

The Economics of Sanctions

From Theory into Practice

Oleg Itskhoki
Harvard University

Elina Ribakova
PIIE

HKS Lunch on International Economic Policy
September 2024

Motivation

- This paper examines the effectiveness of economic sanctions imposed on Russia, particularly following its 2022 full-scale invasion of Ukraine
- Combines empirical assessment with a theoretical framework to understand sanction complexities
- Key takeaways:
 1. Sanctions are a critical tool but not a guaranteed method to end wars or change behavior
 2. Need a comprehensive, technocratic approach with clear, measurable objectives
 3. Efficacy depends on:
 - Target country's size and global integration
 - Unity and enforcement by sanctioning coalition
 - Economic burden on sanctioning nations

State of Russian Economy

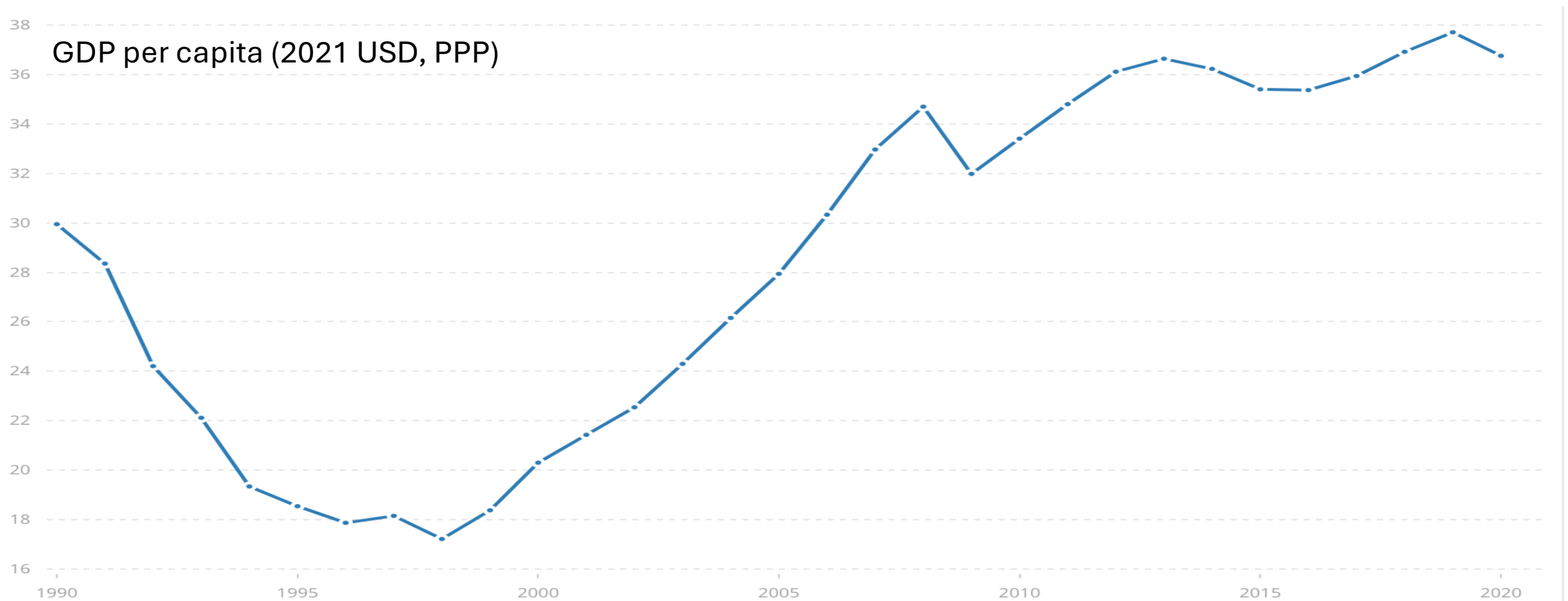
Is Russia a large or small country?

	Total GDP, 2021 (trillions USD)	Population, 2021 (millions)
United States	\$ 23.6	343
China	\$ 17.8	1,412
European Union	\$ 17.3	451
Canada	\$ 2.01	39
New York state	\$ 1.90	20
Russia	\$ 1.84	142
BENELUX	\$ 1.72	30
Mexico	\$ 1.31	127
Ukraine	\$ 0.20	44

- if nuclear weapons prevent a direct military solution to the invasion,
- why is there no economic solution given the economic size differential?

State of Russian Economy

Brief Economic History of Russia



- High-income country by Worldbank classification (2.5 times the world average)
- 45% of the US GDP per capita (with PPP adjustment) = “middle income trap”

Russian Economy Pre-Invasion

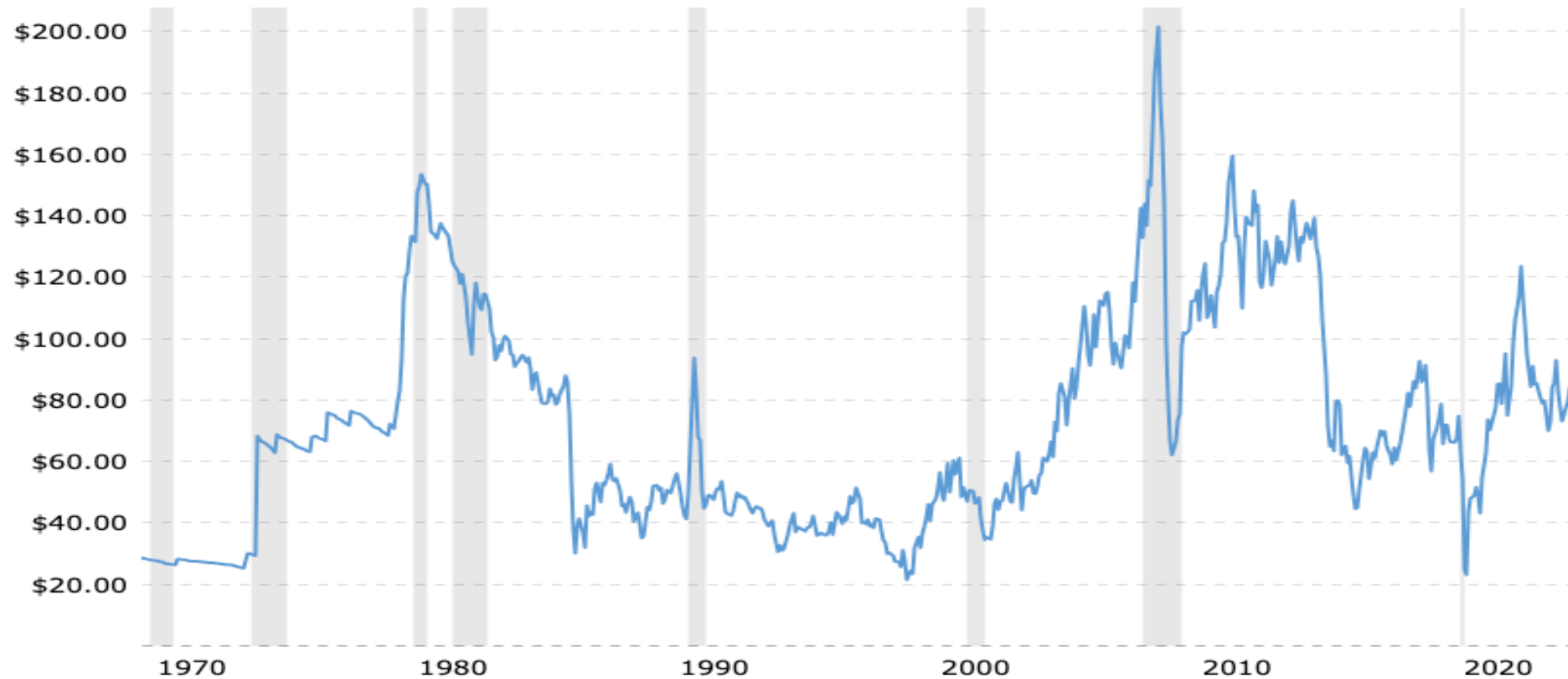
GDP growth (per capita, PPP)

Putin's terms	Annualized growth rate
1 st Term (1999-2004)	7.4%
2 nd Term (2004-2008)	7.2%
3 rd Term (2008-2012)	1.0%
4 th Term (2012-2016)	-0.5%
5 th Term (2016-2019)	2.1%

Country	Annualized Growth 2008-2019
United States	2.7%
Europe (Germany)	1.2%
World	3.4%
Poland	3.6%
Developing world	5.0%
Russia	0.8%

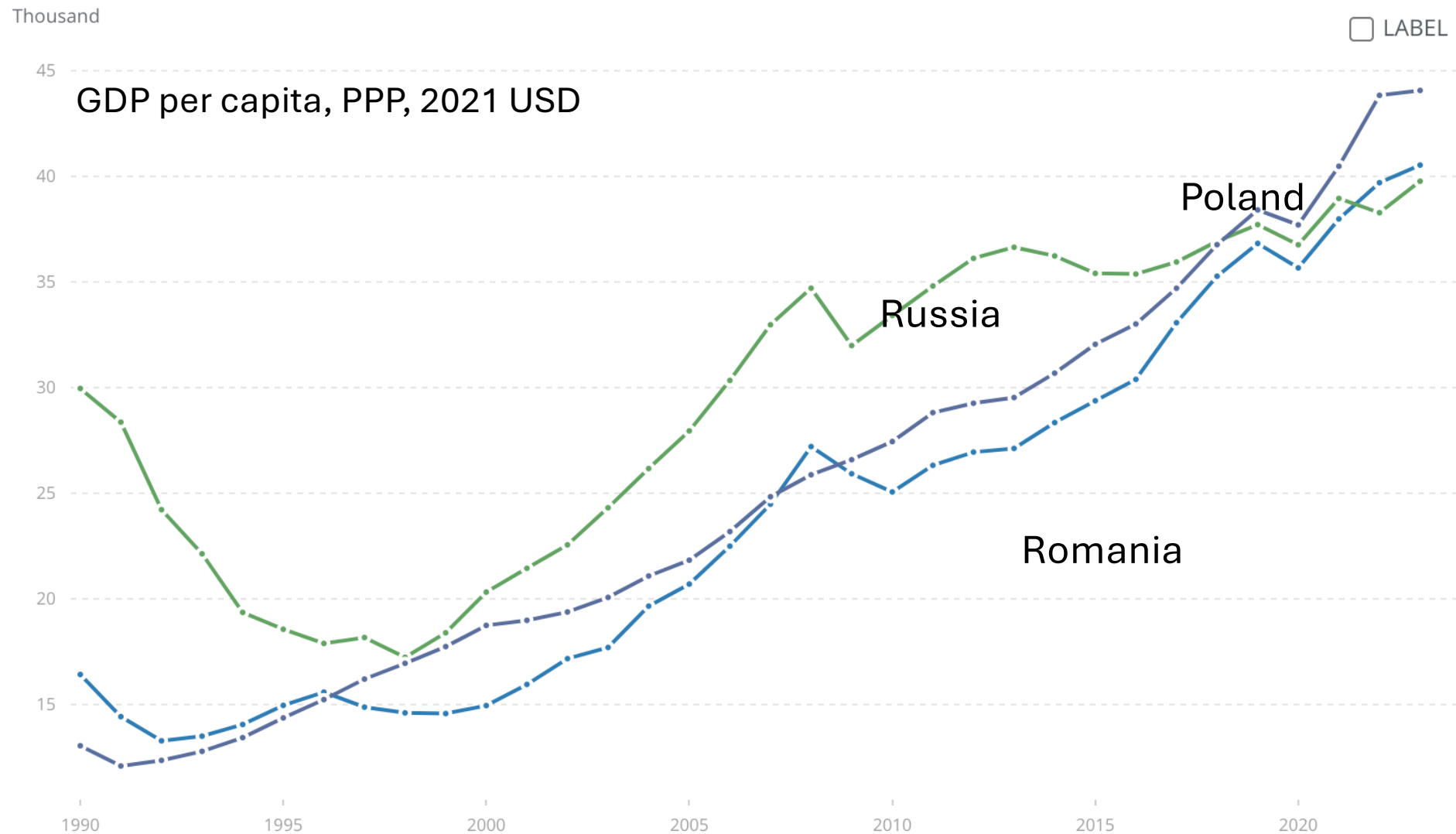
- Recent growth far slower than needed for catch up (in fact, an increasing gap)
- No productivity growth if oil prices are netted out (after 1st term)

Engine of Russian Economy: Oil Exports



- Top-3 world producer, top-2 exporter: 5 mln bbl/day = 10% of GDP
- Dominant regional supplier of gas to Europe before the full-scale invasion

Russia vs Former Soviet Block



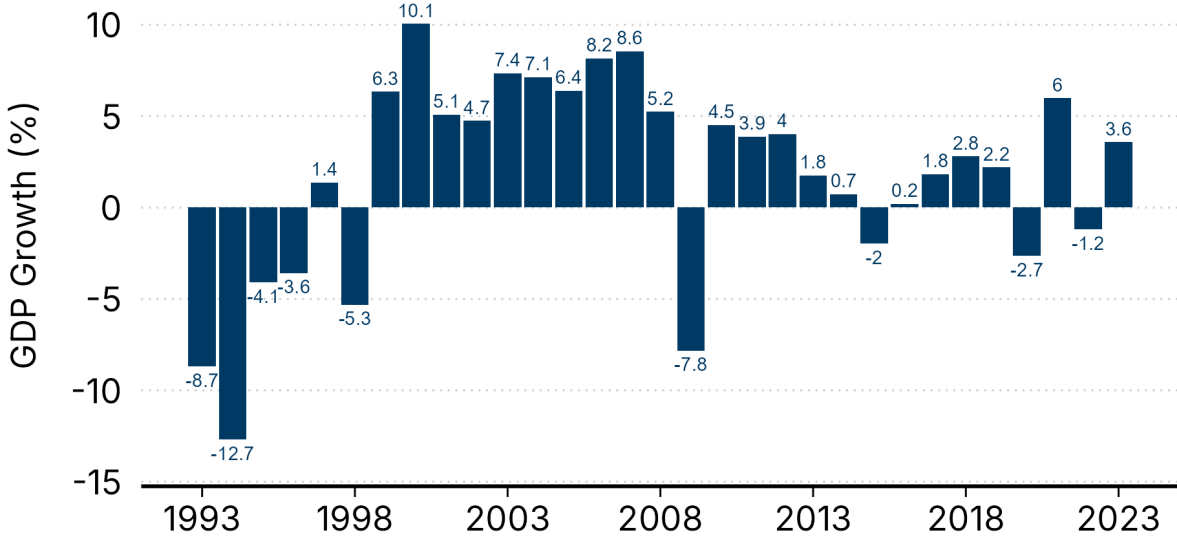
- The EU Miracle: Central Europe (75m people) quickly catching up to core EU
- All countries on similar trajectories, including many aspiring members

Russia's War Economy after 2022

- Large pre-war reserves (“economic fortress”), about 60% of GDP
+ record-high trade surplus in 2022 and consistently high export revenues
- Economic recession in 2022, expansion in 2023-24
- High inflation in 2022 and again starting late 2023
- Shortage in the labor market
- Outsized military expenditure, close to 10% of GDP
- Budget deficit, around 3% of GDP
 - at \$80/bbl oil (vs former break-even price of \$45/bbl) and devalued ruble
- Manageable in the short run, unsustainable in the long-run

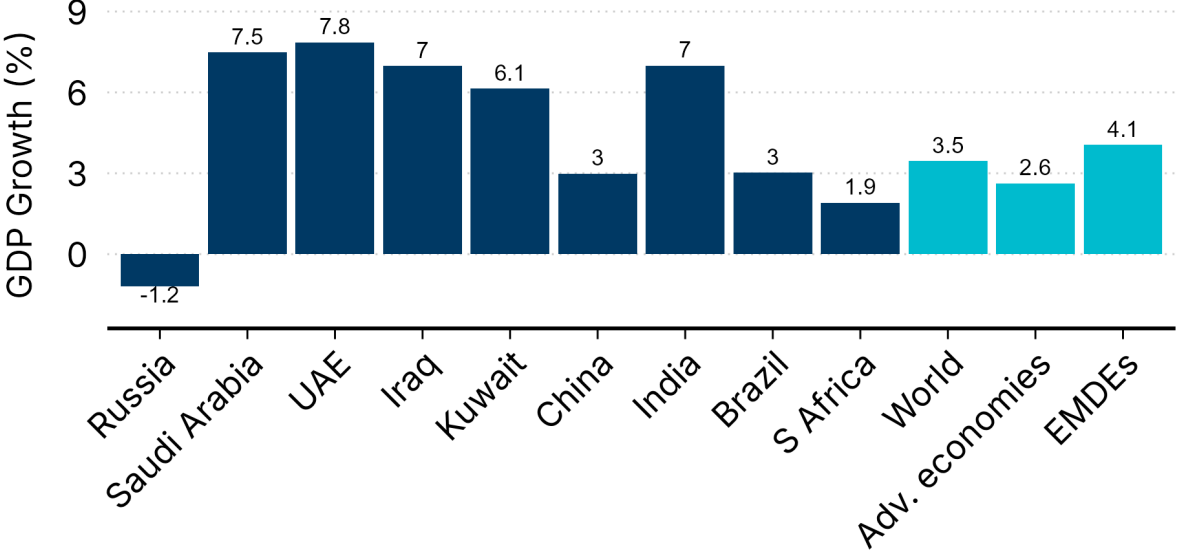
Russia Under Sanctions: Moderate Economic Contraction

Russian GDP Growth



Source: IMF World Economic Outlook, KSE Institute

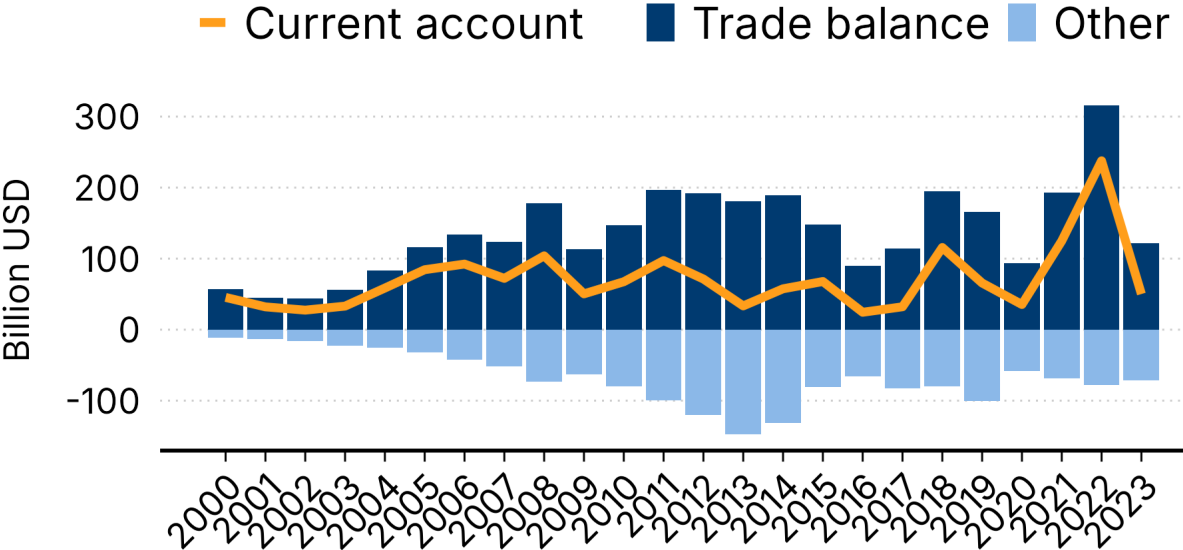
Real GDP Growth in 2022



Source: IMF World Economic Outlook

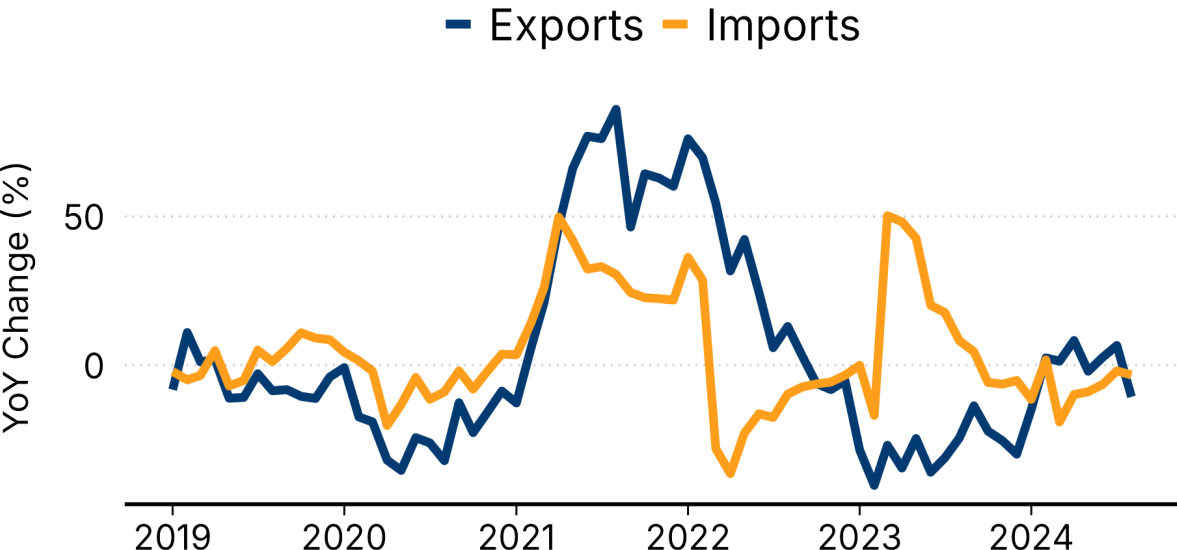
Russia Under Sanctions: Large Current Account Surplus

Current Account and Components



Source: Bank of Russia

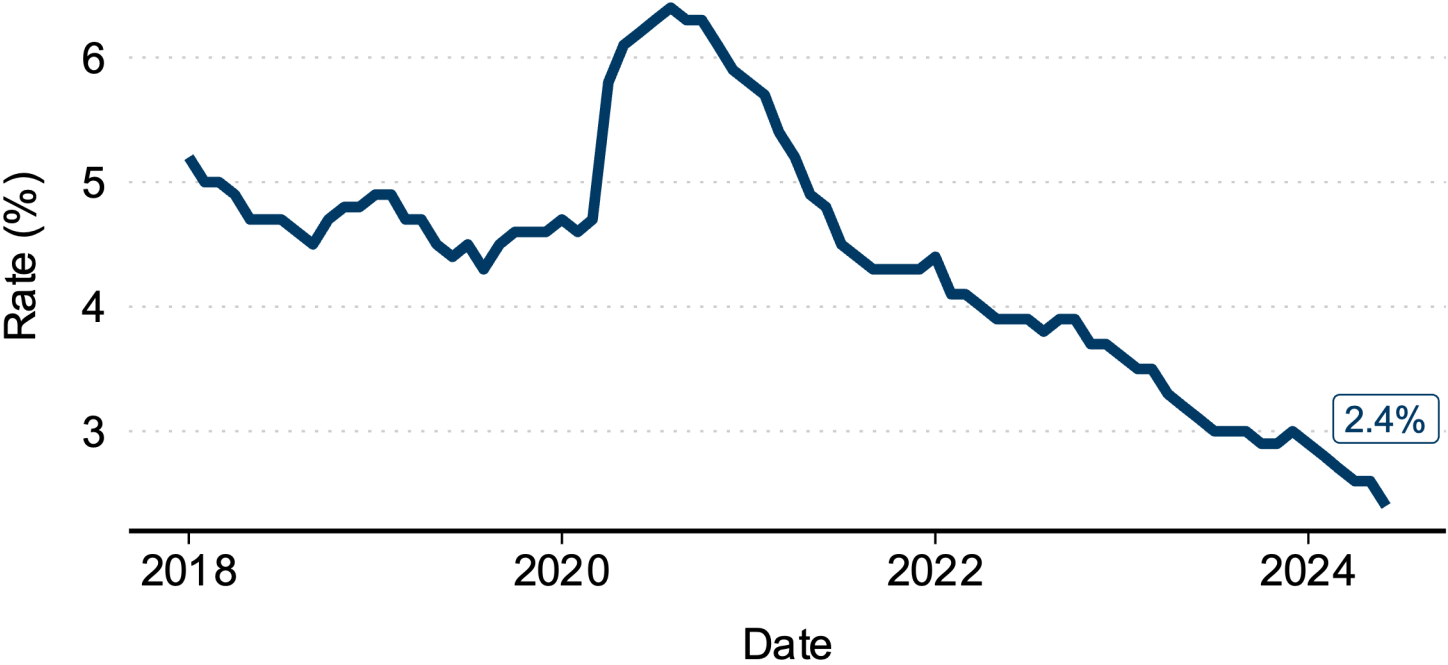
Change in Exports and Imports



Source: Bank of Russia

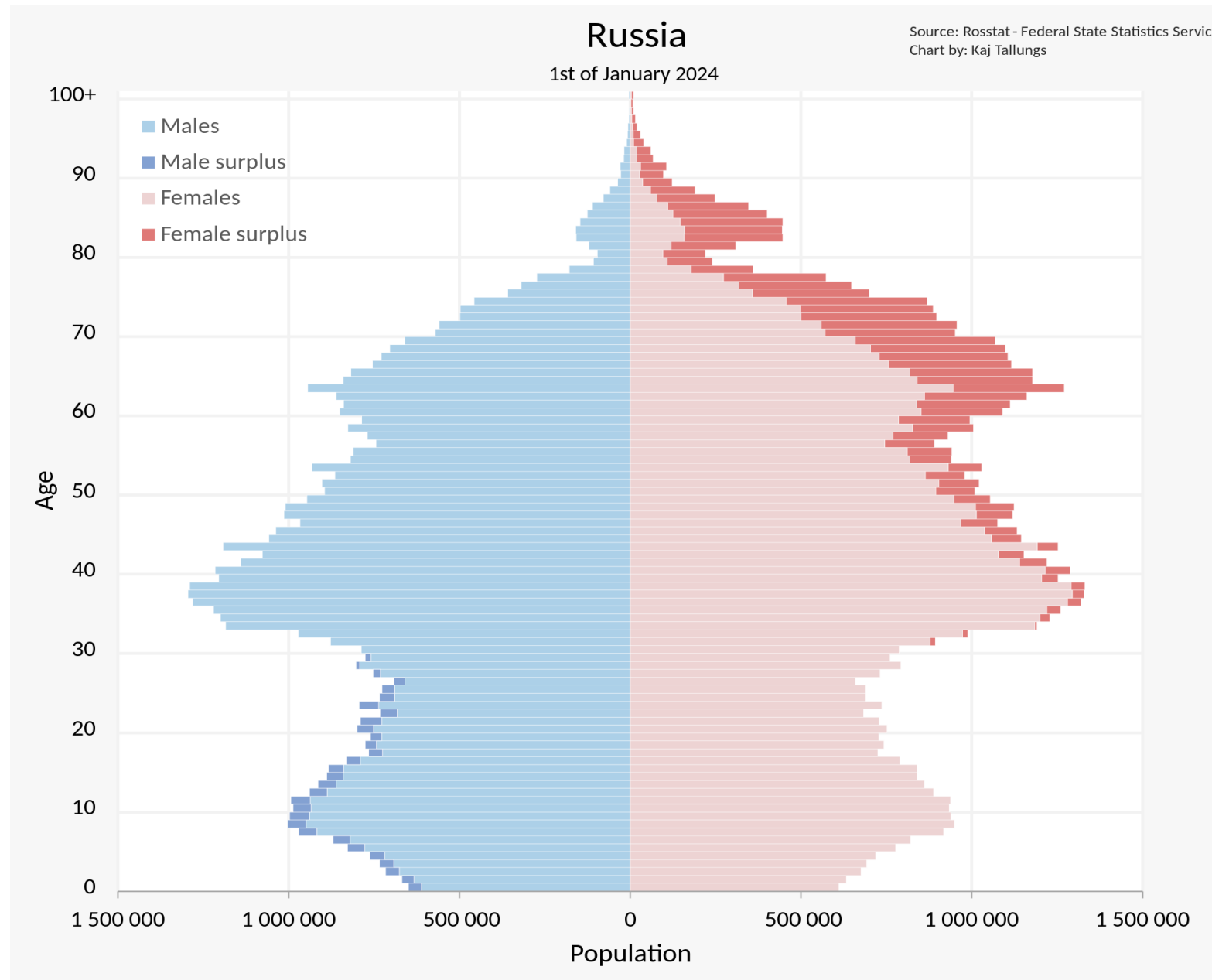
Russia Under Sanctions: Labor Market Deficit

FIGURE 3
Russian Unemployment Rate



Source: Rosstat, KSE Institute

Age Structure



Literature Review

- Economic statecraft: Hufbauer et al (2009), Zarate (2013), Blackwill and Harris (2016), Baldwin (2020), Miller (2022), Mulder (2023)
- Strategic consequences: Farrell and Newman (2019, 2023), Demarais (2022), Mohsin (2024)
- Sanctions on Russia: Ahn and Ludema (2019, 2020), Hilgenstock et al (2023), Keerati (2022), Balyuk and Fedyk (2023), Nigmatulina (2023), Baker (2024)
- Enforcement: Hilgenstock et al. (2023, 2024), Van Nostrand and Morris (2024), Bilousova et al (2024)
- Estimated impact: Felbermayr et al (2019), Gutmann et al (2023), Hausmann et al (2024), De Souza et al (2024)
- Theoretical models: Itskhoki and Mukhin (2022, 2023), Clayton et al (2023), Bianchi and Sosa-Padilla (2023), Becko (2024), Becko and O'Connor (2024)
- Quantitative models: Crozet and Hinz (2020), Moll et al (2023), Ghironi et al (2024), Kilian et al (2024), Alekseev and Lin (2024)

Theory of Sanctions

- Direct goals:

1. Limit overall production capacity or production in certain sectors
2. Limit financing and payment capacity
 - Trigger a swift financing or balance-of-payment crisis (limit liquidity)
 - Tighten long-run budget constraint (limit purchasing power)

- Additional indirect goals:

1. Compel to change course by signaling greater future sanctions
 - Cheap option that allows to delay conflict
 - Provides a heads-up and eliminates the surprise effect when sanctions are imposed
2. Impose overwhelming/prohibitive costs to keep deviations off-equilibrium
3. Limit technology transfer and capital goods in the long run

Trade Sanctions

Long-run impact under balanced trade

- Limit welfare and productivity gains from international trade
 1. Countries gain from trade
 2. Trade results in a distributional conflict
 3. Gains from trade are partially dissipated due to adjustment
- The impact of trade sanctions is proportional to:
 1. Sectoral import-to-expenditure ratio
 - Role of relative country size for both impact effect and cost to sender
 - Equivalence between long-run import and export sanctions (Lerner symmetry)
 2. Elasticity of substitution towards alternative suppliers
 - Role of coalition formation and enforcement (including secondary sanctions)
 - Adjustment is costlier than the LR effect. Evidence of fast adjustment/substitution

Trade Sanctions

Long-run impact under balanced trade

- 1 country's budget constraint:

$$\frac{F_{t+1}^*}{R_t^*} - F_t^* = Y_t^* - P_t^* C_{Ft}$$

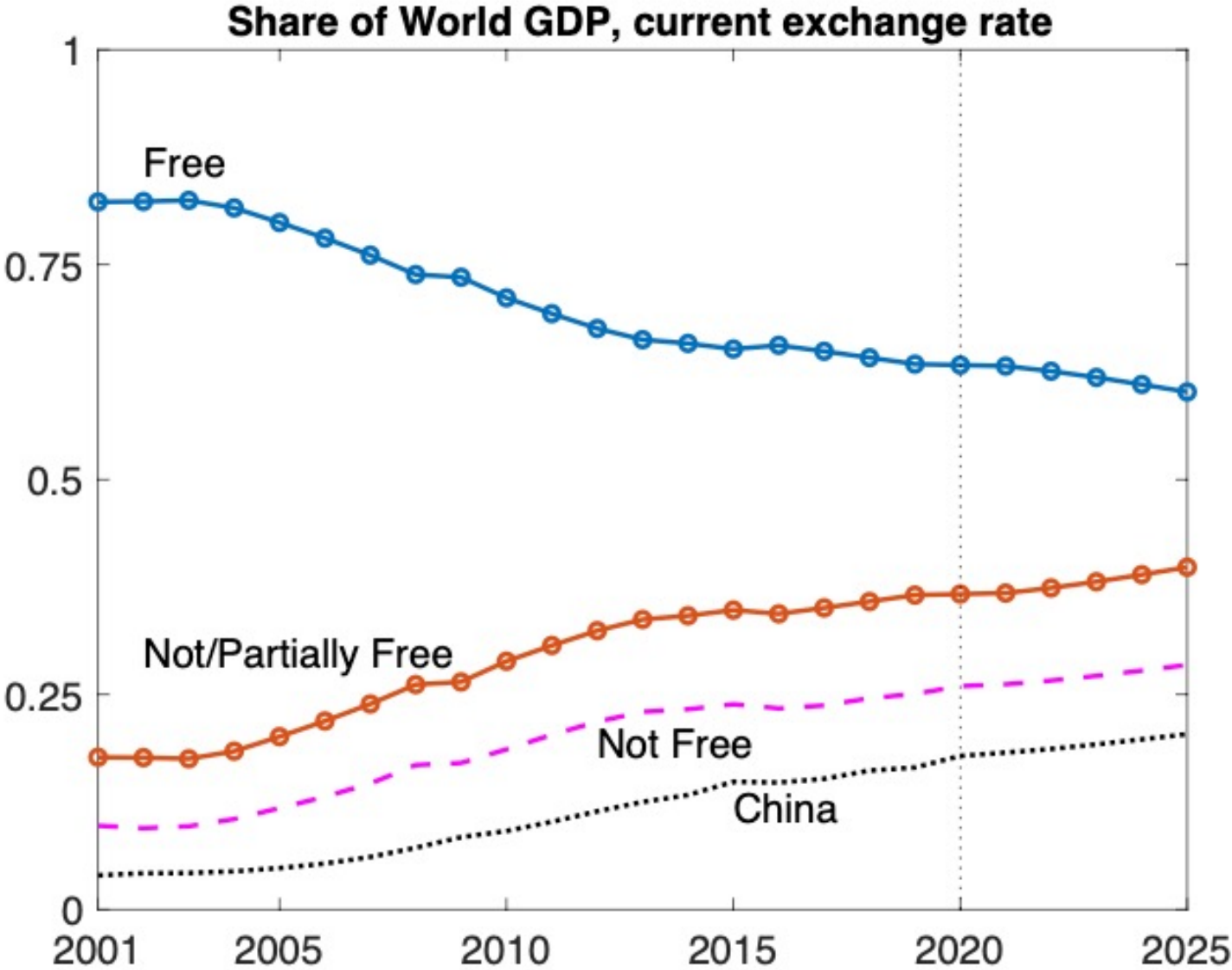
— in steady state: $(1 - \beta)F^* + Y^* = P^* C_F$

- 2 import demand (expenditure switching):

$$\frac{C_{Ft}}{Y_t} = \frac{\gamma}{1 - \gamma} \left(\frac{\mathcal{E}_t P_t^*}{P_t} \right)^{-\theta}$$

- Import, Export and Financial sanctions are equivalent in their effect on allocations, but have a differential effect on the exchange rate
 - Macro manifestation of Lerner Symmetry: equivalence between an export tax and an import tariff
 - Extends to fiscal effects and cost of living (inflation)

Coalition Formation



Optimal Trade Sanctions

1. Relies on international market power of the sender
 - optimal terms of trade manipulation (elasticity of import demand)
 - broad sanctions amplify the optimal tariff
2. Additional Pigouvian tax on trade in certain target industries
 - taking into account the input-output structure

Finance and Payment Sanctions

- Limit the ability to finance trade
 - + disrupt domestic financial and payment system
- Freezing accumulated foreign assets and payment systems
 - lowest direct cost to sender
 - apart from reputational costs
- Disrupt ability to finance imports and receive cash flows from exports
 - large impact, associated with a cost to sender
 - need to finance breaks equivalence between import and export sanctions
- Transmission to domestic financial sector
 - via exchange rate depreciation and financial balance sheet effects
 - in particular, in the presence of foreign-currency debt

Limits of Lerner Symmetry

- ① Temporary sanctions or pre-announced sanctions
 - break uniformity requirement of Lerner symmetry
 - temporary import sanctions encourage savings/avoid need to borrow, and undo the effect of financial sanctions and borrowing constraints
 - in case of Russia: financial sanctions combined with import sanctions and commodity export boom

- ② Financial + export sanctions can trigger a credit crunch when domestic contracts are written in foreign currency (dollarization)
 - exchange rate depreciates increasing FX debt burden
 - may trigger tightened borrowing constraints and defaults on FX debt
 - in case of Russia: little dollarization of the economy or external debt

Financial Sanctions and Repression

Demand for currency:

$$\beta R_{Ht}^* \mathbb{E}_t \left\{ \frac{P_t^*}{P_{t+1}^*} \left[\underbrace{\left(\frac{C_{Ft}}{C_{Ft+1}} \right)^{1/\theta}}_{\text{imports}} + \tilde{\kappa} C_{Ft}^{1/\theta} \underbrace{\left(\psi_t - \frac{B_{t+1}^*}{P_{t+1}^*} \right)}_{\text{savings}} \right] \right\} = 1$$

Three policy options:

- ① **Passive gov't**: no FXI, no financial repression ($R_{Ht}^* = R_t^*$)
 - imports fall $C_{Ft} \downarrow$ to accommodate accumulation of FX
 - exchange rate depreciates $\mathcal{E}_t \uparrow$, gradually mean reverts
- ② **FXI**: full accommodation of currency demand by selling FX reserves
 - leaves unchanged the path of imports and exchange rate
 - in Russia: infeasible under financial sanctions
- ③ **Financial repression**: capital controls or taxes on FX, $R_{Ht}^* < R_t^*$
 - prevents depreciation; redistributes from savers to consumers
 - in Russia: a full spectrum of financial repression [▶ show](#)

Russia: Timeline of Events

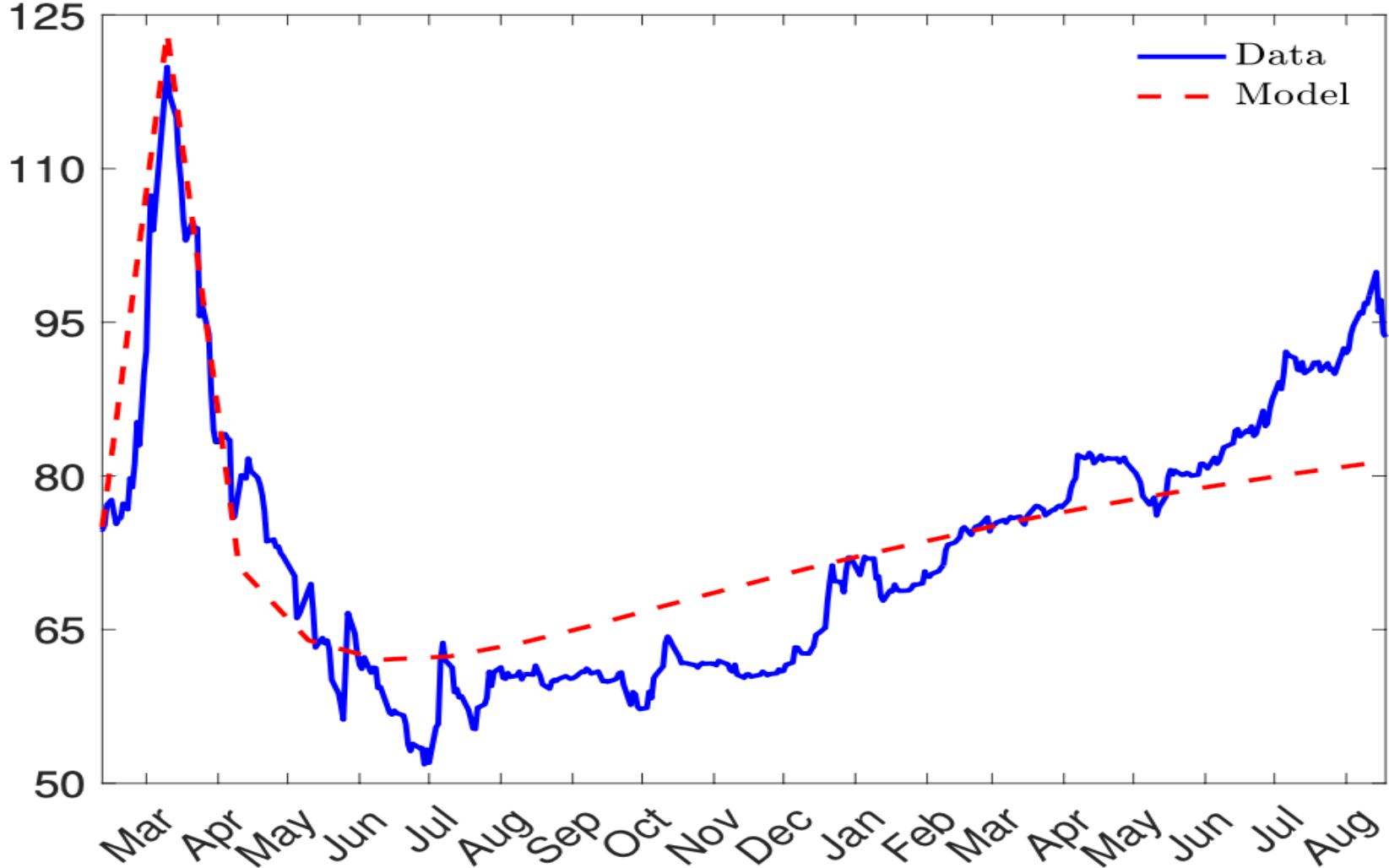
- 2014: focused on deterrence
 1. Financial sector sanctions
 2. Long-term investment and technology transfer, including in energy
 3. Export controls on military use/user

- 2022: impose a cost, undermine Russia's ability to continue the war
 1. Financial sanctions
 2. Export controls (limit Russia's imports)
 3. Oil embargo and price cap, and other Russian exports

Exchange Rate and Finance

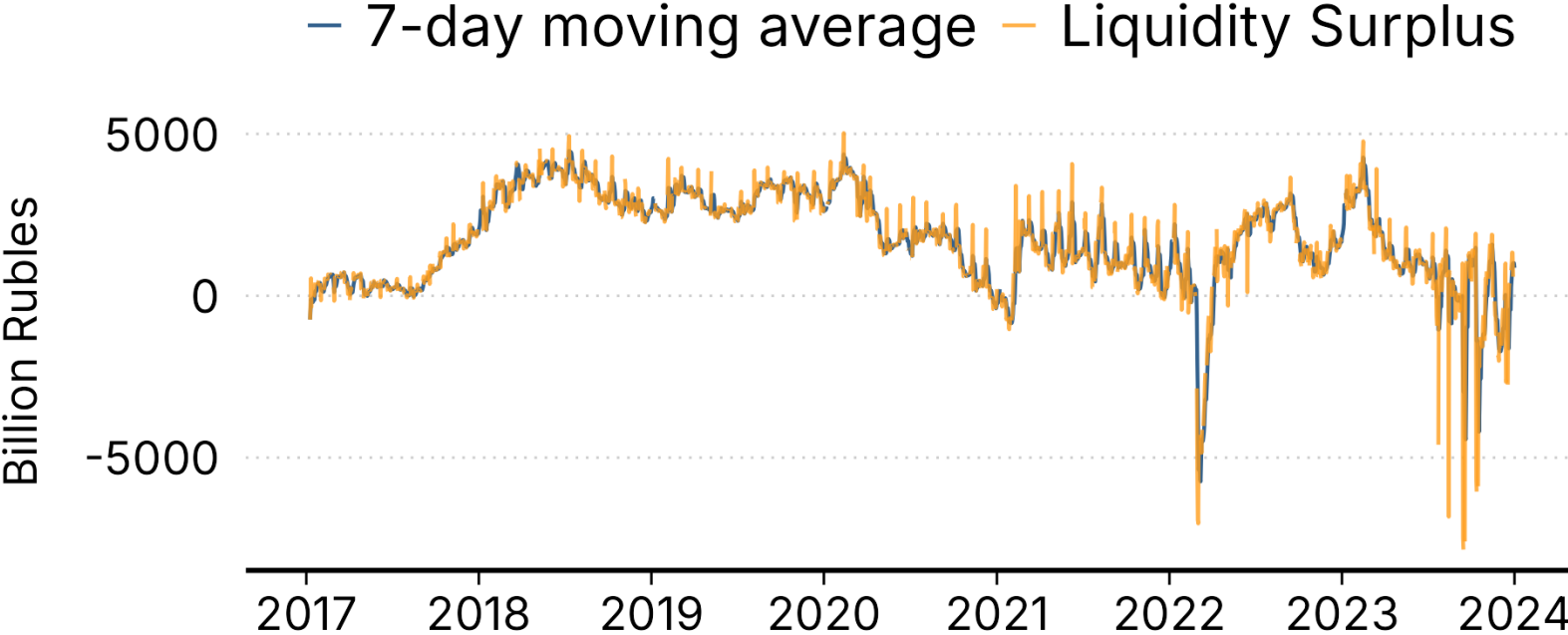


Data vs Model



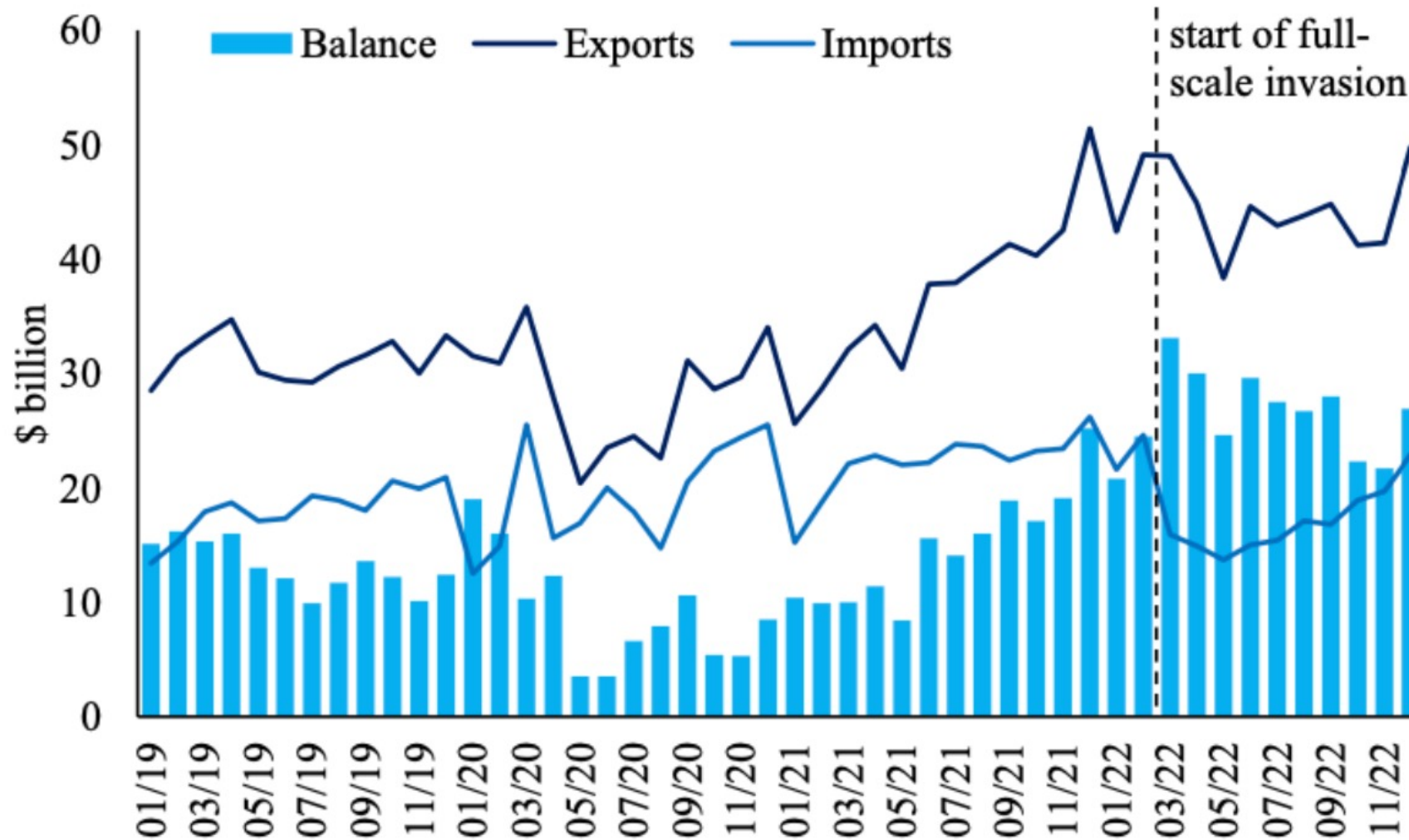
Russia Under Sanctions: Financial Markets

Structural Liquidity Surplus of the Banking System



Source: Bank of Russia

Trade Effects of 2022 Sanctions



Source: Babina, Hilgenstock, Itskhoki, Mironov, and Ribakova (2023)

Russia Under Sanctions: Access to Critical Components

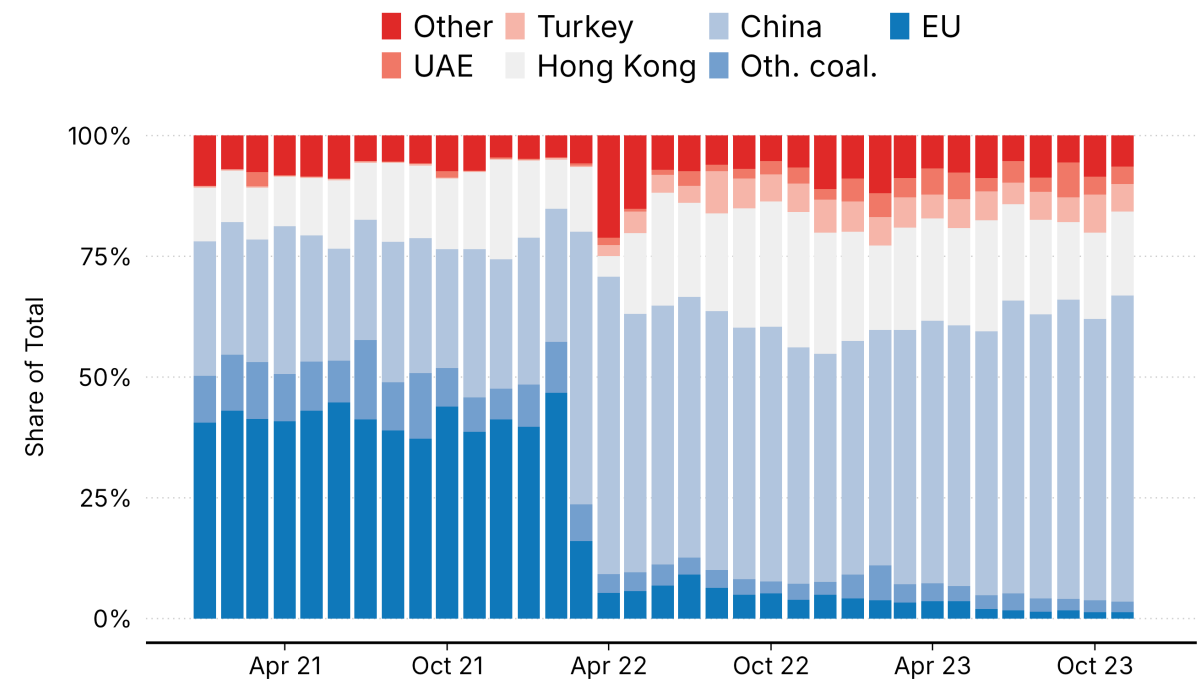
Russian Imports of “Battlefield Goods”



Source: KSE Institute

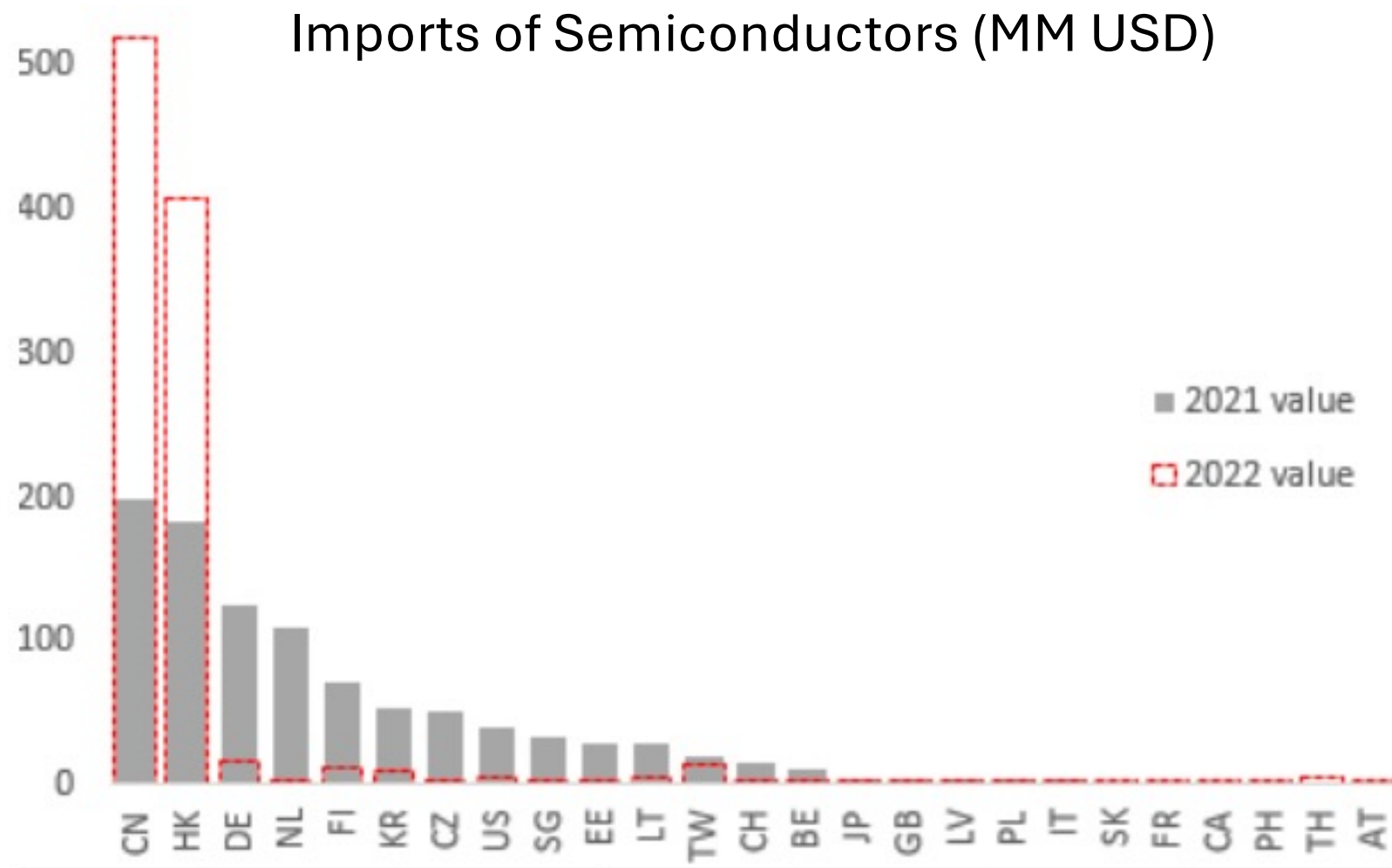
Russian Imports of “Battlefield Goods”

By Country of Dispatch, % of Total

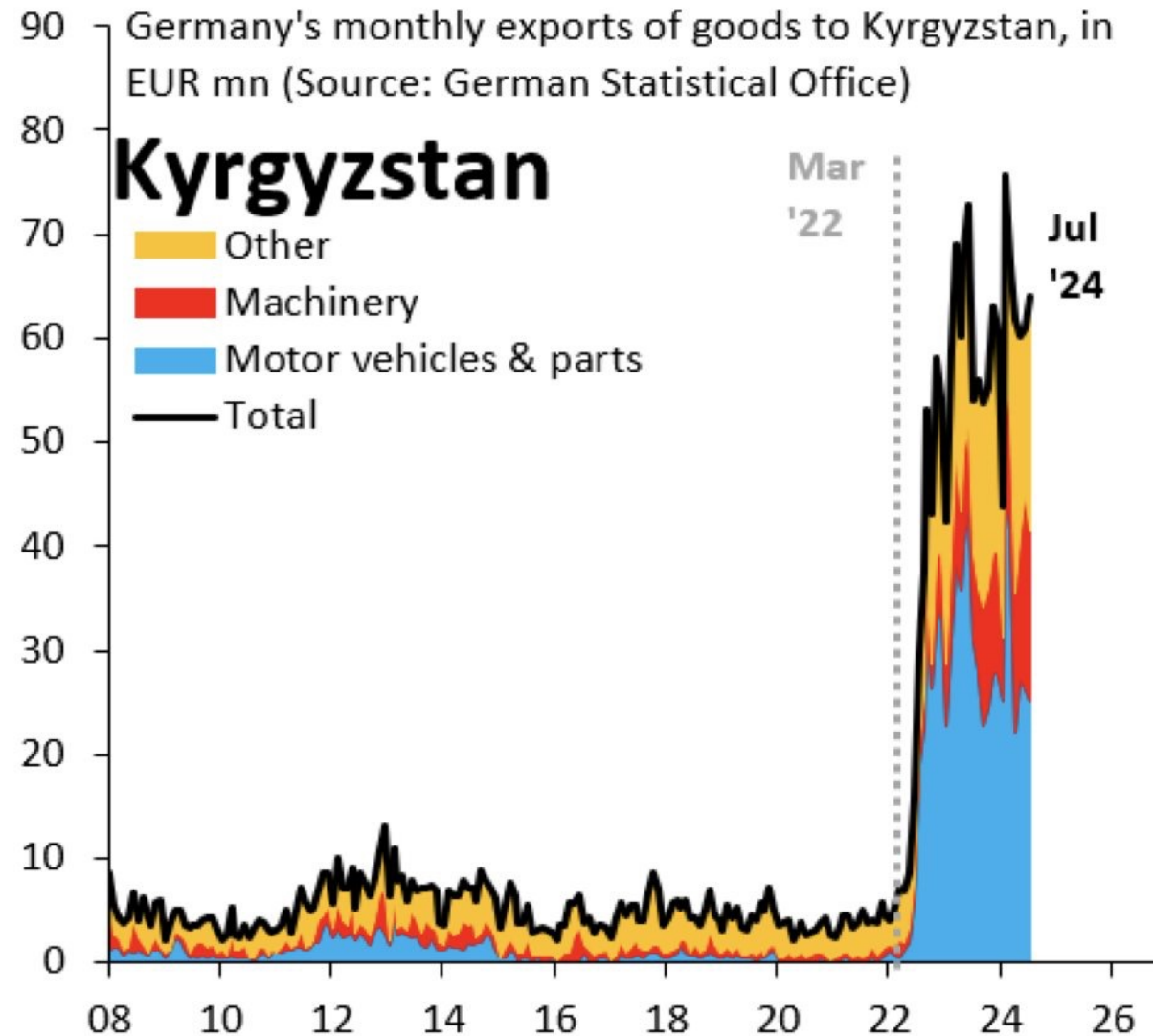


Source: KSE Institute

Russia Under Sanctions: Substitution 1

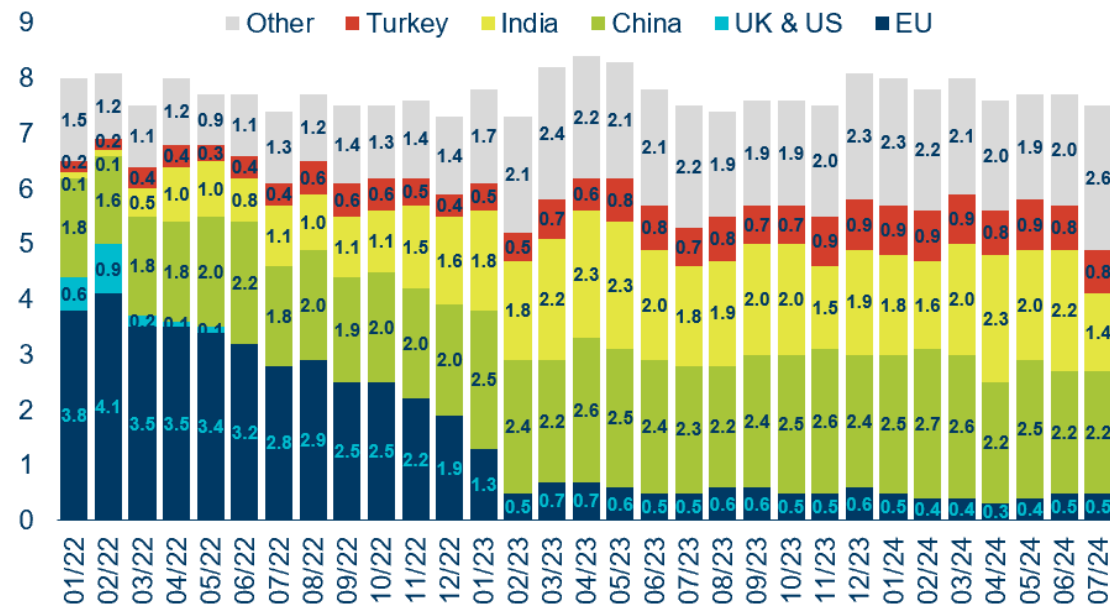


Russia Under Sanctions: Substitution 2



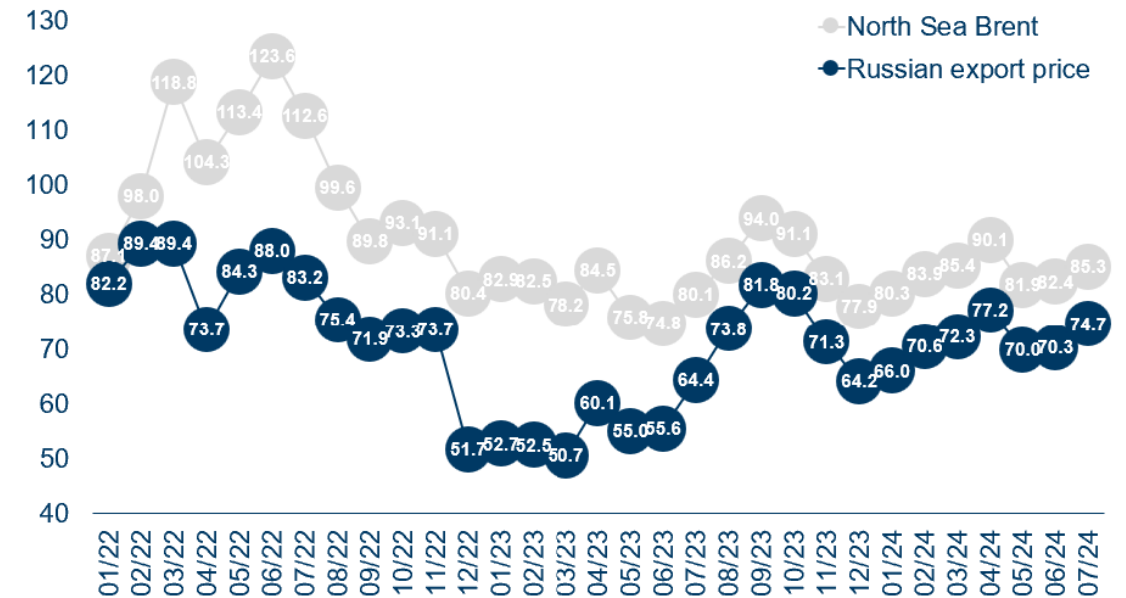
Russia Under Sanctions: Oil Exports

Russian oil export volume by destination, in million barrels/day*



Source: International Energy Agency, KSE Institute *no March data from IEA

Crude oil prices, in U.S. dollar/barrel*



Source: Federal Customs Service, International Energy Agency, KSE Institute

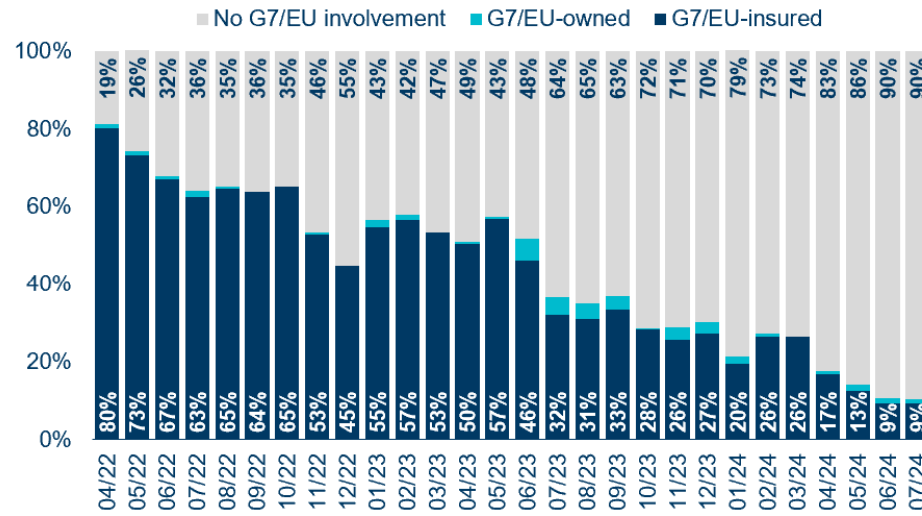
*export price until November 2022 from Russian customs, all other numbers from IEA

Conclusion

- Optimal Sanctions Mix
 - for immediate impact, financial and payment system sanctions combined with sanctions that limit export revenues
 - complemented with narrow targeted import restrictions on bottle-neck sectors
 - broad import restrictions alleviate financing need and impact of other sanctions
- Coalition formation and enforcement are critical
 - financial & payment sanctions easier to enforce than trade sanctions
- Russian 2022- sanctions
 - suboptimal and subject to political constraints with missed opportunities
 - but they shaved off a non-trivial portion of export revenues
 - and made procurement of imports, esp. in key sectors, more difficult

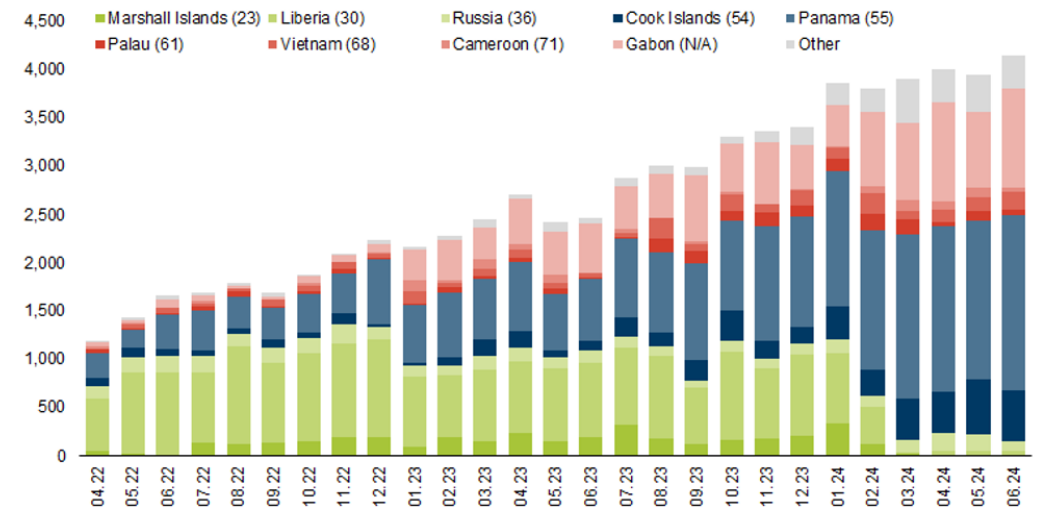
Additional slides

Composition of seaborne crude oil exports, in %



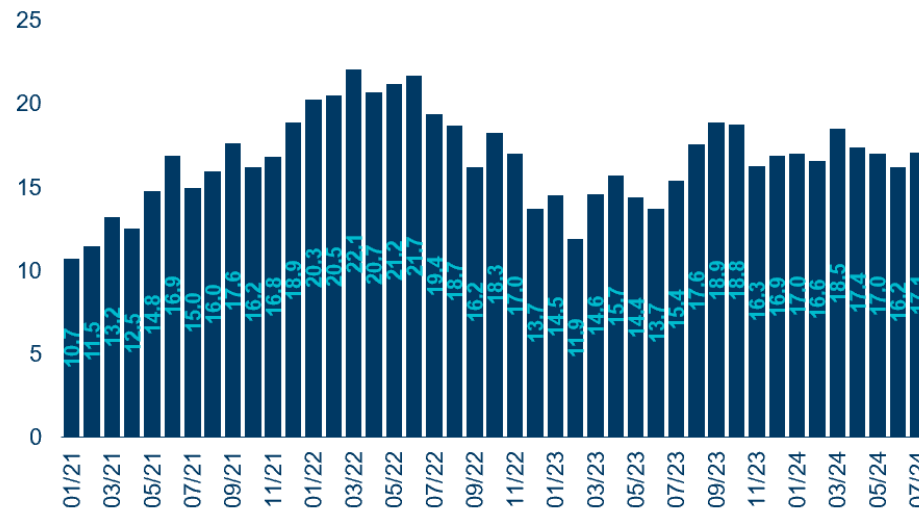
Source: [Equasis](#), [Kpler](#), P&I Clubs, KSE Institute

Flag states of the Russian shadow fleet, in thousand barrels/day



Source: [Equasis](#), [Kpler](#), KSE Institute *Numbers in legend display Paris MoU flag state ranking.

Oil export earnings, in U.S. dollar billion



Source: Federal Customs Service, International Energy Agency, KSE Institute
*2021 data from Russian customs service, 2022-23 data from IEA

Federal budget oil revenues, in ruble billion*



Source: Ministry of Finance, KSE Institute *includes extraction tax and export duty