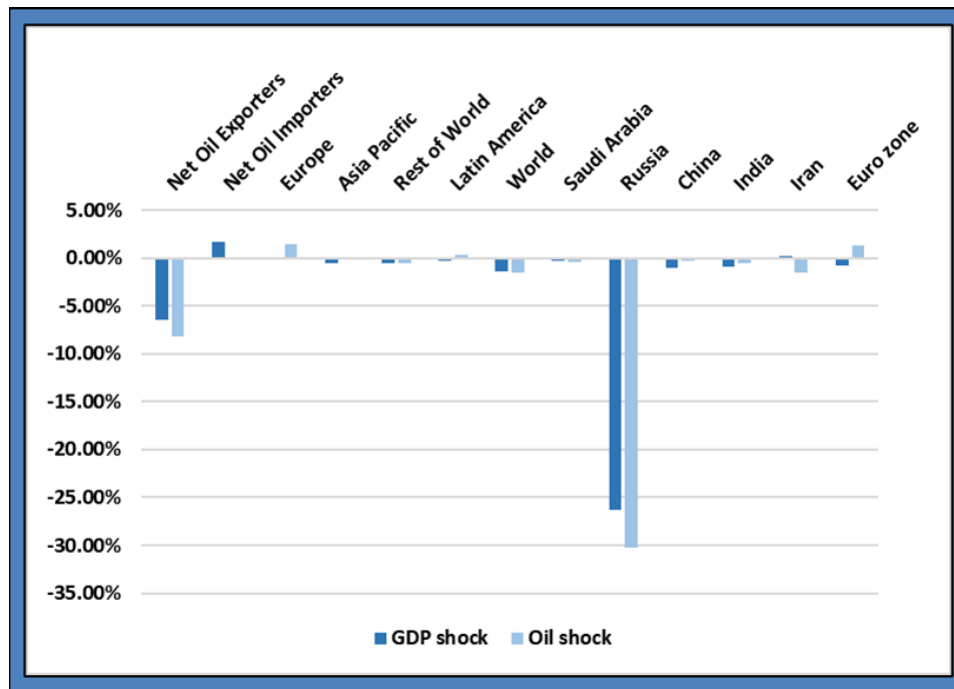
The effects on real exchange rates are remarkably similar for both pure economic sanctions affecting GDP, and those levied on Russian oil production. In both cases the Russian-US\$ exchange rate falls by nearly 30% relative to the baseline. This is almost exactly the response witnessed immediately following the imposition of sanctions in February 2022 (Hotten, 2022).



Since then, the Russian Federation has taken extreme measures to defend the ruble, including (i) a reduction in official interest rates from 20% to 11%; (ii) an announcement by the Russian Finance Ministry that debt service interest and maturity payment will be made in Rubles; and (iii) a request that all gas payments be made in Rubles (*Bloomberg News, 2022; Davis et al., 2022*)

*The Central Bank actions to defend the Rubles fall are similar, but far more severe, than those imposed in response to Western sanctions levied against Russia because of the annexation of the Crimea in 2014. The 2014 sanctions included a massive sale of foreign currency reserves and a sharp increase in domestic interest rates. The current round of Western sanctions is considerably more severe, freezing the accounts of the Russian central bank to prevent Russian intervention in its exchange rate. Russia responded immediately with strict capital controls and limits on the currency that Russian citizens can remove from central banks (Davis et al., 2022).*

**Figure 6**  
Effect of Sanctions on Exchange Rates



Note: Aggregate response over 8 quarters.

Source: KAPSARC Global oil market simulation, June 2022.

### Equity Prices

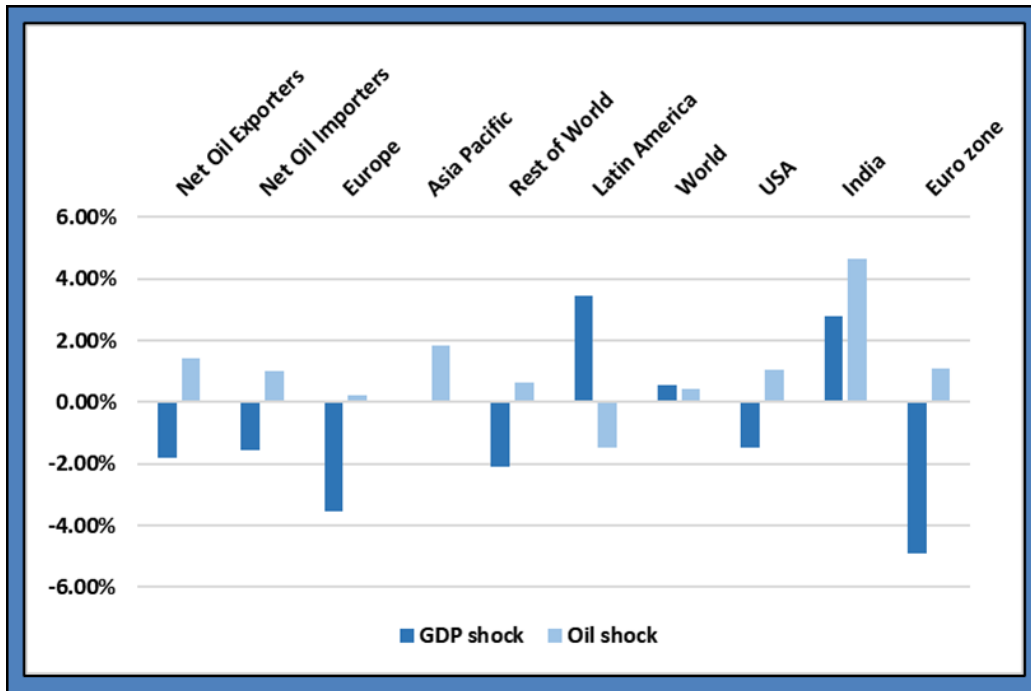
The implications for global equity markets are neutral, with equity markets rising slightly for both GDP and oil sanctions. In the case of economic sanctions affecting Russian GDP, Latin America and India are the clear beneficiaries with equity markets rising at the expense of the U.S. and the Eurozone. When oil is





sanctioned, on the other hand, equity markets in India, the Eurozone and the United States gain. In this case, Latin America is the only region to experience losses due to Russian oil sanctions.

**Figure 7**  
Effect of Sanctions on Equity Prices



Note: Aggregate response over 8 quarters.

Source: KAPSARC Global oil market simulation, June 2022.

## Discussion and Alternative Futures

The unanticipated effects of sanctions on neighboring countries and major trading partners differ significantly depending on the source of the exact nature of the sanctions, specifically a shock to Russian oil production or financial sanctions that have a direct effect on Russian GDP. We find that a sanction on Russian oil production has fewer adverse implications for global equity markets. Economic sanctions affecting Russian GDP have fewer adverse implications for global inflation rates. We find that Russian measures to combat shocks by preempting further sanctions by implementing its own trade embargo are counter productive

The implications of sanctions on Russian oil production are noteworthy. As expected, the impact of lower oil income to Russia is significant, especially in the second year, with more than a half percent negative deviation from its expected course of GDP growth. The adverse effects of these sanctions on Saudi Arabia and Iranian GDP are also notable as the Eurozone, one of their main customers, suffers.<sup>2</sup> The immediate implications for Saudi Arabia are a short-term loss in market share in India and China, due to the sudden and unexpected global shift in crude oil supplies.<sup>3</sup> This is reflected in a small -0.1%-0.2% reduction in Saudi



Arabian GDP relative to the GDP growth rates the Kingdom would have experienced had the shock to Russian oil production not occurred. While we expect the oil price to increase following sanctions, India and China GDP are expected to benefit as these two countries now have access to discounted oil. The overall effect on global GDP, however, is minimal.

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## Appendix A

### The KAPSARC Global Oil Model: A Primer to GVAR

We use KAPSARC's GVAR model, designed to analyze the implications of economic shocks on world oil markets, to gauge the effect of Russian sanctions on crude oil prices, global GDP, equity markets, inflation, exchange rates and inventories.

Two characteristics of the model make it particularly suited to this analysis. The first is that the GVAR framework is designed to account for the interaction between many countries, each with their own political and legislative systems. This is important because the effects of severe shocks and global imbalances, such as a global trade war, are contagious and cannot be contained to one country or region.

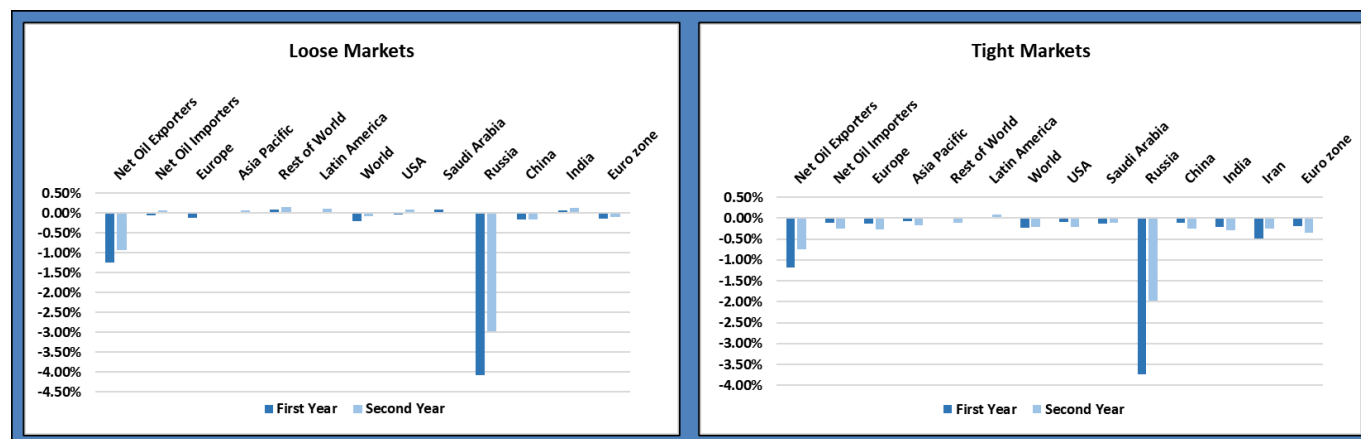
The second is that the world oil market, production, and inventories are modeled jointly with key macroeconomic variables, including short- and long-term interest rates, inflation, equity prices and real GDP. This enables the model to capture the nuances of complex economic interrelationships.

To project the effects of Russian sanctions, we first established a baseline simulation, taking the end of September 2018 as a reference point. This timing coincides a relatively stable period of tight oil markets. We simulated Russian sanctions in our model by shocking several variables separately:

- 1) Real global GDP by one standard error, which amounts to a 3.73% reduction in GDP during the first year of the shock, from the baseline forecast of approximately 5 % (CEIC, 2022). The total shock to the Russian GDP is equal to 12%. The size of this shock is roughly in line with the estimates of various industry analysts (Pestova *et al.*, 2022; Mahlstein *et al.*, 2022).
- 2) The initial "oil sanctions" shock results in a reduction in real Russian oil production of approximately 1% immediately upon the imposition of economic sanctions. The shock is long-lasting and severe, and Russian crude oil flows continue to fall relative to the baseline, resulting in a significant 27% shortfall over 25 quarters.



**Figure 8**  
**Effects of Financial Sanctions on Real Global GDP in Tight and Loose Oil Markets**



Note: The simulations were performed on tight world oil markets, like the conditions existing prior to the implementation of economic sanctions in 2022. The shock to GDP in the case of loose market conditions, with ample inventories and lower oil prices, would be far more severe with Russian GDP falling by an additional 1.3% in the first two years after the initial shock.

## Endnotes

The author would like to thank Emre Hatipoglu, Colin Ward, and Abdullah Al Dayel for their valuable contributions to the article.

1 Other types of sanctions imposed on Russia include travel bans and asset freezes imposed on certain Russian individuals. Due to their minimal effect on the global economy, our analyses do not factor these sanctions that primarily carry a diplomatic/symbolic significance.

2 See Mint (2022) and *Middle East Monitor* (2022).

3 It is important to mention that the results reported are relative to our base case or reference case, which reflected a high price, tight market environment that existed before the initial shock to Russian crude oil flows.

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