Seizing central bank assets?*

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October 23, 2024

Abstract

We study the global macroeconomic and financial impacts of sanctions on central bank assets. We build a new database on freezes and seizures of central bank assets spanning 1914–2024, which we compare with discussions on today's Russia. We show that the scale of the freeze on the Central Bank of Russia's assets is rarely seen in history and that non-belligerent countries have never seized central bank assets to finance reconstruction in a third country in an ongoing war—unlike what is being discussed by scholars for today's Russia. We propose a three-country DSGE model to provide a conceptual framework to understand the global impact of sanctions on central bank assets and tease out the macroeconomic mechanisms. A key insight of the model is that seizing central bank assets can backfire on the sanctioning country in general equilibrium. Calibrated model simulations suggest that seizing today's Russia's immobilized sovereign assets could lead to an increase in interest rates on U.S. government bonds of 90 basis points, in turn resulting in higher U.S. interest rate payments that would outweigh the amount of assets in case they were seized after two years.

Keywords: Sanctions, central bank assets, geopolitics, global economy, historical data, open-economy DSGE models

JEL Codes: E0, F30, F31, F4, F51

*The authors are grateful to Agnès Bénassy-Quéré, Barry Eichengreen, Ryan Chahour, Luca Dedola, Georgios Georgiadis, Michael Ioannidis, Junior Maih, Aiko Mineshima, and Chiara Zilioli for helpful discussions and comments and to participants at the 3^{rd} Dynare Workshop for Advanced Users and in research seminars at the European Central Bank, the International Monetary Fund and the Università Cattolica del Sacro Cuore for helpful suggestions. The authors would also like to thank Thi Hong Van Hoang for sharing data on gold in black markets during World War II. The views expressed in this paper are those of the authors and do not necessary reflect those of the European Central Bank or the Eurosystem.

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1 Introduction

Russia's invasion of Ukraine has been a watershed in the post-World War II geoeconomic order. It led to the imposition of unprecedented and far-reaching sanctions by the G7 and its allies which broke a number of taboos. This includes the prohibition of all transactions with the Central Bank of Russia by its citizens and on its territories. As a result, the Central Bank of Russia has no longer been able to access around USD 300 billion of foreign assets or about half of its total foreign reserves.[1] Immobilization of foreign central bank assets is not a novelty per se, as we discuss below in greater detail.[2] However, the speed and magnitude of sanctions on today's Russia are seen as having no parallels in previous sanctions regimes.[3]

Since immobilizing the Central Bank of Russia's assets,[4] G7 leaders have repeatedly stated that *"consistent with our respective legal systems, Russia's sovereign assets in our jurisdictions will remain immobilized until Russia pays for the damage it caused to Ukraine"*.[5] In parallel, though, discussions emerged as to whether the G7 and its allies should go one step further and seize the Central Bank of Russia's immobilized assets to help fund Ukraine's reconstruction.[6]

In this paper, we put these discussions in broader perspective and unearth the long – albeit hitherto forgotten – history of sanctions on central bank assets. We analyze the global economic and financial impacts of sanctions through the lenses of an international

[1]See the Russian Elites, Proxies, and Oligarchs (REPO) Task Force Joint Statement: https://home.treasury.gov/news/press-releases/jy0839.

[2]For instance, for more than a decade, Syria's central bank assets have been frozen by the U.S. and the member states of the European Union (EU) since 2011 and 2012, respectively. The central bank of Iran's assets have been frozen by the U.S. since 2012 (with a short period of unblocking the assets during 2016-18). And Afghanistan's central bank assets have been frozen by the U.S. since 2022. Asset freezes have not only been imposed by Western nations. In 2011, the member states of the Arab League banned all transactions with Syria's central bank (see Kamminga (2023)).

[3]See e.g for a discussion, *New York Times*, "U.S. escalates sanctions with a freeze on Russian central bank assets", February 28th, 2022.

[4]The correct term is immobilization rather than freezing. This refers to a prohibition on transactions of financial intermediaries with the assets under restrictive measure. This hence involves a command to financial institutions within the sanctioning state's jurisdiction—distinct from interference with the owner's property rights (see Moiseienko (2023)). But immobilization and freeze are often used interchangeably, so we use in the paper the commonly used term "asset freeze".

[5]For instance, see the G7 Leaders' statement published on the second anniversary of Russia's invasion of Ukraine on February 24th, 2024, https://www.g7italy.it/wp-content/uploads/G7-Leaders-Statement.pdf.

[6]This is echoed in the aforementioned G7 Leaders' statement which stresses that "[we] ask our ministers to continue their work [...] on all possible avenues by which immobilized Russian sovereign assets could be made use of to support Ukraine, consistent with our respective legal systems and international law".

macro-model and tease out the underlying macroeconomic mechanisms. We focus on the near to medium-term impacts of such sanctions abstracting from the longer term implications they could have on the international monetary system and reserve currency status.[7] We simulate the global macroeconomic and financial effects of a seizure of today's Russia's immobilized sovereign assets in a calibrated version of the model.

Seizing central bank assets is controversial. While there is broad consensus among legal scholars that immobilizing central bank assets constitutes a lawful countermeasure[8], confiscation is by contrast seen as a departure from normal practice. The immobilization of the Central Bank of Russia's assets has reignited interest in the matter and led to heated discussions among lawyers and economists alike.[9]

One view is that confiscating central bank assets could upend the international legal and economic order, thereby setting harmful precedents and undermining the global financial architecture (see for instance Mulder (2024a), Kirschbaum and Veron (2022)). Proponents of this view consider that central bank assets enjoy sovereign immunity[10] and that taking measures which are permanent in nature against these assets is incompatible with the U.N. Convention on Jurisdictional Immunities of States and Their Property.[11] In addition, from an economic and financial perspective, there are concerns that confiscation could erode trust of official reserve managers in the sanctioned currencies and undermine the international monetary system. Moreover, it may lead to financial fragmentation which could impair the long-term effectiveness of Western sanctions (Demarais (2023) and Panetta (2024)).

Others (for instance Summers et al. (2023)) argue instead that confiscation can be justified under international law as an equitable remedy to push Russia to compensate

[7] In particular, in our model the steady state is unaffected by sanctions and no new safe asset emerges.

[8] See, for instance, Brunk (2023a), Moiseienko (2023) and van der Horst (2023).

[9] See, for instance, https://www.economist.com/finance-and-economics/2024/02/28/what-do-you-do-with-191bn-frozen-euros-owned-by-russia.

[10] State immunity protects a State and its property from the jurisdiction of the courts of another State. It covers administrative, civil, and criminal proceedings (jurisdictional immunity), as well as enforcement measures (enforcement immunity). It reflects the sovereign equality of States as a main pillar of the contemporary international legal order (see Stoll (2011)).

[11] The U.N. convention adopted in 2004 confers on central banks near absolute immunity from execution. Article 19 provides for immunity from post-judgment measures of constraints, with an exception for property used for other than government non-commercial purposes. Article 21 designates certain categories of property as not coming within that exception, including property of the central bank or other monetary authority of the States. There are cases in which the legality of confiscation of central bank assets is less disputed, namely when they are used for commercial purposes. Sovereign wealth funds are a case in point. For a more detailed discussion on the subtleties of the discussion, see, for instance, Brunk (2023a) and Dornbierer (2022).

Ukraine for war damages.[12] Proponents of this view further argue that not confiscating would send the wrong signal to governments that commit grave breaches of international law, i.e. that they could misbehave and not face the consequences of their actions (Stiglitz and Kosenko (2024)). At the same time, they agree that confiscation could be economically costly but consider that most of the costs for the sanctioning countries occur when assets are frozen and that they are likely small insofar as there are no obvious alternative reserve assets to the G7 currencies (Eichengreen (2023)).[13] These different viewpoints have prompted an active debate among legal scholars on possible ways to make use of the immobilized assets while avoiding an outright seizure. For instance, Dixon et al. (2024) argue that the West could provide a loan to Ukraine, in return for which Ukraine could offer its claims on Russia as collateral.[14]

While the debate is rich in conjectures, it remains poor in evidence in part due to the lack of available studies. Studies on the economic effect of sanctions rely on databases limited in scope and size, which mostly ignore restrictive measures on central bank assets. They also lack a conceptual framework tailored to the understanding of the potential effects of such measures on the global economy and the underlying mechanisms. This renders them ill-suited for shedding light on recent events.

A contribution of this paper is therefore the construction of a new database on sanctions on central bank assets spanning the period 1914–2024. We collect data on 117 cases of sanctions, coding their relevant economic and legal features. Moreover, we propose a three-country DSGE model that provides a conceptual framework for understanding the global macroeconomic and financial impacts of sanctions on central bank assets.

[12]Under the international law of countermeasures, when a country commits a grave breach of international law, other nations, proponents argue, are allowed to cancel their obligations vis-à-vis the country in question and use the confiscated reserves to pay what it owes. Others argue instead that while the confiscation would not be justified as a countermeasure, it may be permissible as a lawful measure to repair damages (Kamminga (2023)).

[13]Similarly, McCauley et al. (2024) review the aggregate evidence for diversification out of the dollar by official reserve managers since end-2021 and argue that there does not seem to be a reduced role of the dollar since the freeze of the Central Bank of Russia's assets.

[14]In the current context, there are also discussions and proposals on the use of extraordinary proceeds stemming from immobilized Russian assets. Under such proposals the assets themselves are however not seized. The focus is solely on proceeds which are not required to meet obligations towards Russia under applicable laws. See for instance a reference in the 12 October 2023 G7 statement of Finance Ministers and Central Bank Governors: https://www.mof.go.jp/english/policy/international_policy/convention/g7/g7_20231012.pdf and as further elaborated in the G7 15 June 2024 Apulia leaders communique https://www.g7italy.it/wp-content/uploads/Apulia-G7-Leaders-Communique.pdf. As these proposals do not involve assets or proceeds that require to meet obligations towards Russia under applicable law, we consider them out of scope of this study.

Our new data show that the current freeze of Russian central bank assets is rarely seen in history. Russia's sanctioned foreign reserves are over three times larger than those of the median country sanctioned since 1914 relative to global reserves. They are comparable in magnitude to the total sum of all sanctions imposed on central bank assets during World War II. Moreover, our data show that never in history have non-belligerent countries seized the assets of a belligerent country's central bank in an ongoing war to finance reconstruction of a third country–unlike what is now being discussed for today's Russia.

Our new data also enable to document some of the global economic risks associated with seizing, in line with the aforementioned skeptical view. We provide narrative evidence that some of the risks discussed now—such as harming potentially the role and reputation of reserve currency issuers as international financial centers—were already discussed in the past, which explains why contemporaries were reluctant to go ahead with seizing central bank assets.

A key insight of our model is that seizing central bank assets is not a free lunch. We show that the measure can backfire on the sanctioning country in general equilibrium. Sanctions on central bank assets have global ramifications in our model through two channels that pull in opposing directions. On the one hand, sanctions act as an immediate adverse financial shock, which makes households in the sanctioned country poorer. On the other hand, they also lead to a real exchange rate depreciation in general equilibrium. This allows the economy under sanctions to export its way out of recession, generates valuation gains for its central bank, and leads to weaker growth and higher inflation in the economy imposing sanctions. Historical regularities in the data are broadly consistent with key mechanisms in the model, even after controlling for cases when trade sanctions are imposed simultaneously.

Our model simulations also show that freezes have smaller effects than seizures on the sanctioned country because the frozen assets are returned at some point in the future. This is tantamount to a positive wealth transfer that rational, forward-looking agents anticipate and discount back to the present. The implication is that seizing central bank assets is not just an incremental step relative to freezing but has stronger economic effects and risks globally. Calibrated model simulations suggest that seizing today's Russia's immobilized sovereign assets would lead to an increase in interest rate on U.S.

government bonds of 90 basis points—assuming, as per the current sanction regime, that access of the Central Bank of Russia to U.S. financial markets is restricted—resulting in higher U.S. interest rate payments that would outweigh the amount of assets in case they were seized already after two years.

Our paper is related to three streams of literature. First is the literature that examines the features of financial sanction policies. Two landmark studies here are Hufbauer et al. (2009) and Hufbauer et al. (2010). Other relevant studies include e.g. Elliott and Hufbauer (1999), Clifton et al. (2014), Von Soest and Wahman (2015), Felbermayr et al. (2020) and Eichengreen et al. (2023). Closest to our paper is Mulder (2024b), who examines changes in norms towards confiscation of private and public property by foreign governments in the past 150 years. His review of selected examples of central bank asset freezes and seizures provides narrative evidence of changes in exposures of central banks to international asset confiscation over time. Our paper differs in its systematic and quantitative approach—we provide comprehensive data on *all* cases of central bank asset freezes and seizures over the past century and show quantitative evidence of their relevance for today's Russia.

Another stream in the literature discusses conceptual models of how sanctions work (see e.g. Kaempfer and Lowenberg (1988), Eaton and Engers (1992), Eaton and Engers (1999), Lorenzoni and Werning (2022), Itskhoki and Mukhin (2022), Bianchi and Sosa-Padilla (2022), Itskhoki and Mukhin (2023), and Ghironi et al. (2024)) and frameworks of geoeconomics—how great powers use their financial and economic strength to extract economic and political surplus from other countries (Clayton et al. (2023)). Closest to our research is Chahrour and Valchev (2023)'s model of currency choice with emphasis on trade finance which they use to gauge whether geopolitical fragmentation could threaten the dominant role of the U.S. dollar as a medium of exchange. In one exercise, the paper simulates the effect of a freeze of U.S. bonds held by non-U.S. residents (i.e. not the official sector, unlike in our paper) showing that financial sanctions may help the yuan to dethrone the U.S. if sanctions last sufficiently long. Bianchi and Sosa-Padilla (2023) in turn propose a two-period monetary model to investigate the implications of international financial sanctions for the reserve currency status of the U.S. dollar and show how anticipation of financial sanctions imposed on the private sector (i.e. not the official sector, unlike in our paper) can reduce the U.S. dollar convenience yield and

holdings of U.S. dollar reserves. Our contribution is to propose a model that allows to analyze the effects of sanctions on central bank reserves in general equilibrium; which captures dynamics while allowing to differentiate asset freezes from asset seizures; and distinguishes between dollar bond and gold reserves—an important trait given that most past sanction cases involved gold—not dollar bonds. Importantly, a distinctive feature of our model is that the central bank is an active investor in assets markets alongside households.

Finally, there exists an empirical literature that attempts to estimate the international economic effects of sanctions, for instance on the direction of trade (e.g. Haidar (2017)), cross-border financial flows (e.g. Besedeš et al. (2017)) and spillbacks onto the sanctioning country (e.g. Besedeš et al. (2021), Crozet and Hinz (2020)). Recent papers have examined how financial sanctions can be designed to limit access to the international payment system and, in particular, the SWIFT network (Cipriani et al. (2023)) as well as international fallouts from Russia's invasion of Ukraine e.g. on global equity markets (Federle et al. (2022)), sovereign default (Bianchi and Sosa-Padilla (2022)), inflows and outflows from Russian bank accounts (Drott et al. (2022)) or the ruble exchange rate (Eichengreen (2023)). Our paper focuses on the financial effects of sanctions imposed on central bank assets, unlike earlier studies.

Section 2 introduces our new database on 1914-2024 central bank asset sanctions. Section 3 presents narrative evidence on risks raised by seizures of central bank assets for the global economy. Section 4 briefly introduces our model, while Section 5 considers basic simulations. Section 6 turns to the empirical validation of the model, before Section 7 discusses results of a calibrated version of the model for today's Russia. Section 8 draws conclusions for research and policy.

2 A New database on sanctions on central bank assets

2.1 Data construction

Existing databases do not provide detailed information on sanctions on central bank assets. Freezes or seizures of – both public and private – assets are typically not covered in much detail and usually subsumed under financial sanctions more broadly. This contrasts with other economic sanctions (e.g. on imports, exports, individuals, etc.) on which

available databases elaborate in more detail, as we explain below. We identified cases of sanctions on central bank assets and their features using primary, contemporary and secondary sources, including articles in contemporary newspapers and academic journals, and scholarly accounts (see Appendix E for details on the sources).[15]

Our database contains 117 cases of sanctions on central bank assets imposed between 1914 and 2024 (Appendix E provides a summary of each case). We have information on: (i) the type of sanction, (ii) the country targeted; (iii) the country or coalition of countries imposing the sanctions; (iv) how sanctions were implemented; (v) the legal basis used to impose them; (vi) the circumstances when they were adopted; (vii) their beneficiary(ies);[16] and (viii) how long the sanctions were imposed. We code the episodes by type of sanctions taken and the dates when they were introduced and lifted.[17]

A key strength of our database is to distinguish between asset freezes and asset seizures—the two main types of control of property of foreign nationals discussed in the legal literature (Littauer (1945)). As stressed above, freezing involves prohibition of transfers of the sanctioning country's property owned by a sanctioning country. It is implemented by imposing an embargo on financial transactions of any kind involving the target country—effectively freezing all targeted assets subject to the jurisdiction of the sanctioning country.[18] Seizure involves the transfer of title in the targeted country's property to a custodian in the sanctioning country.[19] Put differently, freezing involves no transfer of ownership and is reversible, while seizing involves a transfer of ownership and is—once the asset is liquidated— permanent.

The distinction is not only important to legal scholars but has potentially important economic consequences. Freezing public assets—even central bank assets—is widely accepted as a lawful countermeasure under international law under certain circumstances

[15] In fact, we collect information on all broad-based asset freezes of public and private assets, but focus on central bank assets in this paper.

[16] This is especially important to make comparisons with discussions on the use of exceptional revenues from Russia's immobilized sovereign assets or the assets themselves to finance Ukraine's reconstruction.

[17] In the case of Russia's war in Ukraine, Itskhoki and Mukhin (2022) argue that such timing is crucial for understanding the evolution of the ruble's exchange rate against the dollar in the early phases of the war.

[18] Strictly speaking, freezing assets means temporarily retaining property, pending a final decision. This is what occurs with private assets. However, when government—in particular central bank—assets are "frozen", the property is not temporarily retained but instead transactions on behalf of any person or entity of the targeted country are prohibited. For this reason, formally these assets are "immobilized" rather than frozen. Throughout the paper, we abstract from this legal subtlety and use the word "freeze" regardless of the specific treatment of different kinds of assets.

[19] We treat seizure and confiscation interchangeably throughout the paper.

and is not uncommon, as we document below. Countermeasures are measures against a state responsible for an internationally wrongful act to induce it to comply with its obligation not to commit aggression (Kamminga (2023)). To be permissible under international law they need to be reversible, temporary and proportionate. In contrast, seizing central bank assets is not allowed under international law and far less frequent. In particular, it is difficult to argue that such a measure is reversible or temporary.[20]

Table C.1 compares our data with other databases on sanctions. Most existing databases (e.g. Kirikakha et al. (2021), Felbermayr et al. (2020), Clifton et al. (2014), Von Soest and Wahman (2015)) focus on the post-1945 period. Our database also covers the period prior to 1945. Moreover, it is the most comprehensive and detailed source of information on sanctions on central bank assets. Cases of central bank asset freezes and seizures, if any, are often subsumed under a broad "financial sanctions" category in other databases.[21] Felbermayr et al. (2020) cover such broadly-defined financial sanctions and only since 1945. Similarly, Clifton et al. (2014) do include episodes of asset freezes post-1945, but their coverage is incomplete. Moreover, the criteria used to identify the episodes in question as asset freezes is not always clear for some instances.[22] Hufbauer et al. (2009) cover sanctions since 1914, as we do, but only a handful of cases up to 1945—the limitation being, as we show below, that a large number of cases of sanctions on central bank assets occurred during World War II. Moreover, their database ends in 2006. Since then, major sanctions against central bank assets have been imposed. Finally, Eichengreen et al. (2023) examine multiple cases of assets freezes but mainly imposed by the U.S. in World War II under the Trading with the Enemy Act of 1917. Our new database aims instead to cover a complete set of the relevant cases up to today's Russia.

[20]Reflecting this, as we show below, never in history have non-belligerent countries seized central bank assets in an ongoing war to finance reconstruction in a third country—i.e, what is now being discussed for today's Central Bank of Russia's assets

[21]A significant share of the sanctions in this category are cuts in aid flows.

[22]For instance, the database includes the nationalization of the London-based British oil company, British Petroleum (BP), by Nigeria in 1979 as a sanction labeled as an asset freeze. Indeed, the popular narrative in some of the literature seems to assert that Nigeria nationalized BP as punishment for the U.K.'s wrong-headed policies in southern Africa (Genova (2010)). However, based on an historical investigation including material of private BP's archives Genova (2010) shows "[...] that the nationalization of BP was part of a project of economic nationalism" where "Nigeria took over aspects of BP's operations on its own economic timetable with little regard to the events unfolding in southern Africa" (Genova (2010), pp. 116). Syropoulos et al. (2024), for instance, also do not list this case as a sanction episode in their database. Another example is an apparent U.S. freeze of Nigerian assets in 1993. While this measure was discussed at that time, to the best of our knowledge, the U.S. in the end did not decide to impose such a measure. Instead, some of the asset freezes imposed by the U.S. (e.g. Libya (1986) or Panama (1988), to mention a few) do not seem to be included in the database.

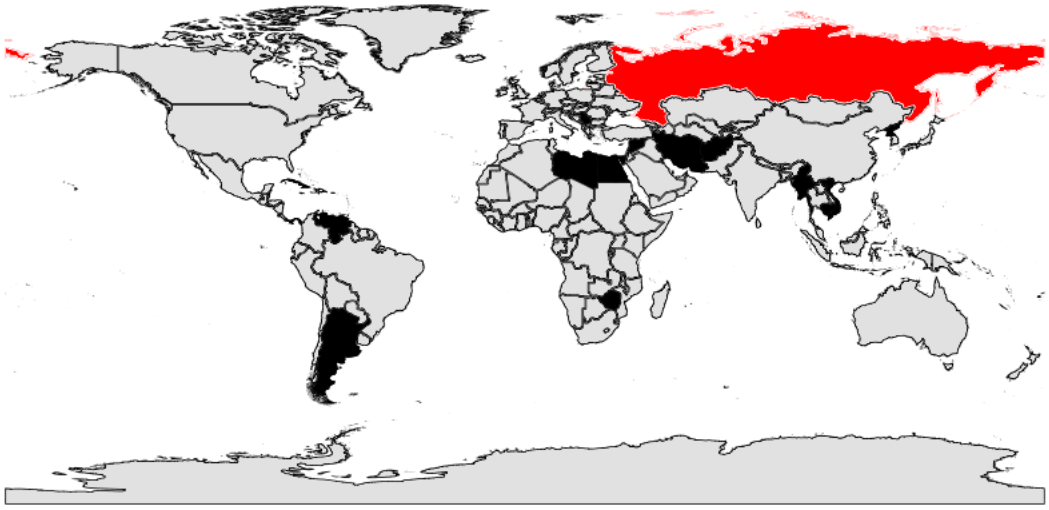


Figure 1: Countries targeted by sanctions on central bank assets since 1950.
Notes: The figure puts countries facing sanctions on central bank assets since 1950 on the map. The black shade corresponds to countries which were targeted and the light gray shade those that were not. Red is today's Russia.

2.2 Stylized facts

2.2.1 Today's Russia in historical perspective

Figure 1 puts countries targeted by sanctions on central bank assets since 1950 on the map. Black denotes sanctioned countries, light gray countries that were not sanctioned. Red is today's Russia. Among the other countries highlighted some were sanctioned in the 1950-60s, such as North Korea (in 1950, after the Korean War), Egypt (in 1956, after the nationalization of the Suez canal), Cuba (in 1963, after the Cuban revolution); during the 1970s cases included Vietnam and Cambodia (in 1975, the year when the Khmer rouge captured Phnom Penh) and Iran (in 1979, when the Islamic revolution broke out), while Afghanistan is a more recent case (in 2022, after the Taliban came back to power).

Figure B.1 does the same for countries sanctioned between 1914 and 1945 (on a map featuring 1938 national borders). To our best knowledge, the first case of sanctions on central bank assets was the confiscation in January 1918 by the new Soviet government of gold shipped to Moscow by the National Bank of Romania during World War I. No fewer than 34 countries, including the Axis Powers, had central bank assets targeted by the U.S. under the Trading with the Enemy Act during World War II.[23]

[23]After the U.S. declared war on Germany in April 1917, President Wilson created the Office of Alien Property Custodian (APC) under the Trading with the Enemy Act with power to confiscate property from anyone whose actions might be considered a possible threat to the war effort.

Figure 2 compares the scale of sanctions on central bank assets between 1914 and 1945 with those after World War II. It shows for the countries facing central bank reserves sanctions the median share of these reserves in total global foreign reserves (in percentages) between 1914 and 1945 (light grey bars), 1945 and 2022 (dark grey bars) and of today's Russia (red bar), respectively.[24] Global foreign reserves are restricted to gold reserves for the period 1914-1945 against total foreign exchange reserves for the period 1945-2022. We have the exact amounts of assets seized post-1950; pre-1950 we use total reserve holdings as a proxy. Central bank assets sanctioned up to 1945 were typically much smaller in size compared to today's Russia— the median share of global foreign reserves was negligible, compared to about 2.5% of global foreign reserves frozen for Russia today. Moreover, the median share sanctioned post-World War II was similarly small. This underscores that the scale of the current sanctions on Russia's central bank reserves is a rare case in history. There are two exceptions, however. One was the freeze by the U.S. (and Canada) of a portion of Banque de France's gold—which accounted for almost 5% of the world's gold reserves—in World War II.[25] The other exception is the freeze of Iran's large U.S. dollar reserves in 1979—then almost 4% of global foreign exchange reserves— by the U.S. in the wake of the Iranian revolution and hostage crisis.

Figure B.2 scales instead the output of the sanctioned country by global output. The result is similar: countries facing sanctions on central bank assets accounted typically for smaller shares of global GDP (i.e. less than 1%) than today's Russia (almost 3%).[26] Scaling the trade of sanctioned countries by global trade, as in Figure B.3, confirms this finding: countries targeted in the past were smaller—accounting for about 1% or less of global trade—than today's Russian (about 1.5%).[27]

The left panel of Figure 3 complements the picture, showing the percentage share of sanctioned to total global foreign exchange reserves since 1914 (grey bars; today's Russia

[24]Global foreign reserves were estimated using historical data from the League of Nations (League of Nations (various years)) for the period 1914-1945 and from the International Monetary Fund's International Financial Statistics database for the period 1945-2022.

[25]France had accumulated large gold reserves in the interwar period–placing downward pressures on global money supplies and exacerbating the Great Depression, according to some observers (see e.g. Eichengreen (1992), Bernanke and Mihov (200) and Accominotti (2009) for more details.)

[26]GDP shares were estimated using historical GDP data in USD 2011 taken from the Maddison Project database (de Pleijt and van Zanden (2020)). Linear interpolated observations were used when GDP data were missing from the Maddison Project database.

[27]Trade shares were estimated using historical data from the RICardo Project database (Dedinger and Girard (2017)) for the period 1914-1938 and from the International Monetary Fund's Direction of Trade Statistics database for the period 1945-2022.

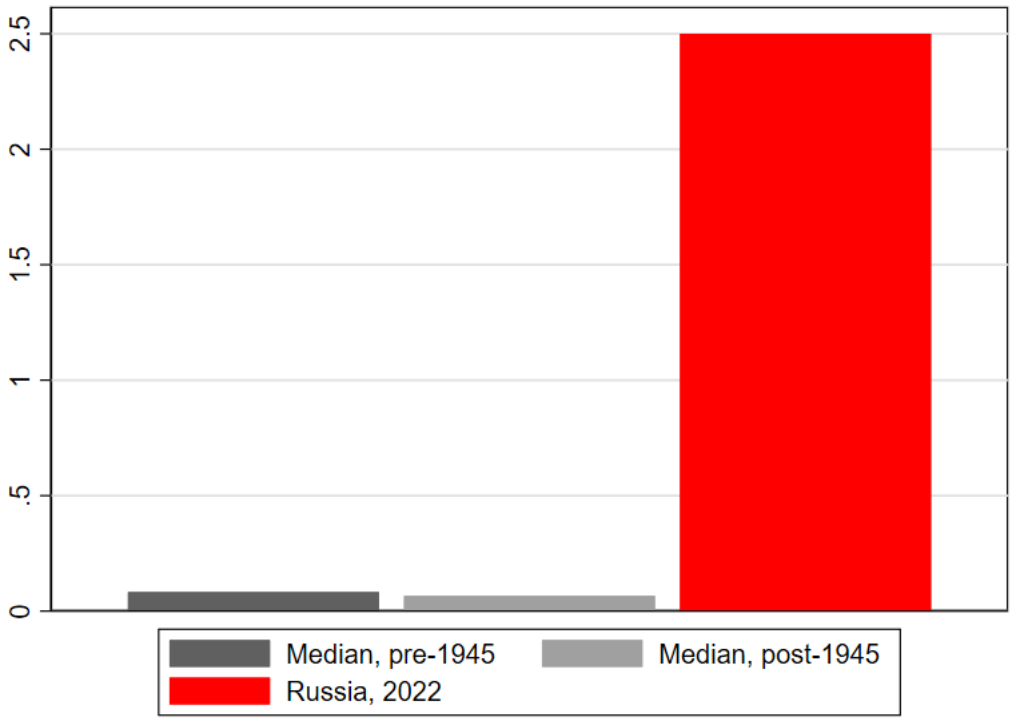


Figure 2: Median share of global foreign reserves held by targeted countries in selected periods.

Notes: The figure shows for the countries facing central bank assets sanctions the median share of these reserves in total global foreign reserves (in percentages) between 1914 and 1945 (light grey bars), 1945 and 2022 (dark grey bars) and of today's Russia (red bar), respectively. Global foreign reserves were estimated using historical data from League of Nations (various years) and Federal Reserve Board (1926) for the period 1914-1945 and from the International Monetary Fund's International Financial Statistics database for the period 1945-2022. Global foreign reserves are restricted to gold reserves for the period 1914-1945 against foreign exchange reserves for the period 1945-2022. The exact amounts of assets seized are used after 1950; before 1950 total reserve holdings are used as a proxy.

is shown as a red bar). Sanctioned reserves are only counted in the Figure the first year the measure was imposed. The picture makes clear how exceptional World War II was. The scale of sanctions relative to global foreign reserves was large if one considers all cases between 1939 and 1945 (light grey bars).[28] Note that we assume though that all gold reserves of the sanctioned countries were held in the financial centers of New York and London (and therefore blocked) in the absence of country-level information on the location of the reserves in question. Hence, the totals for World War II should be considered as an upper bound.[29] Moreover, the data over that period also include

[28] Figure B.4 and Figure B.5 tell a similar story for the evolution of the shares of the countries facing sanctions on central bank assets in global output and global trade between 1914 and 2018/9.

[29] Contemporary reports suggest that the Axis countries did not necessarily hold large amounts of central bank assets in Allied countries. For instance, the total gold holdings of enemy-countries earmarked in the U.S. only amounted to USD 24 million in 1941 which represented only about 1 percent of total

multiple instances of U.S. asset freezes for precautionary reasons, i.e. not intended to induce the responsible state to bring its conduct into compliance with international law. At the time, the U.S. and U.K. blocked the gold of countries invaded by the Axis powers (or countries at risk thereof) that was earmarked at the Federal Reserve Bank of New York or the Bank of England on concerns that it could be looted to finance the Axis' war efforts (more on this in Appendix E). Today's Russia again stands out—together with 1979 Iran—once these cases are excluded, as in the right panel of Figure 3.[30]

Finally, the upper left panel of Figure 4 shows that asset freezes (shown as dark gray slices on the pie) were almost twice more common than asset seizures (shown as light gray slices). But the upper right panel of the figure shows that virtually all cases of seizures occurred during a war (or a following settlement such as a peace treaty), such as when the U.K. and the U.S. seized the assets and gold reserves of the Axis powers, or the looting by the Nazis of the gold reserves of countries they occupied during the war.[31] One prominent case of seizure outside a war was that of the reserves of Da Afghanistan Bank (the central bank of Afghanistan) by the U.S. in 2022. The U.S. seized the reserves in question because they refused to recognize the Taliban regime as a legitimate government and intended to return half of the seized amount to the Afghani people. The other half was set aside to potentially allow U.S. plaintiffs who hold terrorism-related default judgments against the Taliban to execute these judgments. Therefore, the lower left panel makes clear that never in history have central bank assets of a country been seized outside a war (or a following settlement such as a peace treaty) for *a third party* (there is no light gray slice on the pie)—in contrast with what is being discussed for today's Russia.[32]

blocked gold reserves in the U.S. (BIS (1943), p. 46). In addition, Stoenescu et al. (2006) show that Romania (whose share in global foreign reserves in 1940 was half a percent) held most of their gold reserves in domestic deposits before the outbreak of World War II, hence outside the reach of foreign sanctions.

[30]We also exclude in the the right panel of Figure 3 the attachment of USD 320 million worth of French gold held at the Federal Reserve Bank of New York further to a ruling by a New York court on behalf of the Belgian and Polish central banks in 1941 (see Harold James (2024), "Letter: The story of Bank Polski's reserves has echoes today", https://www.ft.com/content/3bad0d4d-1814-45d8-b457-840ee929f348). (Attachment is the action of seizing property in anticipation of a favorable ruling for a plaintiff who claims to be owed money by the defendant.) In the face of Nazi Germany's invasion, Belgium and Poland entrusted Banque de France with gold reserves they meant to evacuate to the U.S. before France itself was invaded by Germany. The attachment of French gold was not a financial sanction imposed by Executive Order but the result of a judicial process between two foreign countries about their respective fulfillment of contractual obligations. See Appendix E for more details.

[31]Moreover, neutrals such as Portugal, Spain and Switzerland and Sweden also liquidated Nazi Germany's property, gold and reserves which they had immobilized shortly before the end of the war.

[32]Mulder (2024b) arrives at the same conclusion by examining a selection of historical cases of central bank asset freezes and seizures since 1870.

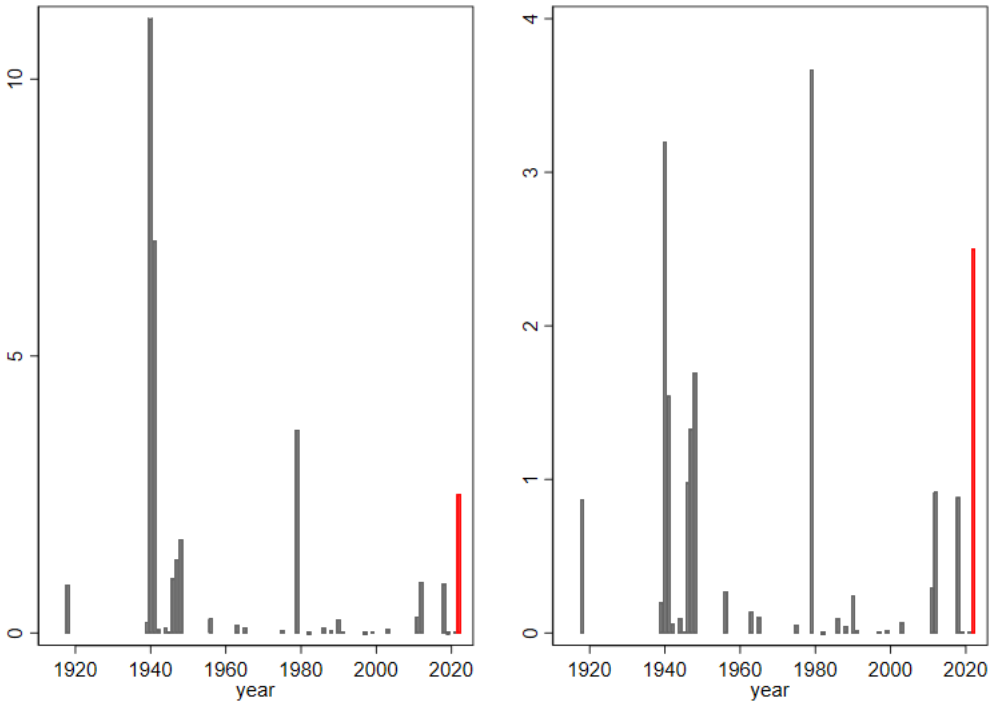


Figure 3: Share of global foreign reserve targeted: 1914-2022 (excluding precautionary measures).

Notes: The left panel shows the evolution of the share of global foreign reserves (in percentages) of countries facing sanctions on central bank assets between 1914 and 2019 (grey bars; today's Russia is shown as a red bar). The right panel excludes sanctions imposed for precautionary reasons and the attachment of Banque de France's gold following a New York court ruling in 1941. Global foreign reserves are estimated using historical data from League of Nations (various years) and Federal Reserve Board (1926) for the period 1914-1945 and from the International Monetary Fund's International Financial Statistics database for the period 1945-2022. Global foreign reserves include gold reserves for the period 1914-1945 and foreign exchange reserves for the period 1945-2022. The exact amounts of assets seized are used after 1950; before 1950 total reserve holdings are used as a proxy.

Numerous scholars and commentators have recently brought forward cases they deem to be relevant historical precedents for today's Russia. We discuss in Appendix A that many of these cases seem strikingly similar at first sight although differences appear once one looks more closely.

3 Narrative evidence

While there is no precedent to seize Russia's sovereign assets now immobilized, striking similarities exist between current discussions about the global economic risks raised and the corresponding discussions in earlier eras.

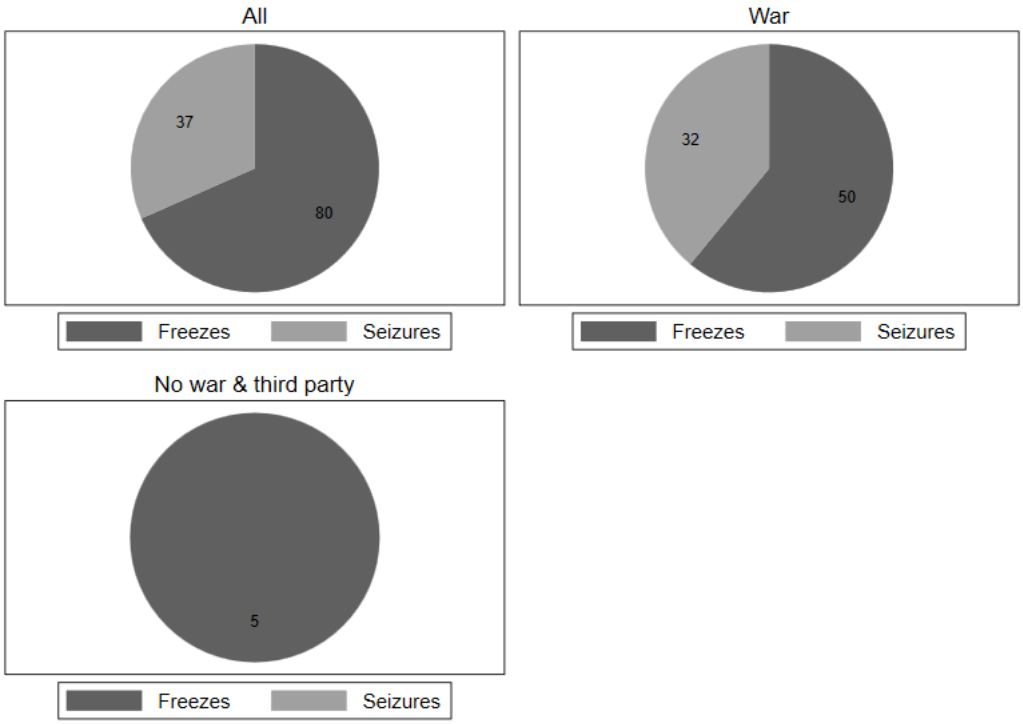


Figure 4: Breakdown of sanctions by type.

Notes: The figure breaks down sanctions on central bank assets by type distinguishing asset freezes from asset seizures across the sample (upper left panel), focusing on war times (upper right panel) and on cases outside wars to the benefit of a third party (lower right panel). The count of each type of sanctions is shown on its slice of the pie. The database contains information on a total of 117 sanction cases but information may be incomplete in some cases.

For instance, during World War II Germany grappled with the question of a possible confiscation of enemy property for years. There was an active debate in the German administration on whether the German legislation should deviate from the pure enemy property preservation and contain provisions to liquidate. The internal debate lasted from 1940 to 1943. After very intense negotiations, it was finally decided not to deviate from the principle of preservation owing to concerns about retaliatory measures and the resulting consequences for German property abroad. Many high-level government officials allegedly argued that in case Germany would lose the war, it would need to compensate Allied countries. If Germany would win the war, in contrast, the property could easily be kept anyway (see subsection E.2 for further details).

Another relevant example is a discussion in the U.S. that took place in the late 1980s. After the withdrawal of Vietnamese troops from Kampuchea (and before the lifting of sanctions), U.S. Congress discussed a bill which would have allowed the seizure of Viet-

namese assets to reimburse U.S. nationals which held claims against Vietnam. However, this bill was never passed. At a hearing on this bill on November 17, 1989, Richard Newcomb, the Director of the Office of Foreign Assets Control (OFAC)—an agency of the U.S. Treasury Department that administers financial sanctions programs—strongly advocated against seizure of the blocked assets. He warned that such a measure would be a permanent—non-reversible—transfer of title and counter to the objective of facilitating an eventual claims settlement. Moreover, he cautioned that "*a unilateral vesting of blocked property could damage the reputation of the United States as a safe location for the investment of foreign capital, as many foreign investors would view the action as arbitrary, unjustified, and counter to standard international practice*" (Leich and Vassar (1990), p. 545), which chimes with the concerns expressed by observers stressed above about today's Russia—that seizing Russia's immobilized sovereign assets would damage the reputation of G7 nations as global financial centers and their currencies.

Even in discussions that did not explicitly point to possible seizure, concerns about potential detrimental effects on sanctioning countries' roles as financial centers were indeed salient throughout history. For instance, after the U.K. imposed financial sanctions—including an asset freeze—on Argentina in the context of the Falkland Islands War, the Deputy Governor of the Bank of England tried to address concerns that the asset freeze would damage the future of London as an international financial center. In a speech for representatives of foreign banks in London, he acknowledged that "*[t]here are clearly risks that we have to run in dealing with the present situation*" (Bank of England (1982)). At the same time, he underlined that "*[..] it is our [Bank of England] belief that the way in which we are administering the controls, and the wide international support and understanding that our position enjoys*[33]*, should ensure that the position of London as a financial centre will not be adversely affected by the present temporary exigencies*" (Bank of England (1982)).

Also the possibility that sanctions on central bank assets might lead to shifts in foreign reserve portfolios is nothing new. In an internal memo from February 24, 1942, Harry Dexter White (then Assistant to the U.S. Treasury Secretary) informed Treasury Secretary Henry Morgenthau about "*a pronounced shift from dollar deposits to gold by foreign governments and central banks*" that occurred in the six months following the

[33]Note that on April 3, 1982, the UNSC passed Resolution 502 which demanded an immediate cease-fire and Argentine withdrawal, even though it did not impose multilateral economic sanctions.

U.S. asset freeze imposed on June 14, 1941. White noted that the usual explanation that such gold is needed for reserves "*certainly does not apply to the recent shift from dollars to gold*" and that the dominant reason for the increase in earmarking was rather "*[t]he feeling that earmarked gold historically has a preferred legal status compared to dollar deposits*" (Morgenthau (1942)).

4 Model

What are the global economic and financial impacts of sanctions on central bank assets? We now present the conceptual framework we propose to understand how such sanctions work. We extend a standard multi-country dynamic stochastic general equilibrium (DSGE) model (Eichenbaum et al. (2021)) to include a convenience yield from internationally-traded assets and active management by central banks of their balance sheets.

The model includes three countries of equal size, namely the U.S., a sanctioned country and the rest of the world indexed by $c \in \{US, S, RoW\}$.[34] Each country is populated by households, firms, a government and a central bank. Households derive utility from consumption, leisure, and holdings of money and U.S. bonds. The money-in-the-utility function assumption captures a wide range of micro-founded frictions that generate demand for payment instruments, such as cash-in-advance or shopping-time constraints (see e.g. Feenstra (1986)). The assumption that U.S. bonds enter households' utility functions captures the special role of U.S. dollar bonds—that they are the most liquid and safe financial asset in the world (see e.g. Jiang et al. (2021)). This in turn creates a convenience yield—a non-pecuniary benefit—of holding U.S. dollar bonds, as in e.g. Valchev (2020) and Bianchi and Sosa-Padilla (2023)[35], which allows the U.S. to pay lower interest rates on its debt in equilibrium.

The monetary authority in each country determines money supply and manages reserves actively. In each period central bank liabilities (money) need to match central bank assets which comprise gold—priced in dollars—and U.S. bonds. Gold and bonds issued in all three countries are traded internationally. But only U.S. bonds offer a convenience

[34]Note that this assumption is mainly for the sake of simplification. For the current case of Russia one could also interpret $c = US$ as the bloc of G7 countries that are collectively issuing the major global reserve currencies.

[35]See Bianchi and Lorenzoni (2022) for more details on micro-founding demand for U.S. debt securities.

yield. Gold supply is fixed and the price of gold clears the market.

The rest of the model follows Eichenbaum et al. (2021): international markets are incomplete and uncovered interest parity does not hold. Firms, owned by domestic households, produce intermediate goods that are sold domestically and internationally; labor and capital are used in production and the Calvo formalism delivers price stickiness. The full model is explained in greater detail in Appendix F. We discuss in what follows its most distinctive and novel features.

4.1 Demand for U.S. bonds by foreign households

In each foreign country, c, households period utility is:

$$U_{c,t} = e_{c,t} \ln\left(C_{c,t} - h_c C_{c,t-1}\right) - \frac{\chi_{c,l}}{1+\phi_{c,l}} L_{c,t}^{1+\phi_{c,l}} + \mathcal{F}_m\left(\frac{M_{c,t}}{P_{c,t}}\right) + \mathcal{F}_b\left(\frac{B_{US,c,t}}{P_{c,t} NER_{US,c,t}}\right) \quad (1)$$

where C denotes consumption, L labor, M domestic nominal money balances, P_c the domestic price index, $B_{US,c}$ holdings of internationally-traded U.S. bonds, $NER_{US,c}$ the nominal exchange rate (defined as dollars per unit of currency c) and e is a preference shock.[36] As in Valchev (2020) and Jiang et al. (2024) $\mathcal{F}_m(\bullet)$ and $\mathcal{F}_b(\bullet)$ define the utility of liquidity services arising from holding domestic real money balances and international reserves assets, respectively.[37] Utility is separable in these two components and $\mathcal{F}_b(\bullet)$ leads to an international premium on U.S. bonds. If $c \neq \{US\}$, optimization[38] results in the following international demand for U.S. bonds:

$$\left(\frac{1}{r_{US,t}} + \phi_{c,b}\frac{B_{US,c,t}}{P_{US,t} NER_{US,c,t}}\right) = E_t\left(\beta_c \frac{\lambda_{c,t+1}}{\lambda_{c,t}} \frac{1}{\pi_{c,t+1}} \frac{NER_{US,c,t}}{P_{c,t} NER_{US,c,t+1}}\right) + \frac{\mathcal{F}_b'\left(B_{US,c,t}/P_{c,t} NER_{US,c,t}\right)}{\lambda_{c,t}} \quad (2)$$

where $\frac{\mathcal{F}_b'\left(B_{US,c,t}/P_{c,t} NER_{US,c,t}\right)}{\lambda_{c,t}}$ is the convenience yield on U.S. bonds and $\phi_{c,b}$ captures

[36] In other words, a fall in NER is a depreciation of the domestic currency. For the U.S., $NER_{US,US} = 1$.

[37] The functions $\mathcal{F}_m(\bullet)$ and $\mathcal{F}_b(\bullet)$ are defined such that $\mathcal{F}_\bullet(0) = 0$, $\mathcal{F}_\bullet'(\bullet) > 0$, $\mathcal{F}_\bullet''(\bullet) < 0$.

[38] The budget constraint in nominal terms for country c is:

$$P_{c,t}C_{c,t} + \frac{B_{c,c,t}}{R_{c,t}} + \sum_{l\neq c}\frac{B_{l,c,t}}{R_{l,t} NER_{l,c,t}} + P_{c,t}I_{c,t} + M_{c,t} \leq w_{c,t}L_{c,t} + B_{c,c,t-1} +$$
$$+ \sum_{l\neq c}\frac{B_{l,c,t-1}}{NER_{l,c,t}} - \sum_{l\neq c}\frac{\phi_c^B}{2}\left(\frac{B_{l,c,t}}{NER_{l,c,t} R_{l,t} P_{c,t}}\right)^2 P_{c,t} + P_{c,t}R_{c,t}^k K_{c,t-1} + M_{c,t-1} + \Pi_{c,t}$$

.

costs of holding internationally traded bonds. r_{us} is the U.S. interest rate between period t and $t+1$.[39]

4.2 Central banks

In each country the central bank steers real money supply $\frac{M_c}{P_c}$ by managing domestic, i.e. bonds, and foreign reserve assets, i.e. U.S. bonds and gold. We assume that central banks have preferences over the composition of reserves and that the three assets are imperfect substitutes. These stylized facts are captured by a CES aggregator for *real* foreign reserves defined as:

$$\frac{M_{c,t}}{P_{c,t}} = \left[\psi_{c,b}\left(\frac{B^{CB}_{US,c,t}}{P_{US,t}}\frac{1}{RER_{US,c,t}r_{US,t}}\right)^{\gamma_{c,CB}} + \psi_{c,g}\left(\frac{P^G_t\mathcal{G}_{c,t}}{P_{US,t}RER_{US,c,t}}\right)^{\gamma_{c,CB}} + \psi_{c,d}\left(\frac{B^{CB}_{c,c,t}}{P_{c,t}}\frac{1}{r_{c,t}}\right)^{\gamma_{c,CB}}\right]^{\frac{1}{\gamma_{c,CB}}} \tag{3}$$

where P^G is the price of gold, $B^{CB}_{c,c}$,

$$B^{CB}_{US,c}$$

and $\mathcal{G}_c$ the central bank's holdings of domestic bonds, U.S. bonds and gold, respectively and r_c returns on domestic bonds. $RER_{US,c,t}$ defines the nominal exchange rate, which translate changes of the nominal value of foreign assets into changes of money supply. Equation (3) is a CES aggregator that nests alternative assumptions on the composition of the balance sheet. Notice that Equation (3) implies that changes in foreign reserves do not decrease money supply one-to-one; this captures, in a tractable way, that foreign assets are not the only assets held by central banks. The parameters ψ_g, ψ_b and ψ_d capture preferences for gold, U.S. and foreign bonds, respectively. In other words their ratio is the coverage of U.S. bonds by gold, which allows to capture different preferences and international monetary regimes. For instance, strong preference for gold is well-suited in a model of the international gold standard, whereas strong preference for U.S. bonds is well-suited to model an international monetary system in which the U.S. dollar is dominant. The parameter $\gamma_{c,CB}$ defines the degree of substitutability between gold

[39] In the U.S. instead domestic bonds have a convenience yield, that is the FOC for domestic bonds is $-\frac{\lambda_{US,t}}{r_{US,t}} + \beta_{US}E_t\left(\frac{\lambda_{US,t+1}}{\pi_{US,t+1}}\right) + \mathcal{F}'_b\left(B_{US,US,t}\right) = 0$.

and U.S. bonds. If $\gamma_{c,CB} \to \infty$ the aggregator boils down to a Leontief function where holdings of each asset are tied to the coverage ratio. If $\gamma_{c,CB} \to 1$ gold and U.S. bonds are perfect substitutes.

In each period, the central bank chooses the composition of the balance sheet to minimize costs under Equation (3). First-order conditions are:

$$1 = \psi_{c,b}\mathcal{M}_{c,t}\left(\frac{M_{c,t}}{P_{c,t}}\right)^{1-\gamma_{c,CB}}\left(\frac{B^{CB}_{US,c,t}}{r_{US,t}P_{US,t}RER_{US,c,t}}\right)^{\gamma_{c,CB}-1} \tag{4}$$

$$1 = \psi_{c,g}\mathcal{M}_{c,t}\left(\frac{M_{c,t}}{P_{c,t}}\right)^{1-\gamma_{c,CB}}\left(\frac{P^{G}_{t}\mathcal{G}_{c,t}}{P_{US,t}RER_{US,c,t}}\right)^{\gamma_{c,CB}-1} \tag{5}$$

$$1 = \psi_{c,d}\mathcal{M}_{c,t}\left(\frac{M_{c,t}}{P_{c,t}}\right)^{1-\gamma_{c,CB}}\left(\frac{B^{CB}_{c,c,t}}{r_{c,t}P_{c,t}}\right)^{\gamma_{c,CB}-1} \tag{6}$$

where $\mathcal{M}_c$ is the Lagrange multiplier associated to the problem, which defines the shadow cost of holding foreign reserves. Profits from managing the balance sheet are transferred to the government.

The stock of gold evolves according to the following law of motion:

$$\mathcal{G}_{c,t} = (1-\delta_{c,g})\mathcal{G}_{c,t-1} + IG_{c,t} \tag{7}$$

where IG are new gold purchases. We assume that in each period the supply of new gold is fixed, so that the gold market clears as:

$$\mathcal{G}_{supply} = \sum_{c} n_c IG_{c,t} \tag{8}$$

Gold can be sold by any of the three countries, which expands availability of gold supply on the global market. Calibrated parameters for the symmetric model are reported in Table C.2 of the Appendix.

4.3 Sanctions

We model sanctions as an expropriation of some of the assets held by the targeted central bank. Importantly, we distinguish between freezes, where assets are eventually returned to the owner, and seizures, where they are not and the sanctioned central bank is per-

manently expropriated.

Formally, for sanctions on gold reserves we assume that a share ξ_g of the gold holdings of the sanctioned central bank is taken between period $t-1$ and t. The law of motion of gold then becomes:

$$\mathcal{G}_{c,t} = \xi_{g,t}(1-\delta_{c,g})\mathcal{G}_{c,t-1} + IG_{c,t} \tag{9}$$

The sanctioned central bank can replenish its gold holdings ($IG_{c,t}$) by purchasing gold on the market from households. In so doing, it impacts the price of gold because supply is fixed. The price of gold increases which generates positive valuation effects on non-sanctioned gold reserves, in turn dampening the impact of the sanction (more on this below).

For sanctions on U.S. bond reserves we assume that a share ξ_b of the U.S. bond holdings is targeted, leading to the following changes on the balance sheet of the sanctioned central bank:

$$\frac{M_t}{P_{c,t}} = \left[\psi_{c,b}\left(\frac{\xi_b B^{CB}_{US,c,t}}{P_{US,t} r_{US,t} RER_{US,c,t}}\right)^{\gamma_{c,CB}} + \psi_{c,g}\left(\frac{P^G_t \mathcal{G}_{c,t}}{P_{US,t} RER_{US,c,t}}\right)^{\gamma_{c,CB}} + \psi_{c,d}\left(\frac{B^{CB}_{c,c,t}}{P_{c,t}}\frac{1}{r_{c,t}}\right)^{\gamma_{c,CB}}\right]^{\frac{1}{\gamma_{c,CB}}} \tag{10}$$

In both cases the sanctioned central bank makes losses which are transferred to the government through Equation (F.25).[40]

To distinguish asset freezes from asset seizures we assume in the former case that the nominal value of the assets frozen (gold or U.S. bonds) is returned after 10 years.[41] Hence the sanctioned country receives with *certainty* a wealth transfer in the future 10 years ahead (i.e. 40 periods in a model calibrated or estimated on quarterly data).

[40] Note that this also relates our work to the existing literature on central bank losses stemming from "unconventional policies" such as large-scale asset purchases (e.g. Reis (2013), Cecchetti and Hilscher (2024), Labrousse and Perdereau (2024)). These studies highlight that central bank losses differ qualitatively depending on whether the central bank chooses to buy domestic or foreign assets, as consolidating the balance sheets of the central bank and the government cancels out the effect of domestic sovereign securities held by the central bank (in our case for $c = US$). In contrast, consolidation of the domestic central bank's balance sheet with that of the domestic fiscal authority has no impact on foreign assets such that changes in the central bank's net worth can arise from changes in the value of foreign assets (Cecchetti and Hilscher (2024), p. 22). Both of these effects are also featured in our model. However, we assume that the sanction-induced losses have an immediate (monetary) impact as the timing of losses cannot be influenced by accounting treatments or indemnification policies.

[41] In the case of a freeze of U.S. bonds, the nominal value implicitly includes accumulated interest revenues.

Because of rational expectations, agents discount the wealth transfer in question back to the present.[42] In the case of a seizure, in contrast, the sanctioned assets are not returned to the sanctioned central bank. Hence a seizure is modeled as a permanent loss, unlike a freeze which is modeled as a temporary loss.

4.4 Model solution

We solve the model non-linearly[43] to account for the non-linear response of the system to sanctions on central bank assets and potential out-of-equilibrium dynamics. In the following simulations, the three countries are symmetric and equal in size. We first discuss sanctions on gold reserves—the most frequent case in history—and then sanctions on U.S. bonds—which are more comparable with today's Russia.

5 Simulation

5.1 Basic simulations

Seizure of U.S. bonds. Figure 5 and Figure 6 show the impact of a seizure of U.S. bond holdings of the central bank of sanctioned country S. Unless otherwise specified, black lines show the simulated responses of variables of the sanctioned country S, gray lines those of the sanctioning country US and dotted lines those of the rest of the world

[42] This leads to effects similar to the "forward guidance puzzle" discussed e.g. in Del Negro et al. (2023).

[43] Under rational expectations, the nonlinear system of equilibrium equations describing the model, in a generic period τ, can be written as:

$$E_\tau \left[f\left(x_{\tau+1}, x_\tau, x_{\tau-1}, \eta_\tau \right) \right] = 0$$

where x is the vector of N endogenous variables and η_τ a vector of structural shocks. Note that the information set of agents at time τ includes the sequence of shocks $\{\eta_t\}_\tau^T$; i.e. only shocks in period τ are not expected. The model can be solved non-linearly by solving the stacked system of equations for all periods from 0 to T (we set $T = 100$ in this paper); that is, in compact notation:

$$\mathcal{F}\left(X\right) = 0$$

where $X = (x_0', x_1', ..., x_T')$ and has $N \times T$ variables. This class of problems is typically solved numerically with a Newton-type algorithm. The solution algorithm we implement works as in Adjemian et al. (2024):

1. Start with an initial guess X^j and verify if the system of equations is satisfied;
2. If not, try a new updated solution (X^{j+1}) that is found according to $\mathcal{F}(X^j) + \mathcal{F}'(X^j)(X^{j+1} - X^j) = 0$ where $\mathcal{F}'(X^j)$ is the Jacobian matrix of $\mathcal{F}(\bullet)$ evaluated at X^j;
3. Iterate steps 1)-2) until convergence, i.e. $||\mathcal{F}(X^j)|| < \epsilon$.

RoW. In this simulation, we assume that 1% of the bond holdings in question are seized. The shock is scalable, however: larger shocks would imply stronger effects which might be more than proportional given that the model is solved nonlinearly.[44] We assume that the three countries have the same economic size (i.e. 1/3 of global output), and that gold and U.S. bond reserves have equal weights (50-50%) in the foreign reserves of the three central banks. We set parameter $\gamma_{CB} = 2$, which means that gold and U.S. bonds are imperfect substitutes.[45]

A key insight of the model is to highlight two channels that pull in opposing directions. Sanctions act as an immediate adverse financial shock, which makes households in the sanctioned country poorer. But it also leads to a real exchange rate depreciation in general equilibrium, which can allow the economy under sanctions to export its way out of recession and create valuation gains for its central bank. Another insight is that sanctions can backfire and lead to weaker growth and higher inflation for the sanctioning economy.

As Figure 5 shows, money supply (which is backed by U.S. bonds) falls in country S, leading to an increase in the risk-free rate. The nominal exchange rate of the sanctioned country's currency first depreciates nominally against the U.S. dollar – as sanctions reduce its monetary base – but then starts recovering as the risk-free rate increase. In real terms the exchange rate depreciates against the U.S. dollar because inflation picks up (more on this below) and U.S. dollar bonds are scarcer in the sanctioned country, which is in line with the mechanism discussed in Itskhoki and Mukhin (2022). The real appreciation of the U.S. dollar creates positive valuation gains on non-sanctioned central bank assets, which mitigates the confiscatory effects of the seizure. Tighter monetary conditions lead to a decline in domestic demand in the sanctioned country, with consumption and investment falling. Inflation picks up because the monetary contraction makes capital more expensive—a cost-push shock for firms—and because of the overshooting of the exchange rate. The real depreciation of the sanctioned country's exchange rate against the currencies of the U.S. and the rest of the world boosts exports, which explains why total output increases in the sanctioned country despite falling domestic demand—further mitigating the effects of the sanction.[46] However, households in the sanctioned country are worse-off

[44] More on this below in the case of today's Russia.

[45] As a reminder $\gamma_{CB} = 1$ implies perfect substitutability, whereas $\gamma_{CB} = \infty$ implies perfect complementarity.

[46] This is in line with other findings in the literature such as Ghironi et al. (2024) who model financial

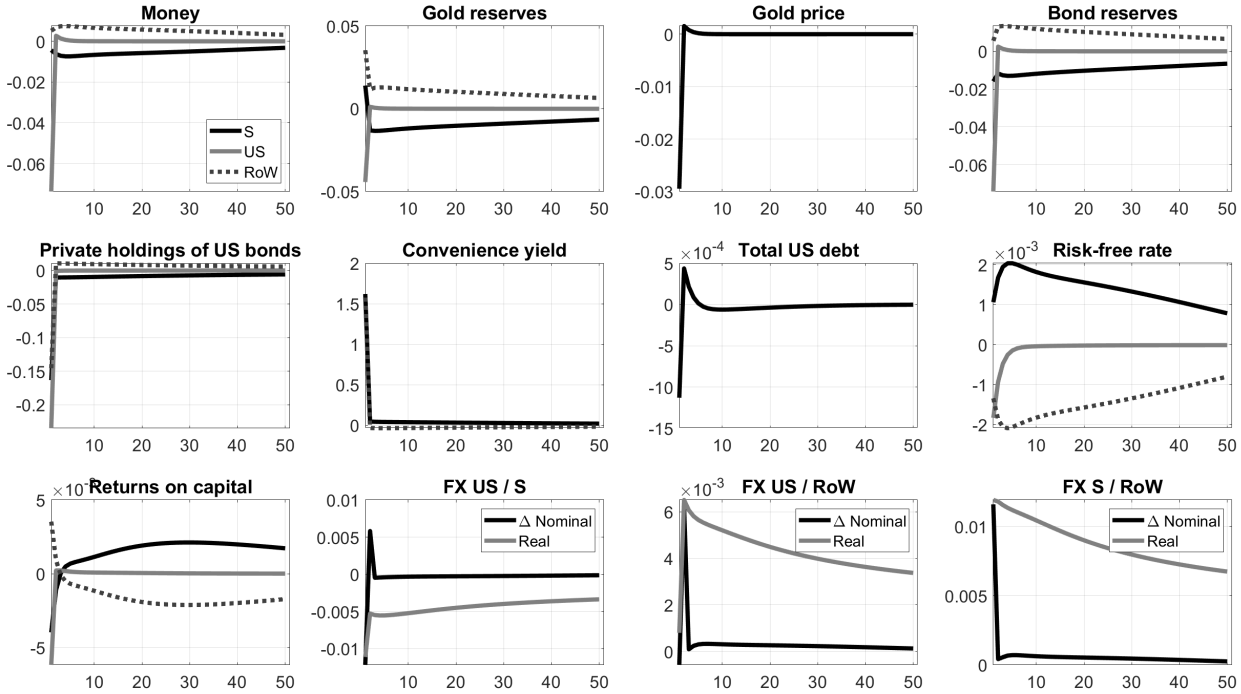


Figure 5: Impact on financial variables of a seizure of U.S. bond reserves.

Notes: Impulse response for a 1% reduction in the U.S. bond reserve holdings of country S. All countries have equal weights; gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

In sanctioning country US, seizing U.S. bonds is not a free lunch. The real appreciation of the U.S. dollar against the currency of the sanctioned country leads to a fall in U.S. exports to that country. At the same time, the U.S. dollar *depreciates* against the rest of the world's currency—fueling inflation in the medium term. This leads to small declines in consumption, investment and output in the short term and in turn into utility losses for U.S. households. As consumption declines, households demand less money, so the central bank needs to liquidate reserves assets (bonds and gold) on impact. In the rest of the world, the U.S. dollar's depreciation leads to valuation losses on the central bank's reserve portfolio; the central bank steps up its purchases of gold (which is priced in U.S. dollars) and U.S. bonds to recoup the losses, thereby pushing up the price of gold after the first period, when the U.S. stops selling gold. All in all, the convenience yield (or

sanctions as an exclusion of private agents from the international bond market. It also reflects the experience of today's Russia in the year following the imposition of sanctions by the EU and the G7: higher oil export revenues allowed Russia's economic output to contract much less than expected in the immediate aftermath of Ukraine's invasion. Home bias in goods is 75% in the model.

[47]Welfare would be the discounted sum of utility over the simulation horizon, i.e. $\sum_{t=0}^{K} \beta_c^t U_{c,t}$ where N is the simulation horizon.

non-pecuniary benefits) of U.S. bonds increases permanently in country S—because they are scarcer—while it first increases and then declines in the rest of the world—because

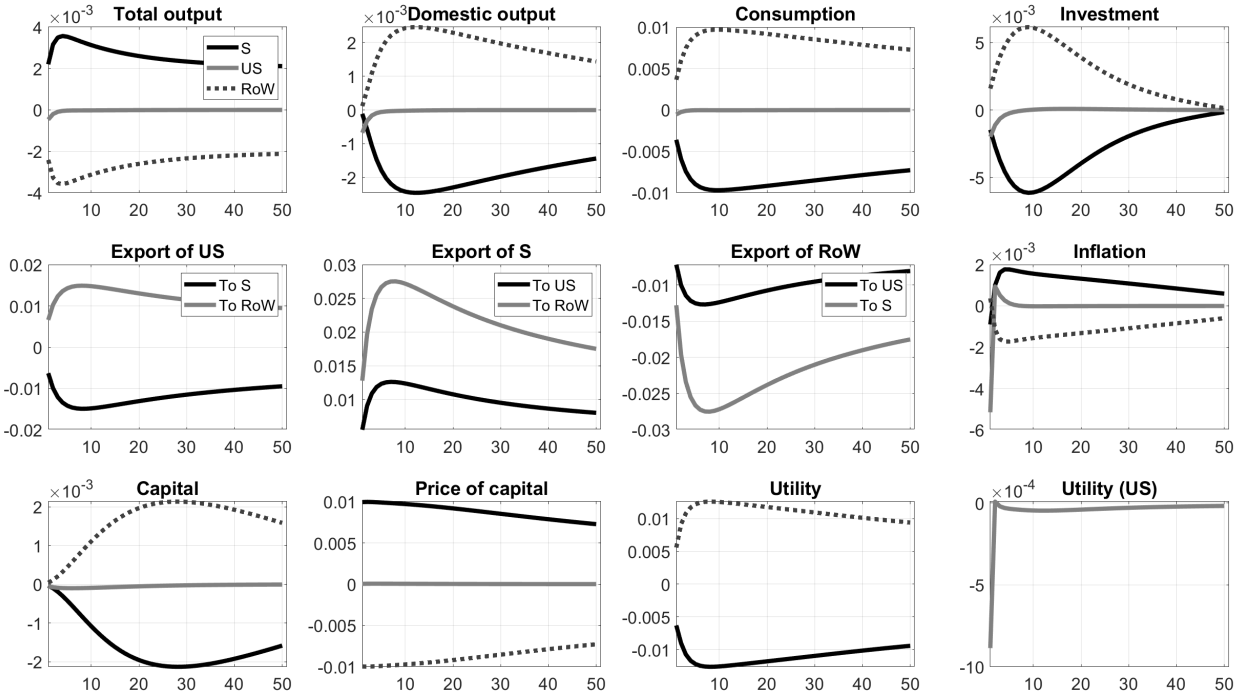


Figure 6: Impact on real variables of a seizure of U.S. bond reserves.

Notes: Impulse response for a 1% reduction in the U.S. bond reserve holdings of country S. All countries have equal weights; gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

Freeze of U.S. bonds. When U.S. bonds are frozen, the difference from seizure is that they are returned at some point in the future. In this simulation we assume that U.S. bonds are returned to sanctioned country S after 10 years (or 40 periods in a quarterly model). This is equivalent to a wealth transfer to the sanctioned country upon restitution which rational, forward-looking agents anticipate and discount to the present (see e.g. Del Negro et al. (2023)). In turn, simulating the effects of freezing 1% of country S's U.S. bonds leads to qualitatively similar results as those obtained with a seizure, as Figure D.10 and Figure D.11 show.

However, the effects are smaller in magnitude—e.g. the real depreciation of the exchange rate of the sanctioned country is about 30% smaller on impact and converges back to steady-state faster. This reflects the expectation of a positive wealth transfer upon restitution of the frozen bonds, which is visible in the jumps in the simulated replies of

the variables in period 40. In particular, the convenience yield on U.S. bonds jumps back to zero upon restitution in the sanctioned country because U.S. bonds are no longer as scarce as they hitherto were. Bond and gold holdings also adjust once sanctioned bonds are returned. Central bank assets are replenished faster and, at the same time, inflation is reduced once the central bank recovers the frozen bonds. Utility losses are also twice smaller in the sanctioned country, reflecting the more benign effects.

Seizing and freezing gold. Seizing gold (see Figure D.12 and Figure D.13 in the Appendix) has similar effects as seizing bonds with one key difference: the resulting increase in gold prices is way stronger because the sanctioned central bank enters the market to replenish its holdings of the yellow metal. Because gold is traded in dollars, the U.S. currency appreciates across the board—i.e. not only against the sanctioned currency but also across the rest of the world, unlike in the case of a bond seizure. These effects combine into stronger positive valuation gains on non-sanctioned gold and bonds, which dampens the effect of the sanction to an even stronger extent than in the case of a bond seizure. The dollar appreciation leads to a fall in U.S. exports towards the sanctioned country and a stronger fall in U.S. output. The distinctive economic mechanism underlying the effects of a freeze relative to seizure remains visible in the case of a gold freeze. Agents in the sanctioned country discount the return of gold back to the present leading to a more muted fall in consumption, a weaker real exchange rate depreciation and lower utility losses.

Joint imposition of trade and central banks asset sanctions. Sanctions targeting the central bank's balance sheet can be imposed jointly with trade sanctions, which may prevent the economy under sanctions to export its way out of recession as easily as in the absence of the trade sanctions in question. We examine the issue in more detail by simulating the combined impacts of large trade and financial sanctions on country S. Specifically, we impose a 20% seizure of bond reserves and restrict exports from country S to the US by 20% as well. We assume that the rest of the world is not aligned geopolitically with the sanctions—to allow for trade diversion effects—and thereby leave unconstrained exports from country S to the rest of the world. The trade sanctions are imposed for 40 periods (i.e. 10 years), after which they are gradually lifted. They are modeled as occasionally binding constraints: trade needs to be lower or equal to the

export limit. We use a linear approximation of the model to solve for this scenario as the nonlinear solution for the problem with four active polices does not converge given the large (but realistic) size of the shocks we impose.

Impulse responses are reported in Figure D.19 and Figure D.20. Trade sanctions disrupt production in country S, which falls into a deep recession—output declines by 10 percentage points at the trough response. Since all countries are equal in size, none remains unscathed and the downturn propagates globally through trade linkages. The recession in country S hence reduces demand for goods from the rest of the world, which falls in turn into recession. This forces the rest of the world to rely more on domestic production and on imports from the U.S. The recession in the US is thereby less severe and shorter than elsewhere, as the economy benefits somewhat from global demand rotation. Yet the key point of the simulation is that the economy under sanctions no longer manages to export its way out of recession as the export channel is impaired.

6 Empirical validation

Next we confront salient predictions of the model to the data. Our aim is not to test the model strictly speaking, which would be challenging given limited availability of data for our large panel of advanced economies *and* emerging and developing economies over a century-long period. Macro data for such a diverse and long panel are hard to come by. Our aim is not to claim causality either, but to merely assess whether historical regularities we see in the data are not at variance with key mechanisms postulated in the model.

We estimate the impact of sanctions on central bank assets on key endogenous variables of the model (i.e. the real exchange rate, gold prices, inflation and output of the sanctioned and sanctioning countries) using a panel local projections in the spirit of Jordà (2005) and Jordà and Taylor (2016). We obtain OLS estimates for each horizon $k \in [0, K]$ of the following model:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \beta_k Sanction_{i,t} + \sum_{i=0,1} \delta_i GPR_{t-i} + \gamma TradeSanction_{i,t} + \varepsilon_{i,t+k} \quad (11)$$

where $y_{i,t}$ is an outcome variable, namely either the natural logarithm of 1 + the

real exchange rate of country i in year t—defined as the number of currency i units per unit of US dollar[48]—or gold prices, the CPI index and output in country i. We estimate Equation (11) for sanctioned and sanctioning countries separately. In the case of sanctioned countries, $Sanction_{i,t}$ is a binary dummy variable equaling 1 in the year when a sanction on central bank assets was taken against target country i and 0 otherwise. In the case of sanctioning countries, $Sanction_{i,t}$ equals 1 in the year when a sanction on central bank assets was taken by *targeting* country i and 0 otherwise. The β_k^j coefficients capture the dynamic response up to year k of the respective outcome variable following the introduction of sanction measures in year t.[49] As control variables, we use annual averages of the index of geopolitical risk of Caldara and Iacoviello (2022). We include its contemporaneous and lagged values to capture other geopolitical shocks – prominently wars – that might affect the outcome variables. Moreover, to account for the fact that asset freezes were in some cases imposed alongside a total or partial economic embargo (or at least import restrictions),[50] we also control for trade sanctions. We merge data on trade sanctions post-1945 from the Global Sanctions Database of Syropoulos et al. (2024) with data for the pre-1945 period from Eichengreen et al. (2023). The resulting dummy variable $TradeSanction_{i,t}$ equals 1 in the year when sanctions on exports or imports of country i were introduced and 0 otherwise. Finally, α_i captures country fixed effects. We obtain Driscoll-Kraay standard errors, which are heteroscedasticity consistent and robust to very general forms of cross-sectional and temporal dependence (see Driscoll and Kraay (1998)).

For our dependent variables, we use data on exchange rates from Eichengreen et al. (2023), on gold prices from O'Connor and Lucey (2023) and Gallais-Hamonno et al. (2019),[51] and on inflation and output from Jordà et al. (2017), League of Nations (various years) and the IMF's International Financial Statistics.

The estimates are shown in Figure 7. The economic magnitude of the responses are not directly comparable with those of Figure 5 and Figure 6—which are based on 1%

[48] An increase therefore means that the exchange rate of currency i depreciates vis-à-vis the US dollar. We use the U.S. dollar as numéraire instead of sterling because this allows us to keep the U.K. in our sample. The U.K. was both a targeting and targeted country in this earlier era

[49] Asset freezes and seizures are grouped together in $Sanction_{i,t}$ as it was not possible to estimate the model equation separately owing to limited availability of data.

[50] See also Clifton et al. (2014).

[51] Gallais-Hamonno et al. (2019) digitized data on clandestine gold markets in occupied Paris in the second World War—a period when international markets like London or New York were virtually closed to foreign trading.

shocks and not average estimated effects, as in Figure 7—but the signs are. Sanctions are associated with an appreciation of the U.S. dollar against the sanctioned currency of about 3% and higher inflation in the sanctioned country of about 6% after two years, while gold prices increase by more than 20% – which is in line with predictions of the model. Real GDP in the sanctioned country declines following sanctions, which seems *prima facie* inconsistent with our basic model simulations. In fact, the estimated response is consistent with the model's response of domestic demand, which likely captures the fact that many of the sanction episodes we use in the local projection estimates occurred during World War II – when economies were closed behind trade barriers and capital controls. Moreover, as mentioned before asset freezes were sometimes accompanied by other economic sanctions such as trade embargoes which can undermine the aforementioned channel of a re-balancing of demand from domestic towards external sources—as our model simulations on joint imposition of trade and central bank asset sanctions suggest.[52] The responses of inflation and output in the sanctioning economy (i.e. frequently the U.S. in the sample) are statistically insignificant, which is perhaps unsurprising given that the amounts of central bank assets sanctioned were typically very small compared to the U.S.'s economic size. Estimation results are not driven by outliers. They remain robust when we winsorize the data at the 1% level (see Figure B.9 in the Appendix).

All in all, historical regularities in the data are not inconsistent with key mechanisms in the model.

7 Calibrated simulation for today's Russia

We now use a calibrated version of the model to examine the global economic and financial impacts of a seizure of the frozen sovereign reserves of today's Russia.

Specifically, we assume that the share of the U.S. in global output is 15%, against 3% for Russia and 82% for the rest of the world, which is about their respective shares in global GDP at purchasing power parity in 2022 according to the IMF's World Economic Outlook database. We further assume that gold accounts for 20% of Russia's foreign reserves, against 80% for U.S. bonds. Russia's foreign exchange reserves stood at about

[52]Note that we do control for the *contemporaneous* imposition of trade sanctions. However, those measures are often in place for many years and their subsequent potential effects are not fully captured by our empirical model.

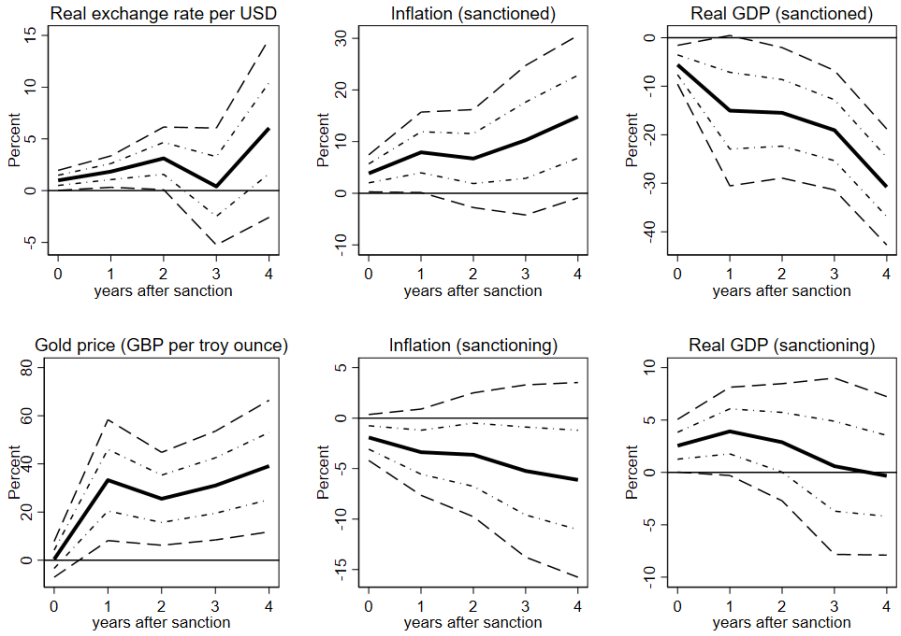


Figure 7: Dynamic response estimates to sanctions on central bank assets.

Notes: The figure shows the responses of selected outcome variables (shown as a solid black line) in years 0–4 following the introduction of sanctions on central bank assets. The local projection estimates are obtained by OLS over the full sample (1914–2022); they control for country fixed effects, Caldara and Iacoviello (2022)'s index of geopolitical risk, and the joint imposition of trade sanctions. The dashed (dot-dashed) lines are 1.96 (1)-standard deviation confidence bands.

USD 600 billion in 2022, against about USD 150 billion for gold reserves, which matches the proportions above. However, we make two simplifying assumptions: all foreign exchange reserves are in U.S. dollars, whereas in fact they are more diversified (e.g. in euros, renminbi, etc.) and most of Russia's immobilized assets are in the European Union, not in the U.S.; finally, we assume that all foreign exchange reserves are invested in bonds, whereas in fact they can also be invested in deposits.

We also estimate 12 key structural parameters (the Taylor rule coefficients, price stickiness, the elasticities of substitution across goods) in the U.S. and Russia to match the volatility of consumption, GDP, inflation, money supply and interest rates. Details on the moment matching methodology are reported in Appendix F.7 while Table C.3 shows the parameter values. We impose that 50% of Russia's U.S. bond reserves are seized. This matches the USD 300 billion worth of reserves immobilized in the G7 jurisdictions. Finally, we assume that the central bank of Russia has access to the U.S. bond markets—an assumption on which we come back below.

The global effects of the seizure are qualitatively in line with those of the basic sim-

ulations discussed in Section 5, but they are small in magnitude (see Figure D.16 and Figure D.17). This reflects the fact that although a large share of Russia's reserves are seized, it remains a relatively small economy. For Russia, the seizure leads to an exchange rate depreciation in real terms against the U.S. dollar of about 0.8%, a fall in consumption and utility of 0.9-1%; and an increase in output of about 0.3% owing to stronger exports; inflation is broadly stable in the long run. For the U.S., the stronger dollar and lower exports to Russia (-1.5%) are accompanied by small declines in consumption and utility.

However, the effects of the seizure are stronger if access from Russia's central bank to U.S. bond markets is restricted. This is, in fact, the case: as one of the economic sanctions imposed on Russia in the wake of Ukraine's invasion, the U.S. Treasury prohibited transactions of U.S. persons with the Central Bank of Russia.[53] Therefore, we now further assume that the central bank of country S has restricted access to U.S. bond markets for 10 years (40 periods) after the seizure. This means that it cannot buy more than 50% of its steady-state foreign exchange reserves and replenish them fully after the seizure.[54]

The real macroeconomic effects of the bond seizure remain broadly unchanged (see Figure 8 and Figure 9). But there is one key difference: U.S. risk-free rates react much more—they increase persistently by up to almost 60 basis points. This reflects the fact that Russia no longer buys U.S. bonds but only gold—which reduces demand for U.S. bonds. Such an increase in interest rates has material consequences for the sanctioning country. With U.S. public debt held by the public at USD 26.5 trillion end-2023, this would translate into higher interest rate payments of almost USD 160 billion *per year*—which would outweigh the amount of assets in case they were seized after three years.

[53]See the press release published on February 28, 2022, which stresses that "[Pursuant to the Russia-related Sovereign Transactions Directive issued under E.O. 14024, United States persons are prohibited from engaging in any transactions involving the Central Bank of the Russian Federation" and that the "the term "United States person" means any United States citizen, lawful permanent resident, entity organized under the laws of the United States or any jurisdiction within the United States (including foreign branches), or any person in the United States."; see https://home.treasury.gov/news/press-releases/jy0612.

[54]Despite the fact that U.S. sanctions prohibit U.S. persons from engaging in any transactions involving the CBR and even threatens secondary sanctions to other countries helping Russia to evade these restrictions, we do not assume that access is fully restricted to entertain the possibility that Russia's central bank could still transact in U.S. bonds with the rest of the world, such as countries in the global south or offshore financial centers. If we relax this assumption the effects discussed below would be stronger still.

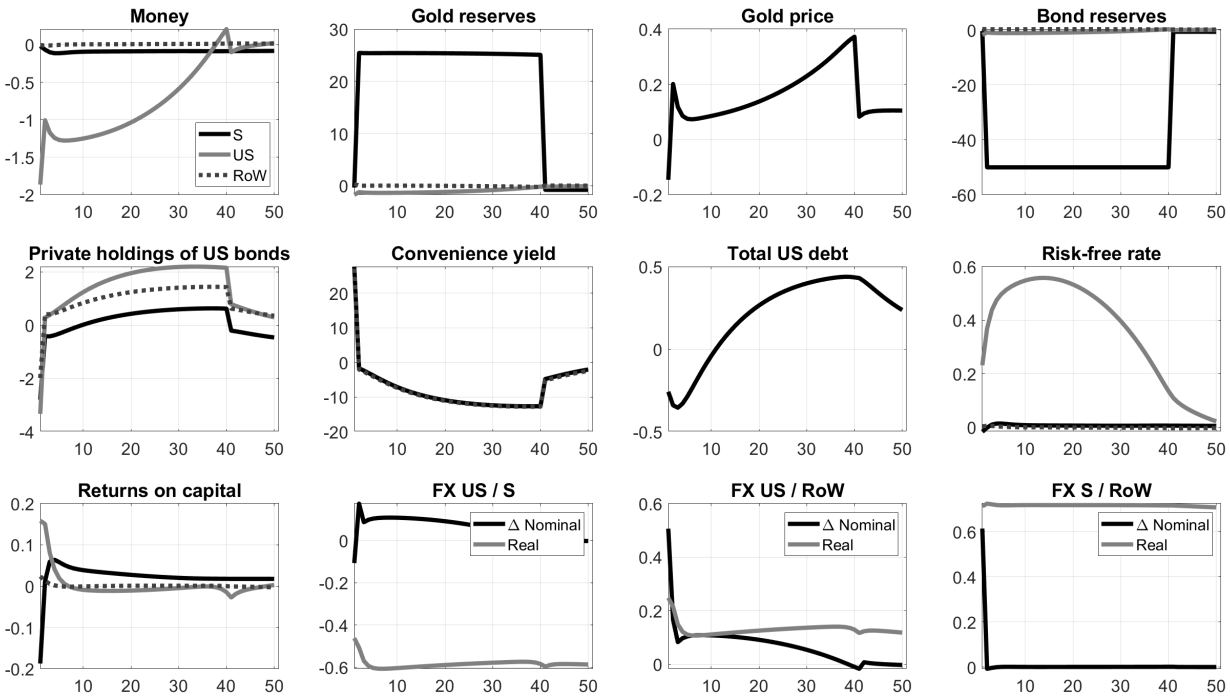


Figure 8: Impact on financial variables of a seizure of today's Russia's foreign reserves – restricted market access.

Notes: Impulse response for a 50% seizure of U.S. bond reserve holdings of Russia (country S). The U.S. accounts for 15% of the global output against 3% for Russia, γ_{CB}=2. Russia's foreign reserves are composed of 20% gold and 80% U.S. bonds. We further assume that Russia has restricted access to financial markets for 40 periods. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

8 Conclusion

In this paper, we examined the global economic and financial impacts of sanctions on central bank assets through the lenses of new data on sanctions of central bank assets over the past century and an international macro model that allows to quantify the effects of the sanctions in question and tease out the macroeconomic mechanisms.

We showed that the scale of the current freeze of Russia's central bank assets is rarely seen in history. And that risks raised by asset seizures for the global economy discussed now were already discussed in the past, which explains why contemporaries were reluctant to go ahead with seizing central bank assets. Our model simulations demonstrate that seizing central bank assets have stronger effects than freezing—effects that can backfire on the sanctioning country in general equilibrium. In one calibrated simulation for today's Russia, the resulting increase in U.S. interest payments would outweigh the amount of assets in case they were seized from Central Bank of Russia after two years.

These findings have implications for policy. One implication is that seizing central

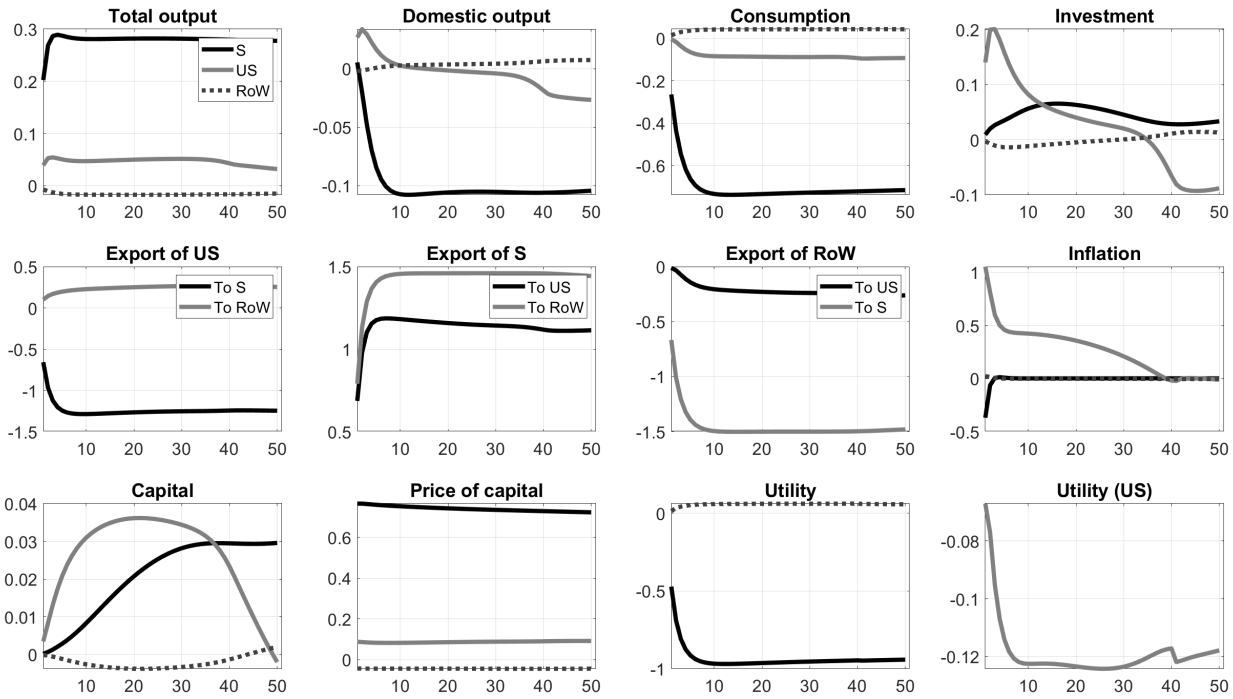


Figure 9: Impact on real variables of a seizure of today's Russia's foreign reserves – restricted market access.

Notes: Impulse response for a 50% seizure of U.S. bond reserve holdings of Russia (country S). The U.S. accounts for 15% of the global output against 3% for Russia, γ_{CB}=2. Russia's foreign reserves are composed of 20% gold and 80% U.S. bonds. We further assume that Russia has restricted access to financial markets for 40 periods. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

bank assets is not just an incremental step relative to freezing but may imply stronger economic effects and risks globally. Another is that seizing assets is not a free lunch for the sanctioning economy which may pay a price in terms of weaker growth, higher inflation or higher interest rates.

These findings are obtained with historical data and a stylized model which is well suited to capture macro-financial linkages but not necessarily reputation effects in the main international reserve currencies or global status of financial centers. The steady state in our model is also unaffected by sanctions and no new safe asset emerges. Modeling such aspects would not only require a different type of model but also further empirical evidence on how reserve currency status changes in response to sanctions. These are relevant and interesting avenues for future research.

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Appendix

A Alleged historical precedents

Numerous scholars and commentators have recently brought forward cases they deem to be relevant historical precedents for today's Russia. Many of these cases seem strikingly similar at first sight. But differences appear once one looks more closely.

One such case is Iraq's unprovoked invasion and attempted annexation of Kuwait in 1990 and the resulting reparation Iraq was forced to pay to Kuwait.[55] Later on, i.e. after the U.S.-led invasion of Iraq in 2003, it was the first, and to date, apparently only, use of a U.S. President of its vesting power embedded in the International Emergency Economic Powers Act (IEEPA) (CRS (2023b)) where he authorized the confiscation of certain blocked property of the Government of Iraq and its agencies (including its central bank).[56] However, such vested property was "*[...] to be used to assist the Iraqi people and to assist in the reconstruction of Iraq*"[57] and thus for the sanctioned country itself.[58] The (previously imposed) reparation payments to Kuwait – which were backed by a U.N. Security Council (UNSC) Resolution – were not funded by confiscated Iraqi assets.[59] Hence, even though neutral countries forced the aggressor nation to pay reparations, froze and even confiscated certain assets (after becoming belligerent countries themselves), the compensation for the invaded country itself (i.e. Kuwait) did *not* involve seized assets and the legal basis for reparations was clearly established by a (binding) UNSC resolution.

Another historical case that has been proposed as a precedent is the attachment of some of the Banque de France's (BdF) gold reserves held at the Federal Reserve Bank of New York that the Polish Central Bank (Bank Polski) received from a New York court ruling in 1941. Given that at that time the U.S. did not yet formally declare war, this case has been labeled "*an excellent, indeed compelling, precedent for seizing gold or*

[55] See, for example, The International Working Group on Russian Sanctions (2023).

[56] See Executive Order 13290, March 20, 2003, https://www.govinfo.gov/link/cpd/executiveorder/13290.

[57] See https://www.govinfo.gov/link/cpd/executiveorder/13290.

[58] Similarly, subsequent executive orders vested title of blocked funds of former Iraqi officials. Again, these funds were transferred to the Development Fund for Iraq (established by the UNSC Resolution 1483) to meet humanitarian needs of the Iraqi people (CRS (2023b)).

[59] The UNSC established the United Nations Compensation Commission (UNCC) to process claims against Iraq. The reparation process was then funded through oil exports under the oil-for-food program which allowed USD 2 billion in Iraqi oil sales every period of 180 days. The resulting revenues were then allowed for humanitarian and for compensatory purposes by dedicating a certain share of the proceeds.

foreign exchange reserves when a country illegally invades another country".[60] However, while again at first glance this case may look similar, there are important differences with today's Russia. First, the seizure was not the result of a financial sanction through an Executive Order, but rather the outcome of a judicial process. Second, the latter was about the fulfillment of certain bilateral contractual obligations that Bank Polski accused the BdF of having failed to meet (i.e. evacuating Polish gold to the U.S.). Third, the seizure was only temporary and there was no final court ruling on the matter. In fact, a few years later the Polish gold was actually returned to Bank Polski and the New York court was informed by the Poles that both parties had agreed to terminate the lawsuit. As a result, the court in New York closed the trial and lifted the seizure of BdF's gold (see subsection E.3 for further details).

In our view, the historical case that comes closest to what is currently being discussed about today's Russia is the so-called "Operation Safehaven" of World War II. Shortly before the end of the war, the Allies were concerned about German assets in—or moving to—neutral countries and started the Safehaven program which was supposed to make it impossible for Germany to start another war and to ensure that German assets would be available for postwar reparations and rebuilding of Europe. The idea was that the neutral—third-party—countries immediately *immobilize* all German assets, including foreign reserves. These cases are strikingly similar to today's discussion along several dimensions: Third-party countries immobilize the assets of an aggressor nation with a view to preventing this country from financing its war efforts and preserving the assets for an eventual settlement regarding reparation and reconstruction of those countries directly involved in the war. However, there was one crucial difference. None of these countries was supposed to take any steps regarding seizure *before* the war had formally ended.[61]

Hence, despite striking similarities that feature in historical cases, what these episodes highlight is that once looking at all the relevant dimensions, it appears that never in history have non-belligerent countries seized central bank assets in an ongoing war to finance reconstruction in a third country—what is now being discussed for today's Central Bank of Russia's assets.

[60] See Harold James (2024), "Letter: The story of Bank Polski's reserves has echoes today", https://www.ft.com/content/3bad0d4d-1814-45d8-b457-840ee929f348.

[61] It was only after the war came to an end that the Allied Control Council—which was the governing body of the Allied occupation zones in Germany—issued a vesting decree (basically on behalf of Germany itself) to be sent to neutral countries on their behalf (see subsection E.6 for further details).

B Figures

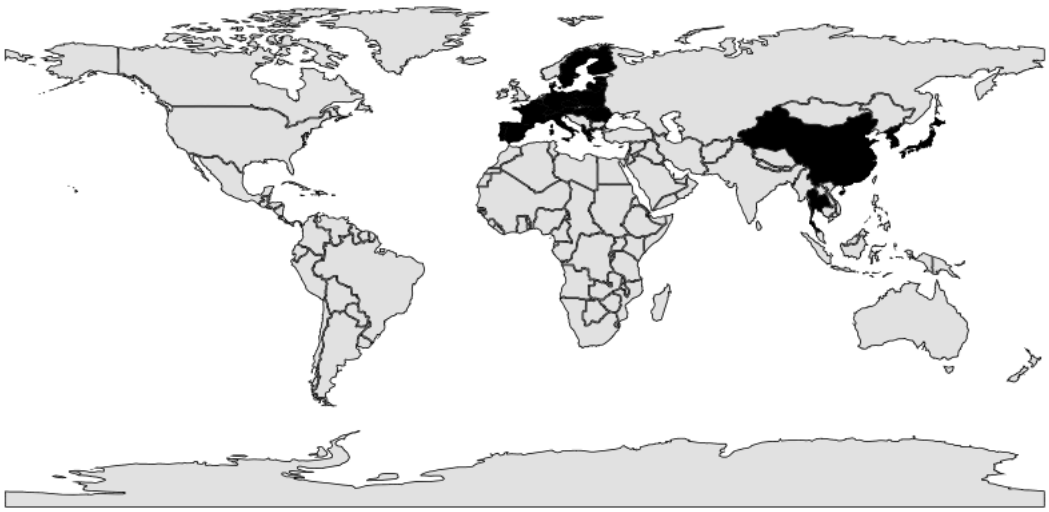


Figure B.1: Countries targeted by sanctions on central bank assets during World War II.
Notes: The figure puts countries facing sanctions on central bank assets on the map. The black shade corresponds to countries which were targeted and the light gray shade those that were not.

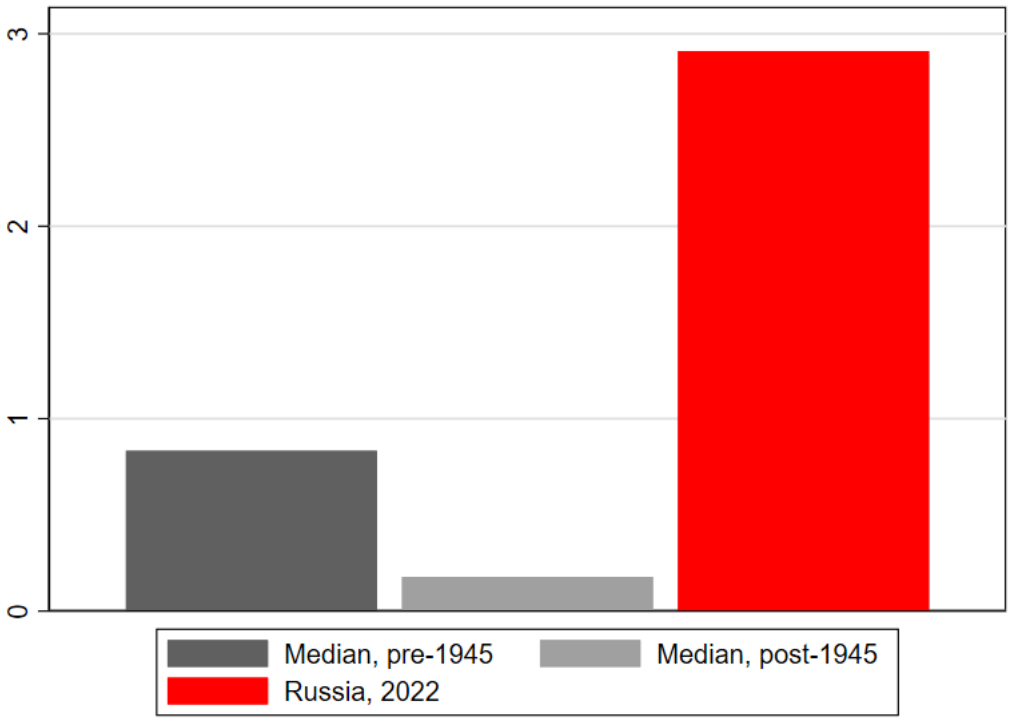


Figure B.2: Median share of global GDP across targeted countries in selected periods.

Notes: The figure shows the median share of global GDP (in percentages) across countries facing sanctions on central bank assets between 1914 and 1945 (dark grey bars), 1945 and 2018 (light grey bars) and of today's Russia (red bar), respectively. GDP shares were estimated using historical GDP data in USD 2011 taken from the Maddison Project database (de Pleijt and van Zanden (2020)). Linear interopolated observations were used when GDP data were missing from the Maddison Project database.

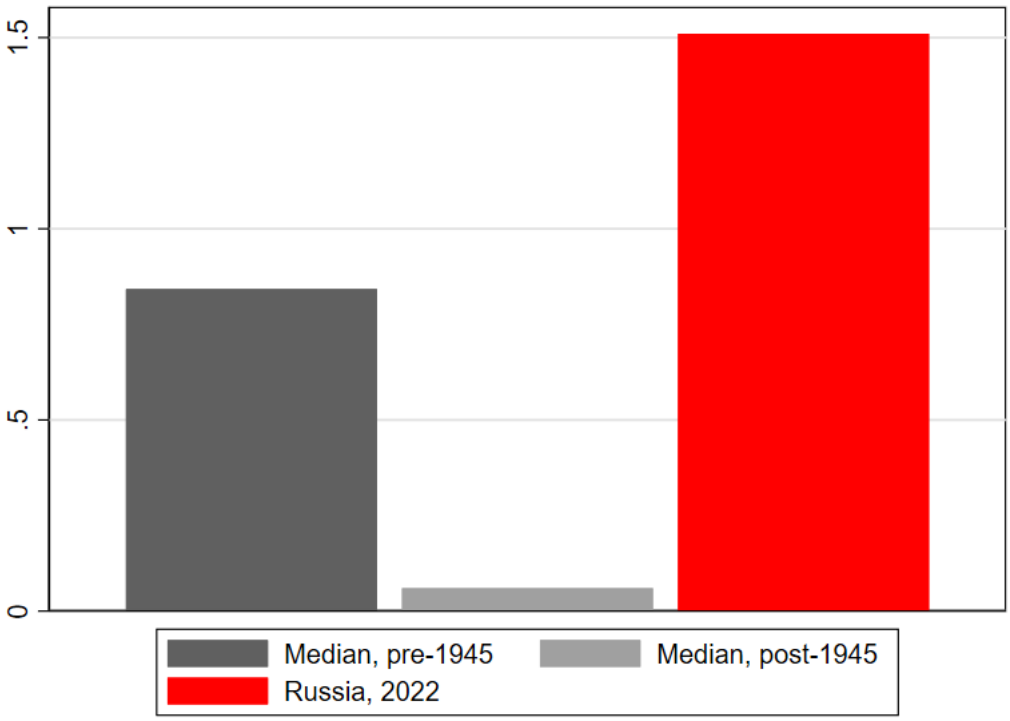


Figure B.3: Median share of global trade across targeted countries in selected periods.
Notes: The figure shows the median share of global trade (in percentages) across countries facing sanctions on central bank assets between 1914 and 1945 (light grey bars), 1945 and 2022 (dark grey bars) and of today's Russia (red bar), respectively. Trade shares were estimated using historical data from the RICardo Project database (Dedinger and Girard (2017)) for the period 1914-1938 and from the International Monetary Fund's Direction of Trade Statistics database for the period 1945-2022.

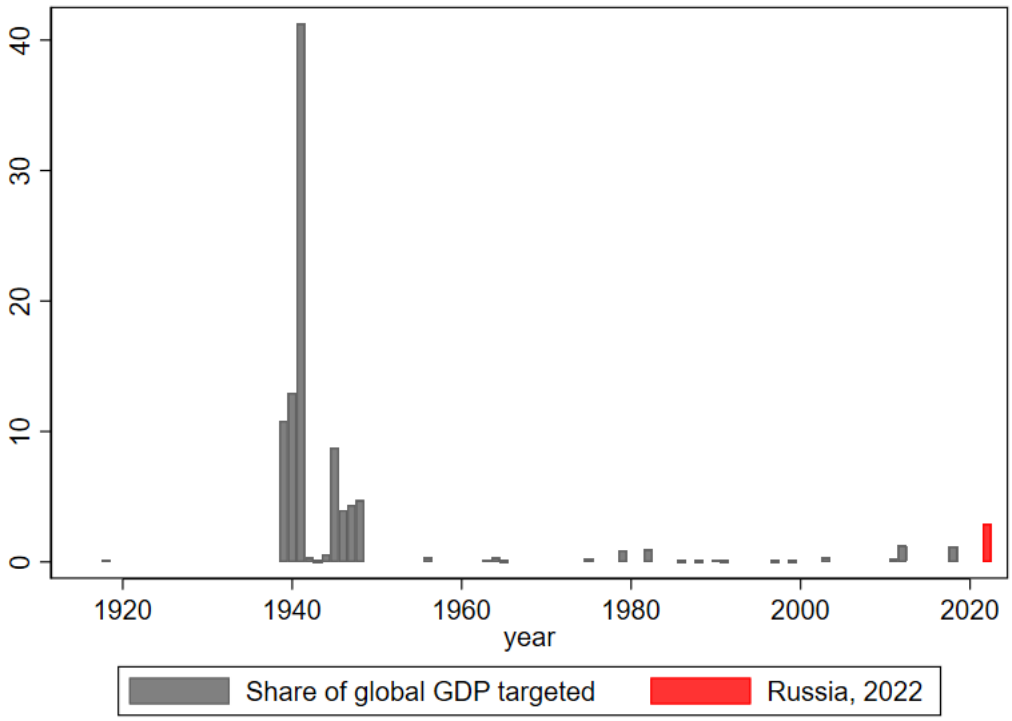


Figure B.4: Share of global GDP targeted: 1914-2018.

Notes: The figure shows the evolution of the share of global GDP (in percentages) of countries targeted by a freeze or seizure of central bank assets between 1914 and 2018. GDP shares are estimated using historical GDP data in USD 2011 taken from the Maddison Project database (de Pleijt and van Zanden (2020)). Linear interpolated observations were used when GDP data were missing from the Maddison Project database.

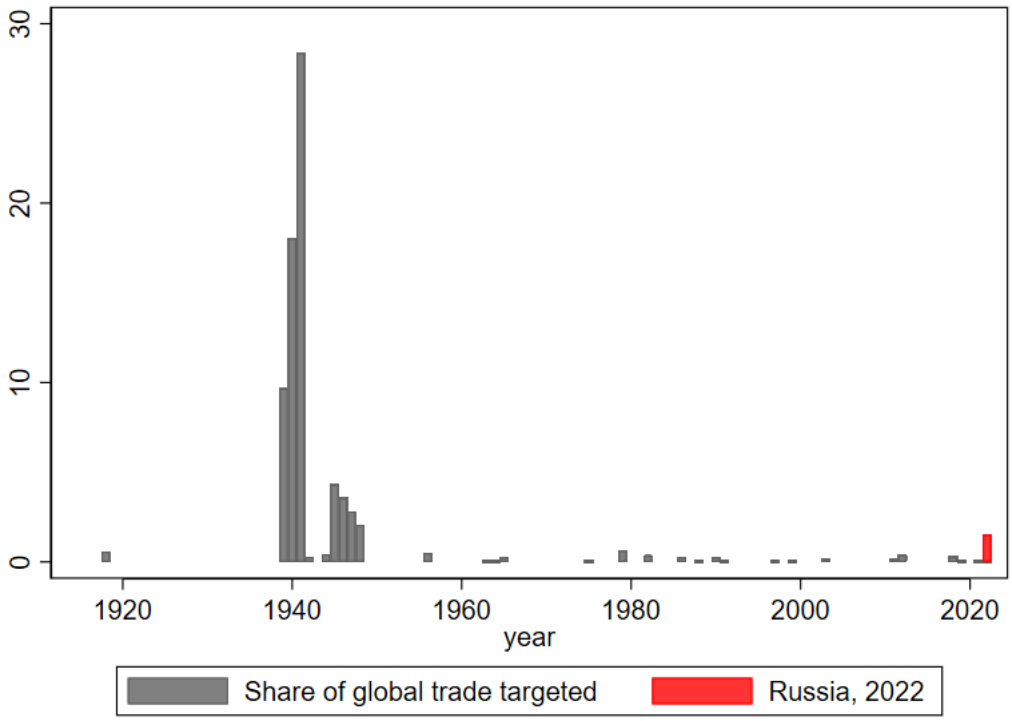


Figure B.5: Share of global trade targeted: 1914-2019.

Notes: The figure shows the evolution of the share of global trade (in percentages) of countries facing sanctions on central bank assets between 1914 and 2019. Trade shares are estimated using historical data from the RICardo Project database (Dedinger and Girard (2017)) for the period 1914-1938 and from the International Monetary Fund's Direction of Trade Statistics database for the period 1945-2019.

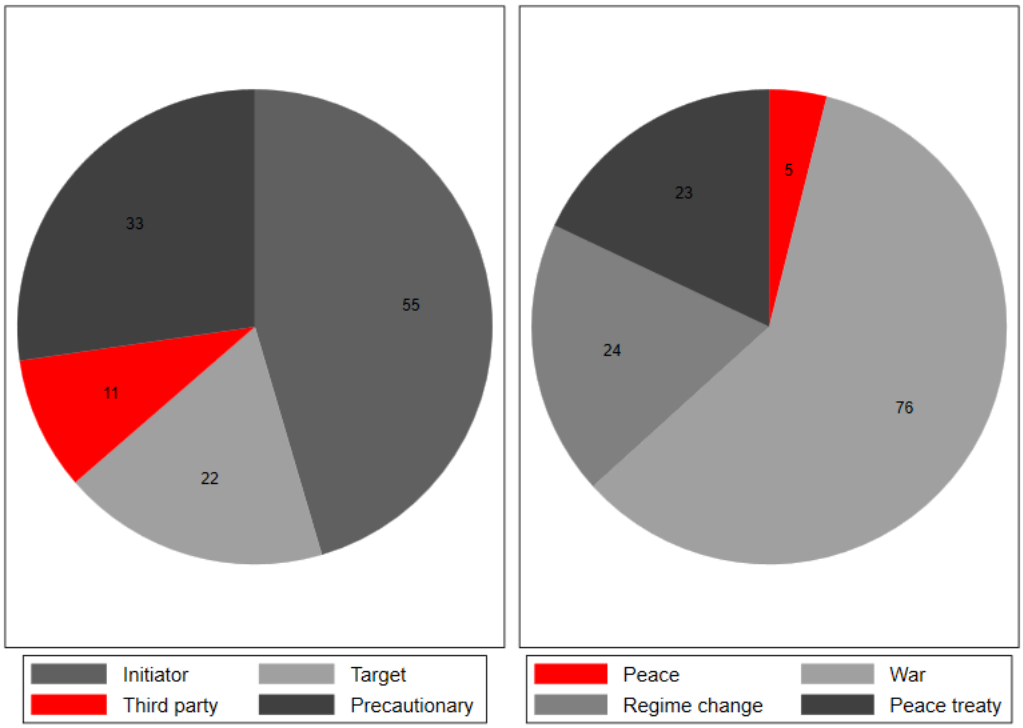


Figure B.6: When and for who? Breakdown of sanctions by type: 1914-2024.

Notes: The figure breaks down sanctions on central bank assets by type. In the left-hand side panel it distinguishes the beneficiaries of the sanctions in question, namely: the initiator(s), the target country (e.g. the country's citizens if the government is seen as illegitimate), a third party, sanctions motivated by precautionary reasons. In the right-hand side panel the figure distinguishes the circumstances when the sanctions were adopted, namely: peace, war, a regime change or a peace treaty. The count of each type of sanctions is shown on its slice of the pie. The number of observations depends on availability of information on the type of sanctions shown on the figure.

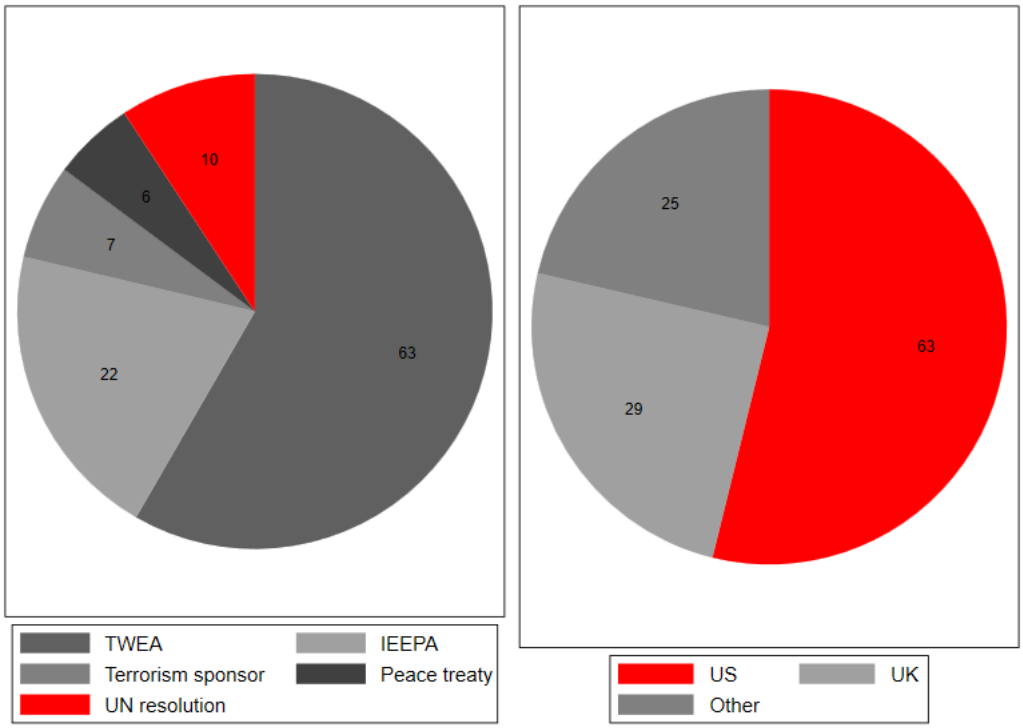


Figure B.7: Targeter? Breakdown of sanctions by type: 1914-2024.

Notes: The figure breaks down sanctions on central bank assets by type. In the left-hand side panel it distinguishes the legal basis used to impose sanctions, including the U.S.'s Trading with the Enemy Act of 1917, International Emergency Economic Powers Act of 1977, state-sponsor-of-terrorism designation, a United Nations resolution or a peace treaty. In the right-hand side panel the figure distinguishes the targeters of the sanctions in question, namely: the U.S., the U.K. and other (group of) countries. The count of each type of sanctions is shown on its slice of the pie. The number of observations depends on availability of information on the type of sanctions shown on the figure.

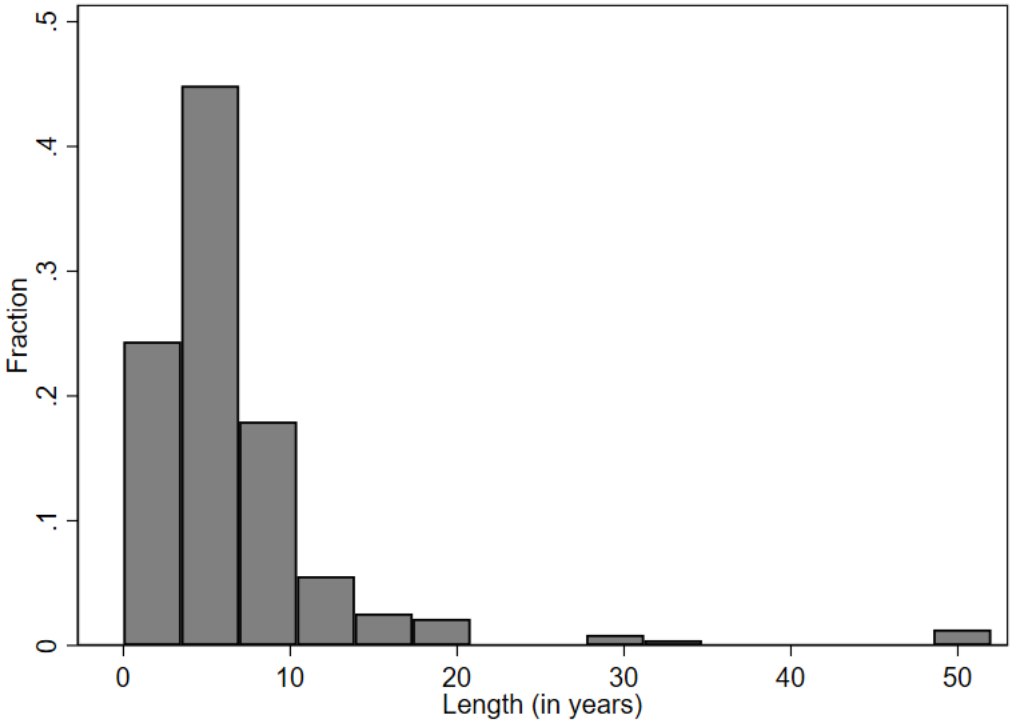


Figure B.8: Length (in years) of sanctions on central bank assets: 1914-2022.

Notes: The histogram shows the distribution of cases of sanctions on central bank assets in terms of duration (years).

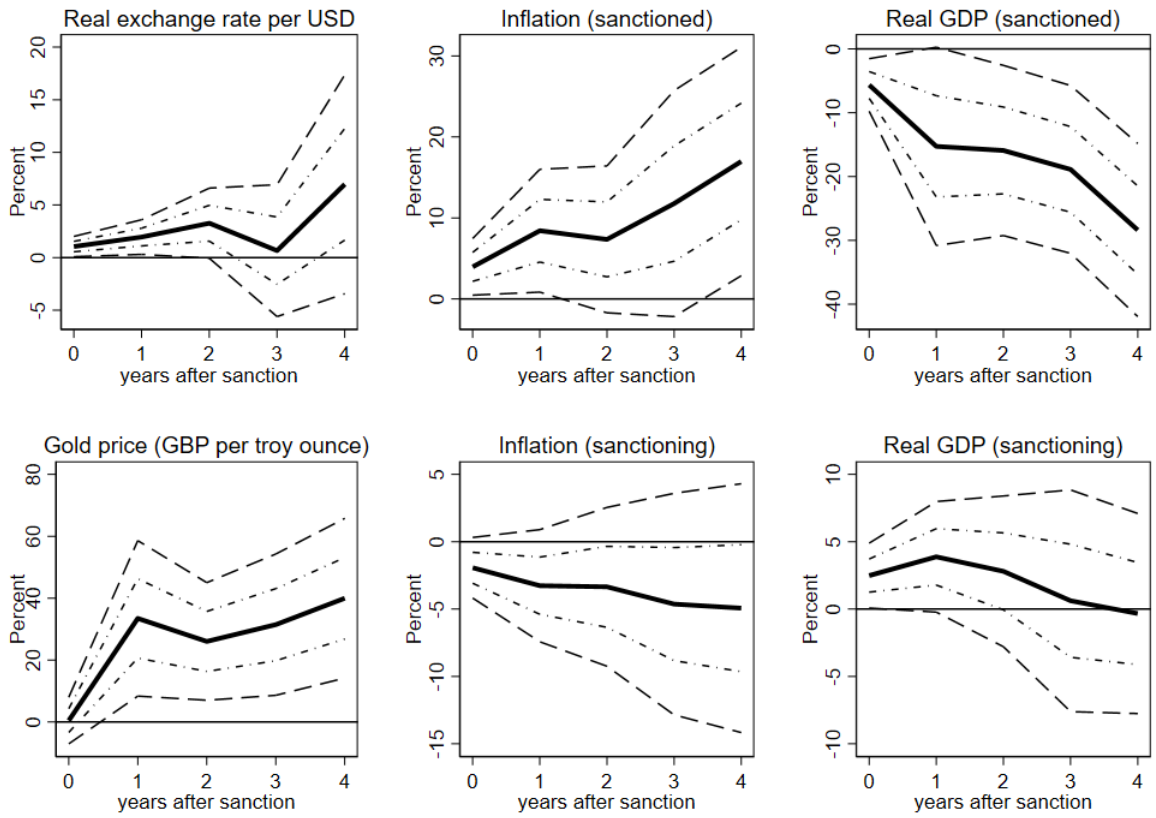


Figure B.9: Dynamic response estimates to sanctions on central bank assets excluding the 1% tails of the data distribution.

Notes: The figure shows the responses of selected outcome variables (shown as a solid black line) in years 0–4 following the introduction of sanctions on central bank assets. The local projection estimates are obtained by OLS over the full sample (1914–2022); they control for country fixed effects and Caldara and Iacoviello (2022)'s index of geopolitical risk. The dashed (dot-dashed) lines are 1.96 (1)-standard deviation confidence bands. When estimating the local projection equation, we winsorize the data at the 1% level.

C Tables

Table C.1: Overview of selected existing databases on sanctions

	No. of episodes	Sample period	Data type	Frequency	Granularity of information on sanctions
Hufbauer et al. (2010)	204 (10 pre-1939)	1914-2006	Case studies	Irregular	-Uncoded lists of measures taken
Syropoulos et al. (2024), Kirikakha et al. (2021), Felbermayr et al. (2020)	1,325	1950-2022	Coded classification	Annual	-Type (trade, financial, travel) -Policy objective -Perceived degree of success
Clifton et al. (2014)	1,412	1945-2005	Coded classification	Daily	-Type (economic embargo, import/export restrictions, asset freeze, termination of foreign aid, travel ban, suspension of economic agreement) -Issue at stake, Threat identity, carrots, diplomatic sanctions, economic costs, etc.
Von Soest and Wahman (2015)	122	1990-2010	Coded classification	Annual	-Type (financial sanctions, trade embargo, non-economic sanctions) -Intensity
Eichengreen et al. (2023)	128	1914-1945	Coded classification	Annual	-Type (trade sanctions, asset freezes)

Notes: The table provides summary information on selected existing databases on sanctions, including the number of sanction episodes available, sample period, data type, frequency of observations, and granularity of information available.

Table C.2: Calibration

Parameter	Description	Value	Parameter	Description	Value
h_c	Habit formation	0.65	$\gamma_{c,r}$	Interest rate smoothing	0.75
ϕ_c	Inverse of Frish elasticity of labor	1	$\theta_{c,Y}$	Interest rate sensitivity to output	0.6
β_c	Discount factor	0.9926	$\theta_{c,\pi}$	Interest rate sensitivity to inflation	1.2
σ_c	Log-consumption	1	$\frac{G_{ss}}{Y_{ss}}$	Steady state gov. spending over output	0.2
$\sigma_{c,m}$	Elasticity of money	10.62	$\kappa_{c,T}$	Tax sensitivity to deficit	0.48
$\sigma_{c,b}$	Elasticity of bonds	10.62	$\varrho_{c,T}$	Persistency of taxation	0.5
$\chi_{c,m}$	Weight of money in utility	0.1	$\delta_{c,g}$	Depreciation rate of gold	0.0002
$\chi_{c,b}$	Weight of bonds in utility	0.1	$\psi_{c,b}$	Weight of bond in reserve aggregator	1
ϕ_c^B	Cross-country bond holding cost	0.001	$\psi_{c,g}$	Weight of gold in reserve aggregator	1
ϕ_c^K	Investment costs	1.728	γ_c, CB	Elasticity of reserves	2
$\omega_{c,c}$	Home bias	0.75	$\rho_{c,R}$	Persistency of monetary shocks	0
ϱ_c	Elasticity of substitution across goods	0.333333	$\rho_{c,A}$	Persistency of TFP shocks	0.5
δ_c	Capital depreciation rate	0.025	$\rho_{c,C}$	Persistency of preference shocks	0.5
$_c$	Prob. of price update	0.6	$\sigma_{c,r}$	Volatility of monetary shocks	0.01
ν_c	Demand elasticity	6	$\sigma_{c,A}$	Volatility of TFP shocks	0.01
α_c	Capital share in production	0.3	$\sigma_{c,C}$	Volatility of preference shocks	0.01

Table C.3: Estimated parameters

Parameter	Description	Value	Parameter	Description	Value
ϱ_{US}	Elasticity of substitution across goods	0.26	ϱ_S	Elasticity of substitution across goods	0.25
ν_{US}	Demand elasticity	5.88	ν_S	Demand elasticity	5.79
$_{US}$	Prob. of price update	0.50	$_S$	Prob. of price update	0.50
$\gamma_{US,r}$	Interest rate smoothing	0.83	$\gamma_{S,r}$	Interest rate smoothing	0.85
$\theta_{US,\pi}$	Interest rate sensitivity to inflation	1.47	$\theta_{S,\pi}$	Interest rate sensitivity to inflation	1.15
$\theta_{US,Y}$	Interest rate sensitivity to output	0.83	$\theta_{S,Y}$	Interest rate sensitivity to output	0.85

D Additional simulations

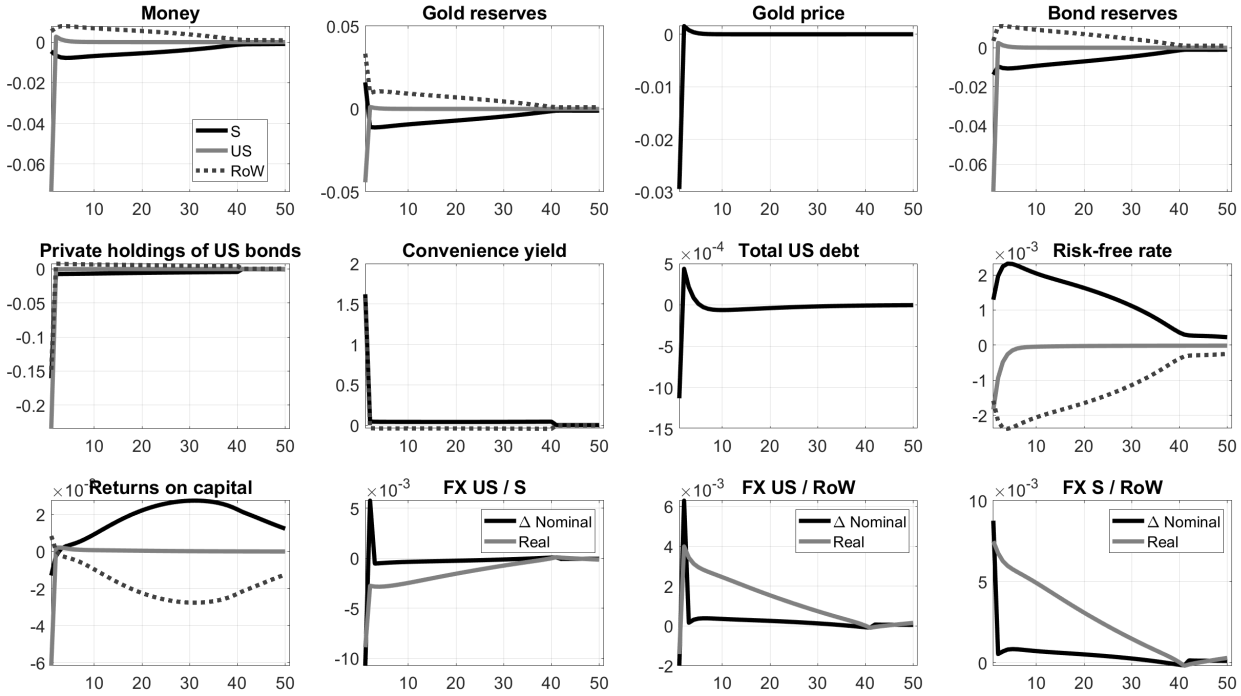


Figure D.10: Impact on financial variables of a freeze of U.S. bond reserves.

Notes: Impulse response for a 1% reduction in the U.S. bond reserve holdings of country S. All countries have equal weights; gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive and U.S. bonds are returned after 10 years (40 periods). Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

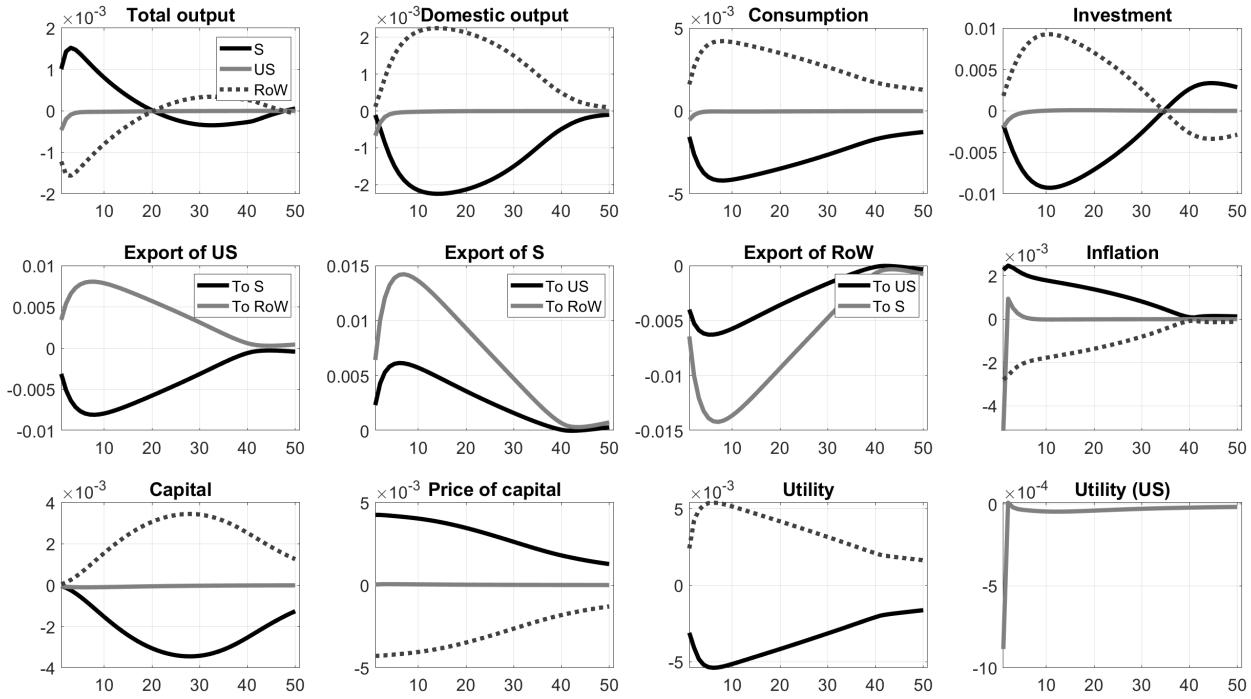


Figure D.11: Impact on real variables of a freeze of U.S. bond reserves.

Notes: Impulse response for a 1% reduction in the U.S. bond reserve holdings of country S. All countries have equal weights; gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive and U.S. bonds are returned after 10 years (40 periods). Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

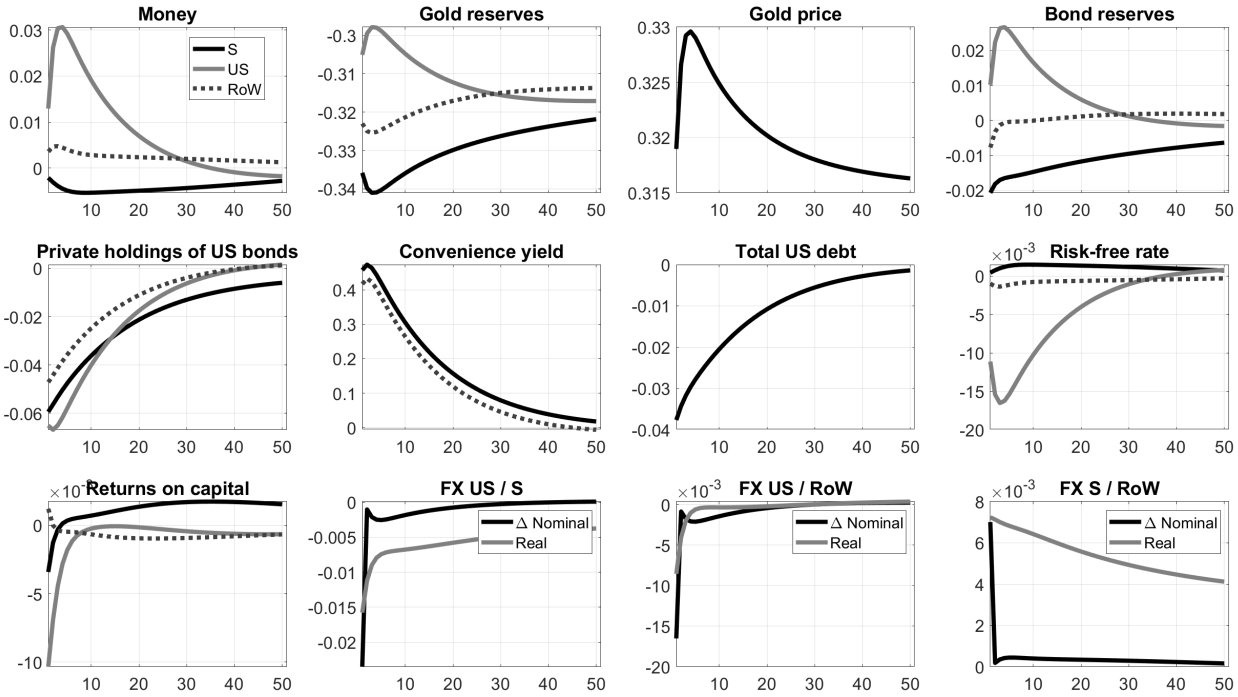


Figure D.12: Impact on financial variables of a seizure of gold reserves.

Notes: Impulse response for a 1% reduction in the gold reserve holdings of country S. All countries have equal weights, gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

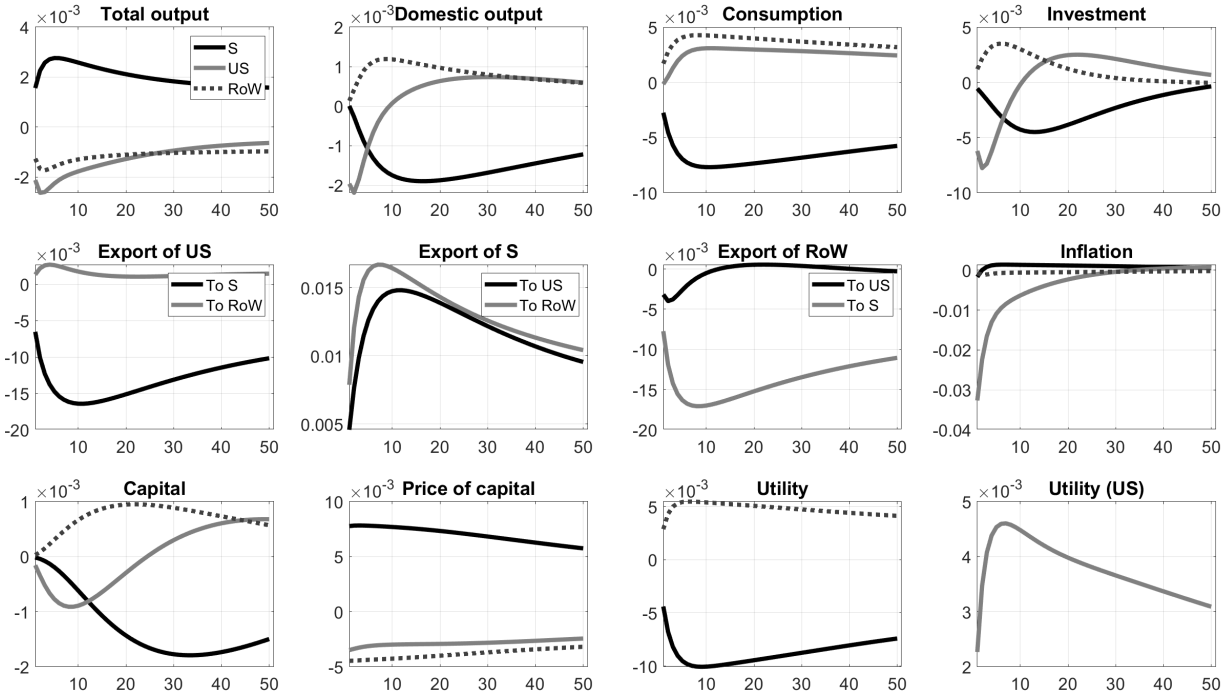


Figure D.13: Impact on real variables of a seizure of gold reserves.

Notes: Impulse response for a 1% reduction in the gold reserve holdings of country S. All country have equal weights, gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage poinst deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

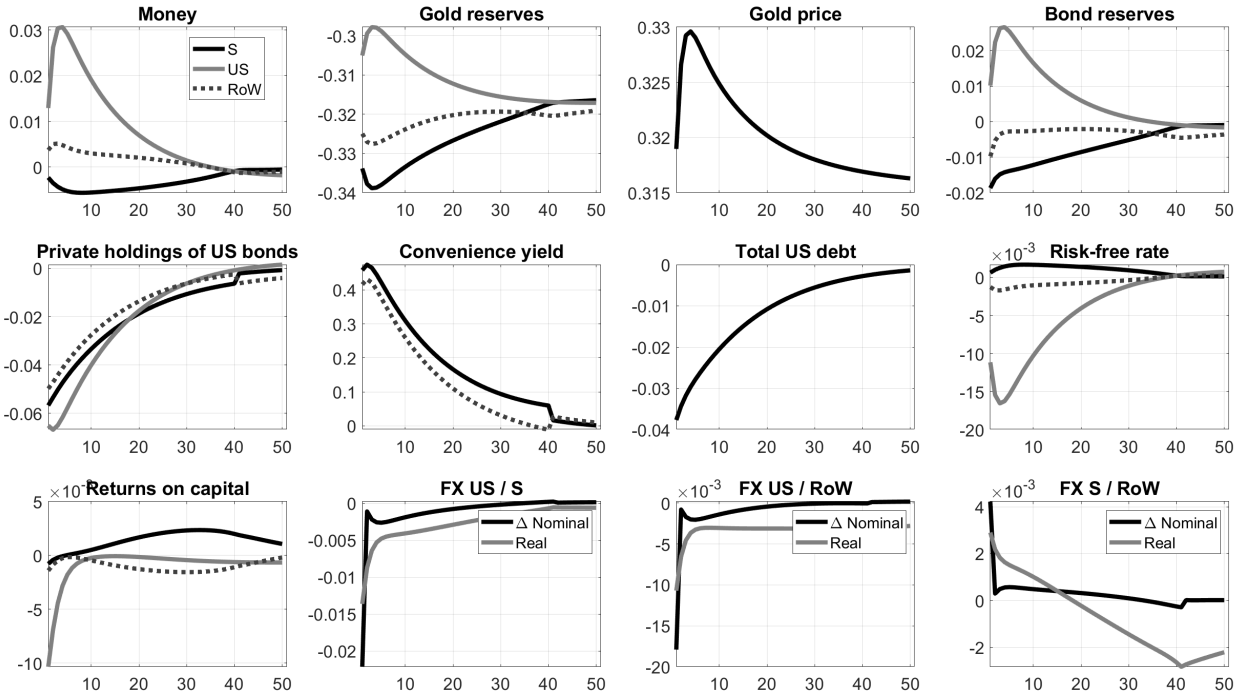


Figure D.14: Impact on financial variables of a freeze of gold reserves.

Notes: Impulse response for a 1% reduction in the gold reserve holdings of country S. All country have equal weights, gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive and gold is returned after 10 years (40 periods). Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

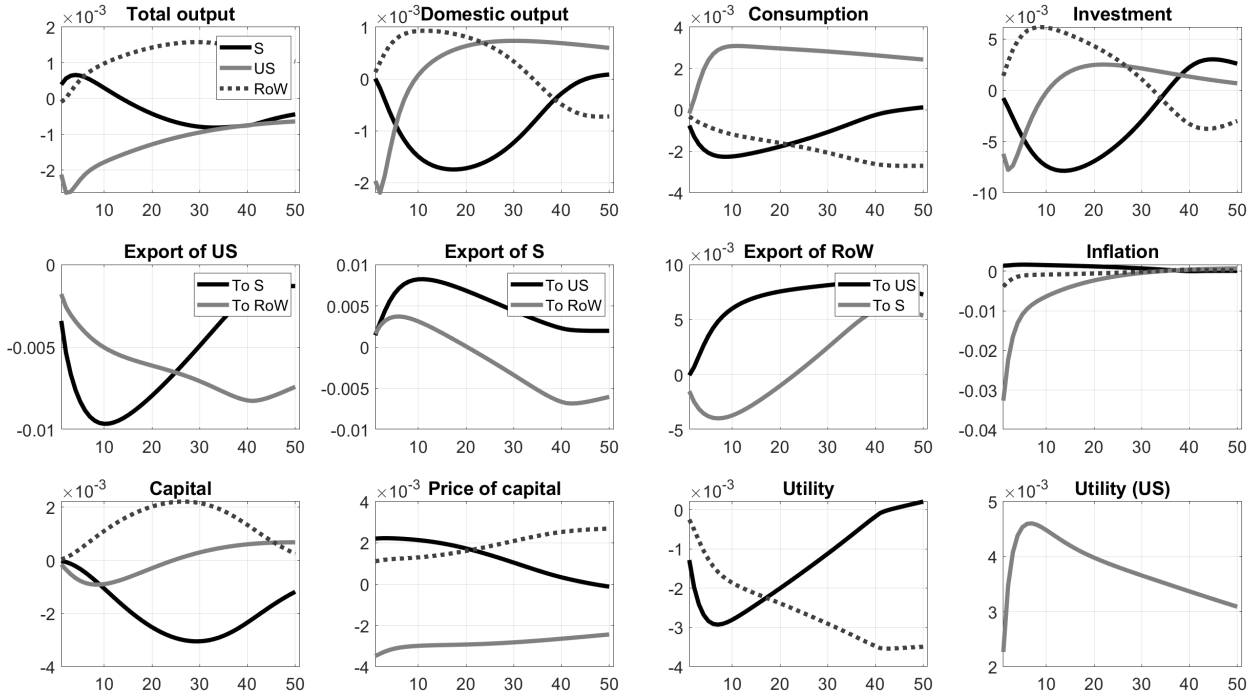


Figure D.15: Impact on real variables of a freeze of gold reserves.

Notes: Impulse response for a 1% reduction in the gold reserve holdings of country S. All country have equal weights, gold and bonds have equal weights in central bank reserves and γ_{CB}=2. The gold market is fully competitive and gold is returned after 10 years (40 periods). Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

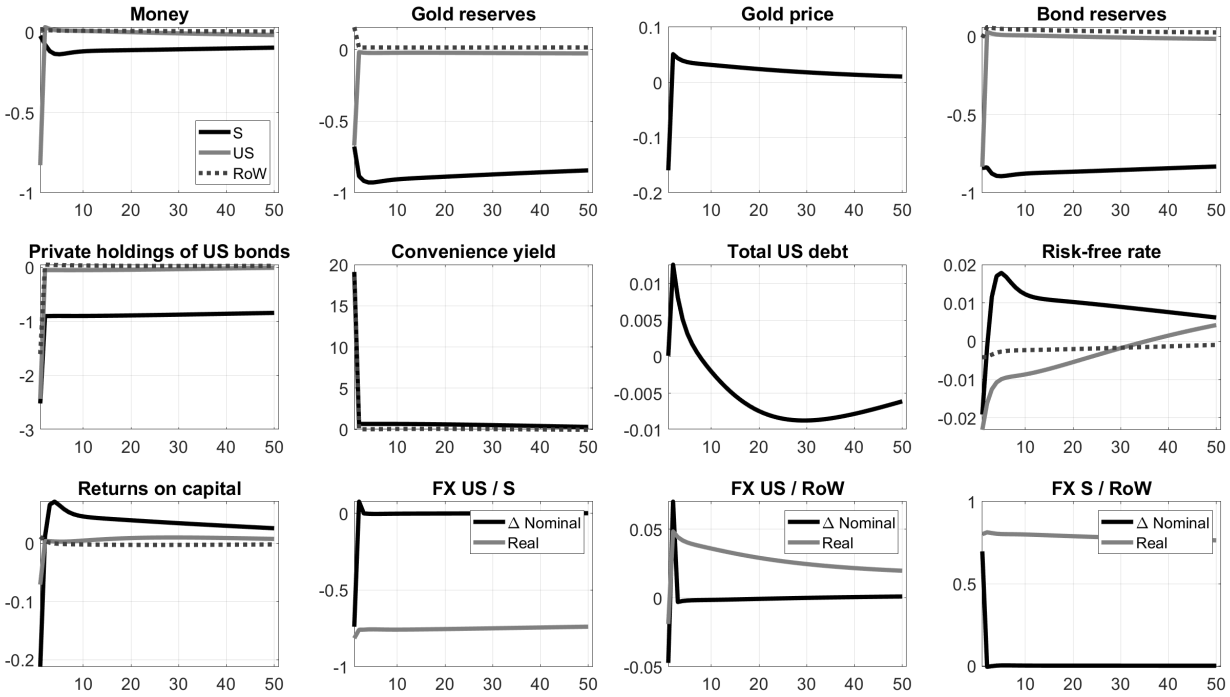


Figure D.16: Impact on financial variables of a seizure of today's Russia's foreign reserves.

Notes: Impulse response for a 50% seizure of the U.S. bond reserve holdings of Russia (country S). The U.S. accounts for 15% of the global output against 3% for Russia, γ_{CB}=2. Russia's foreign reserves are composed of 20% gold and 80% U.S. bonds. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

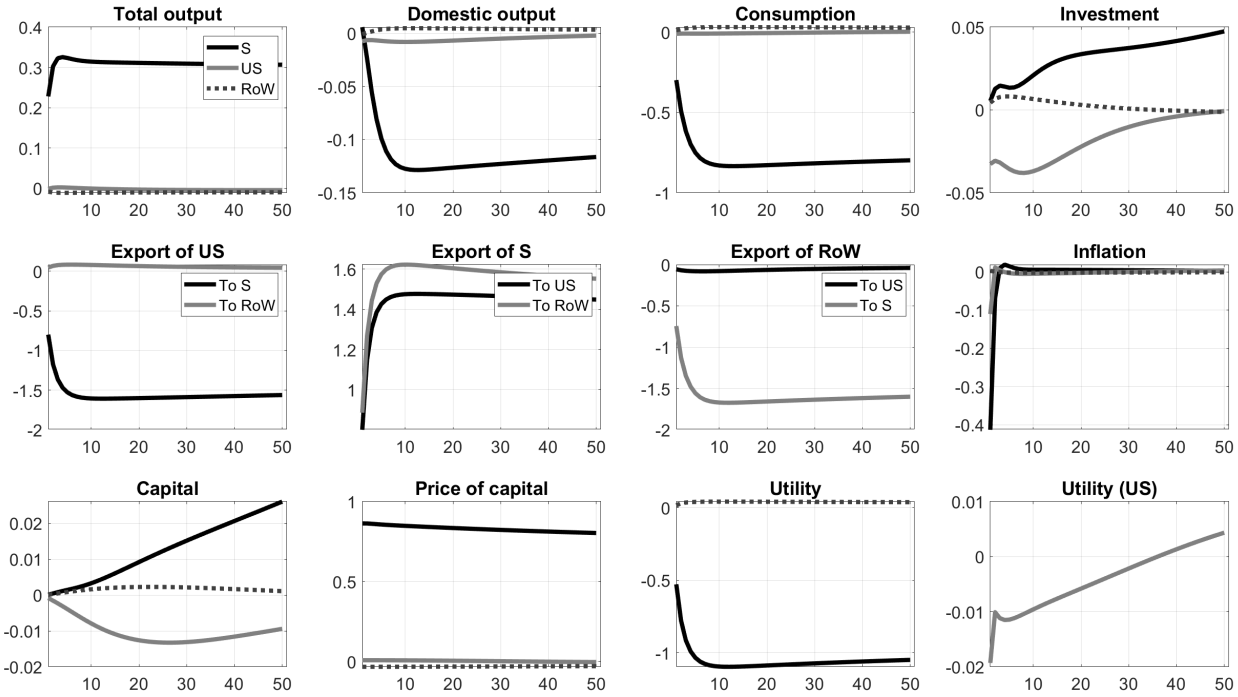


Figure D.17: Impact on real variables of a seizure of today's Russia's foreign reserves.

Notes: Impulse response for a 50% reduction in the U.S. bond reserve holdings of country S (Russia). The U.S. accounts for 15% of the world and Russia for 3%, γ_{CB}=2. Russia's foreign reserves are composed by gold for 20% and by assets for 80%. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

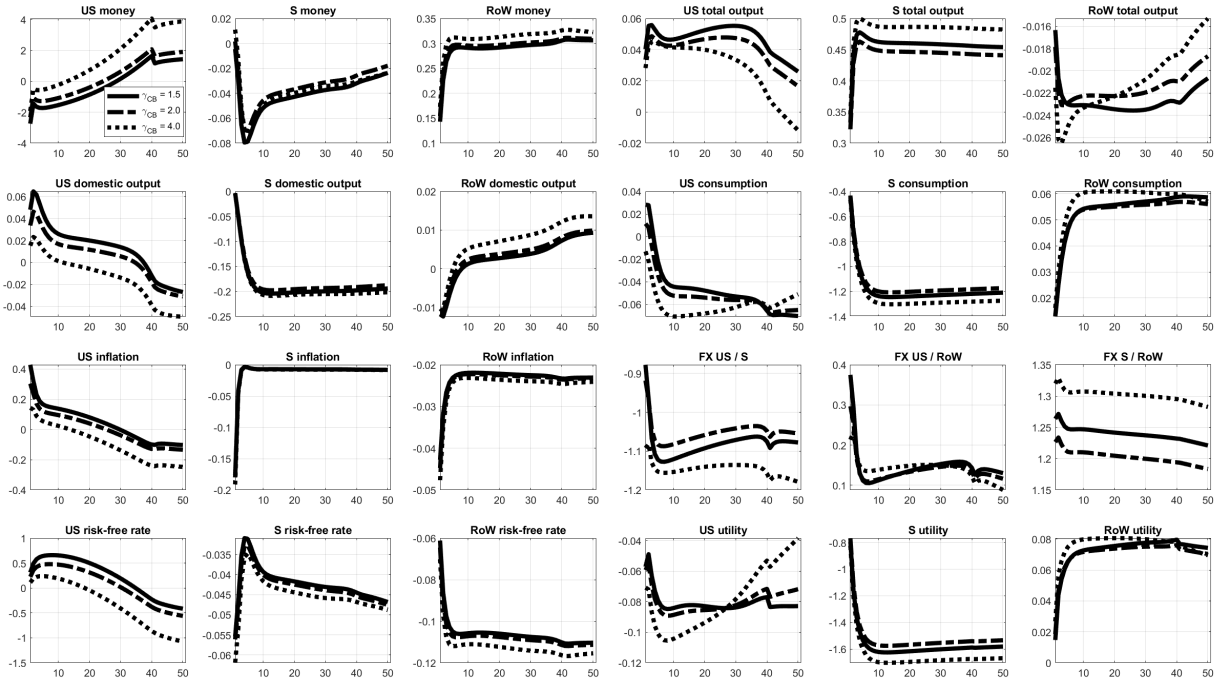


Figure D.18: Impact on real variables of a seizure of today's Russia's foreign reserves – sensitivity to γ_{CB}.

Notes: Impulse response for a 50% seizure of U.S. bond reserve holdings of Russia (country S). The U.S. accounts for 15% of the global output against 3% for Russia, γ_{CB} is set to 1.5, 2 and 4. Russia's foreign reserves are composed of 20% gold and 80% U.S. bonds. We further assume that Russia has restricted access to financial markets for 40 periods. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

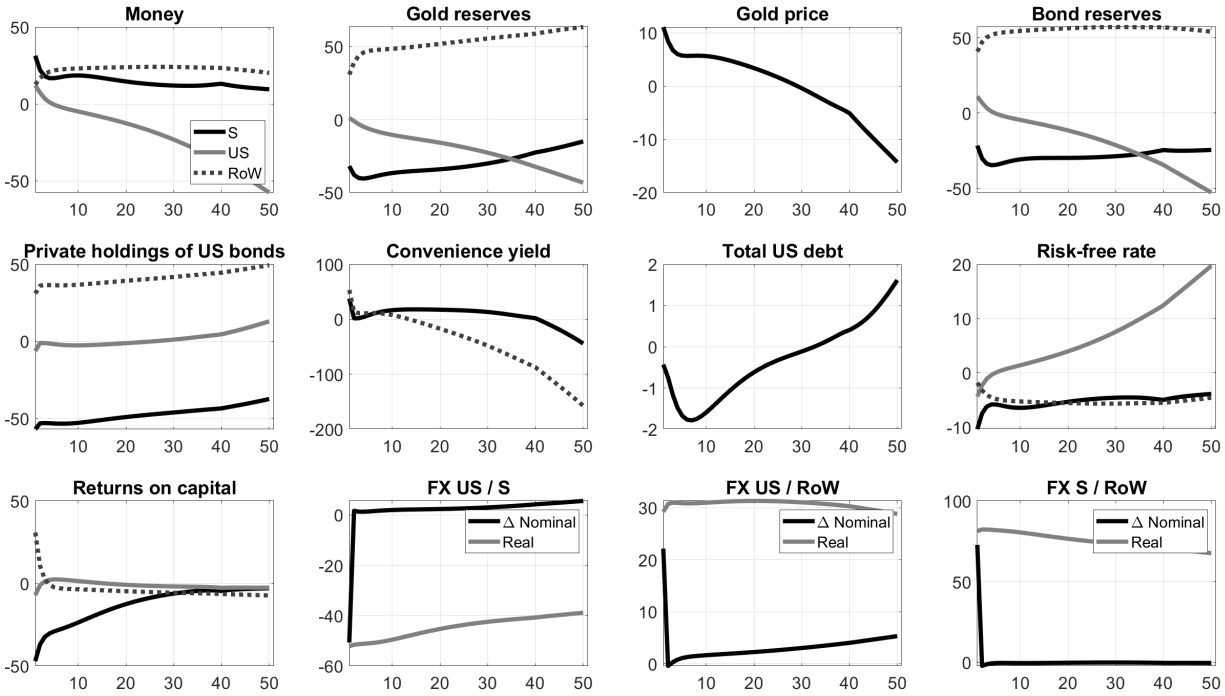


Figure D.19: Impact on financial variables of a seizure combined with trade sanctions.

Notes: Impulse response for a 20% seizure of the U.S. bond reserve holdings of country S jointly imposed with trade restriction (20% of trade between country S and the U.S. and 20% of imports of country S from RoW. All countries have equal weights; gold and bonds have equal weights in central bank reserves and $\gamma_{CB} = 2$. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

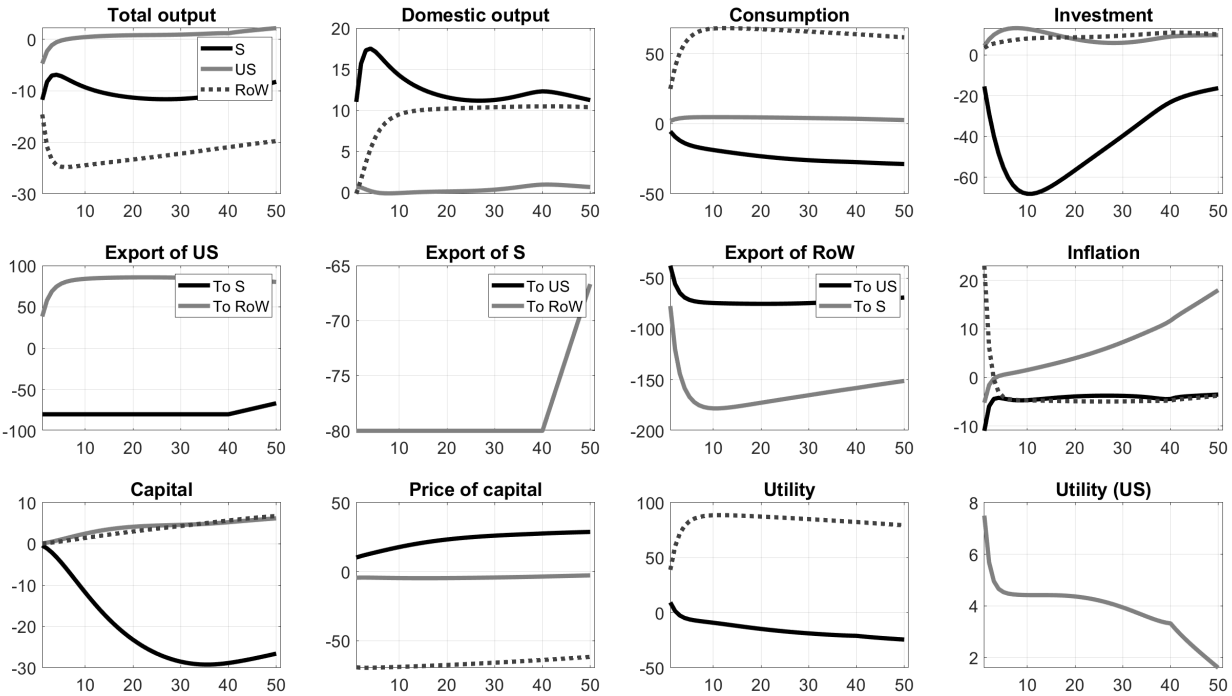


Figure D.20: Impact on real variables of a seizure combined with trade sanctions.

Notes: Impulse response for a 20% seizure of the U.S. bond reserve holdings of country S jointly imposed with trade restriction (20% of trade between country S and the U.S. and 20% of imports of country S from RoW. All countries have equal weights; gold and bonds have equal weights in central bank reserves and $\gamma_{CB} = 2$. The gold market is fully competitive. Simulations are obtained with global methods. The responses are reported in percentage points deviation from the steady-state. Interest rate and inflation rates are reported in annualized percentage points.

E Episodes of Asset Freezes

E.1 Freezes of Assets During World War I (1914-1921)

During the First World War there has been a stark reversal of policies in regard to the prohibition of trading with the enemy and the treatment of private property. Before the war, the predominant view in the Western world was against a prohibition of trading with the enemy and belligerent countries have abstained from the sequestration of enemies' property ever since the end of the American Civil War. The Hague Conventions actually prohibited the sequestration of private property even in war times. As a famous contemporary scholar in international law put it back then: "In 1914 when the European war began, probably no rule of international law had been more firmly established than that which protected from spoliation or confiscation private property within the jurisdiction owned by enemy nationals" (James A. Gathings (1940), introduction by Edwin Borchard).

On August 5, 1914 (one day after Great Britain declared war on Germany), the British Empire issued a royal proclamation relating to trading with the German Empire. The proclamation prohibited the supplying or obtaining of any goods to or from any person resident within the enemy country. The proclamation was extended to Austria-Hungary on August 12, 1914. The British Parliament then formally passed a full version of the so-called Trading with the Enemy Act (TWEA) on September 18, 1914. As noted by Mulder (2020), the August 5 proclamation "marked the start of not just an economic war of manoeuvre – the naval and commercial blockade of Central Powers – but also of what one might call an economic 'war of position' in the world economy." The TWEA focused on controlling German and Austro-Hungarian private property located in the British empire. By additional legislation and orders, the (private) property was sequestrated and placed under government 'controllers' in the form of custodians (the British Custodian of Enemy Property). The TWEA was applied to the entire British empire, including its colonies. According to some estimates, by early 1915, the Germans' possessed property in Great Britain was worth USD 0.5 billion (equivalent to about 3.7 percent of British 1915 GDP; see Mulder (2020), p. 85). In the beginning, the sequestration of enemy property had only the intention of preservation and avoiding that it enables the enemy to benefit their war efforts. However, by early 1916, anti-German sentiment grew amongst the British population and the government came under increasing political pressure to adopt more stringent measures. This led to the Trading with the Enemy Amendment Act of January 27, 1916, which finally gave the Board of Trade the power to liquidate sequestered enemy property and allocate the proceeds to the Public Trustee. According to Mulder (2020), the "TWEA was highly effective in confiscating the majority of German property in British and British-controlled territories worldwide." Canada also applied the British actions through their War Measures Act of 1914 and an order-in-council. As in the U.K., legislation was further tightened in 1916 to allow for liquidation of enemy property by the Secretary of State (Roberts-Moore (1986)).

France enacted somewhat similar laws. On September 27, 1914, a decree was issued which prohibited trading with the German Empire and Austria-Hungary. The decree was retroactive and affected all transactions after August 4, 1914 (in the case of the German Empire), and August 13, 1914 (in case of Austria-Hungary). In France, German property totaled little more than half the amount of such property in England (Potterf (1927)). The sequestrated property was not meant to be seized permanently. The function of custodians was "chiefly to conserve this property until the end of the war 'as an economic hostage' with the dual purpose of preventing its use to the disadvantage of the [...] national interest and to safeguard the interests of the [...] creditors" (Potterf (1927), p. 457). At the Paris Economic Conference of June

14-17, 1916, which led to the Paris Economy Pact, further legislation amongst Allies entailing more stringent measures (including liquidation) was endorsed with the attempt of a more co-ordinated effort of Allied Powers (Huberich (1917)). This notwithstanding, France apparently never decided to pass a respective law which enabled the seizure of enemy property (Lindner (1991)).

After the U.S. declaration of war against Germany (April 6, 1917), the U.S. followed its Allies and Congress passed a Trading with the Enemy Act of its own on October 6, 1917. The U.S. used the British TWEA as some sort of blueprint. As in Great Britain, sequestrated private property was placed under custodianship under the newly-created Alien Property Custodian (APC). Originally, the law only mandated the sequestration of property but over time (and as anti-German sentiment grew) an additional amendment to the TWEA from March 28, 1918, eventually allowed the APC to seize and liquidate private property. As Mulder (2020) states, "[b]y the summer of 1918 the APC had taken over more than USD 0.5 billion worth of German and Austro-Hungarian assets" and approximately one year later the stock of controlled assets stood at USD 0.7 billion (Mulder (2020), p. 88). By February 15, 1919, the APC actually claimed to have taken over "all known enemy property in the United States" (Potterf (1927), p. 469).

Germany reacted to these measures and started in September 1914 to enact a number of laws which "tended to assimilate the German law to the law prevailing in the United States and the principal Allied countries" (Huberich (1917), p. 653). In the beginning, an ordinance of November 26, 1914, provided only for the sequestration of enemy property while on July 31, 1916, provisions for liquidation were enacted (even though technically these would have been already possible under the 1914 legislation; (Lindner (1991))). In November 20, 1917, all these provisions were extended to property owned by citizens of the U.S. Apparently, however, comparatively little property in Germany was held by Americans (Potterf (1927)). Laws in Austria-Hungary closely followed the ones in the German Empire (Huberich (1918)).

Russia was the first country that passed a legislation allowing for liquidation of private property. While trading with the enemy was only prohibited from October 24, 1916, onwards, a law of January 11, 1915 and its amendment of May 10, 1915, allowed the sequestration and liquidation of enemy-owned commercial enterprises. On December 17, 1915, the legislation was extended to industrial companies, while a law of October 23, 1916, eventually allowed for liquidation of corporations (stock companies). After the Russian revolution, the Soviets extended the sequestration and liquidation of enemy property to all private property in their area of control. At the beginning of 1918, the Soviet government also repudiated all debt issued by the Tsarist government and decided to expropriate all assets of foreign nationals in Russia (as well as most of the assets of their own residents; see McMeekin (2009)).[62] Moreover, after Romania's military intervention in Bessarabia, the relations between Romania and Moscow were deteriorating, especially after a limited number of Romanian units had crossed the Pruth to chase away revolutionaries from Bessarabian villages. The latter prompted strong protest from the Soviet government to which Romania failed to respond. Apparently, this led Lenin to take drastic action on January 13, 1918. Among other measures such as the arrest of a Romanian envoy in Petrograd, the Soviets also seized the gold reserves of the National Bank of Romania (NBR) which were evacuated to Moscow at the end of 1916 (van Meurs (1994), pp. 63). At that time, Romania had just entered the war alongside the Allied Powers and soon ended up fighting

[62] Apparently, the British government retaliated by freezing about USD 330 million of gold reserves that Tsarist Russia had shipped to London during the war. However, according to McMeekin (2009), these gold shipments were meant to securitize arms purchases and thus appear to have been stored in London as some sort of collateral. Against this backdrop, we do not treat this episode as an asset freeze in our dataset as it rather appears to have been a contractual right of the U.K. to freeze the Russian gold they possessed (see also Denza and Poulsen (2023) for further details of the 1918 Soviet default and the highly complex sovereign debt dispute that lasted for almost a century).

on two war fronts. The NBR thus decided to relocate their gold reserves to a safe place and shipped their treasure to Moscow. The respective agreement signed with the Russian government stipulated that the Romanian valuables were "under the Russian Government's guarantee as regards the safety of shipment, the security of the deposit and the return to Romania".[63] Despite the seizure, Romania was hoping to eventually get their gold reserves back and the NBR continued to list the gold in Moscow as an item on their balance sheet until the Soviet occupation of Romania in August 1944.[64] Up until today, the issue remains unresolved and Romania has been bringing up the case repeatedly calling on Russia to return their gold holdings (e.g. at the time Russia was joining the Council of Europe). According to the NBR, a total of 91.48 tonnes of fine gold (about USD 55 million at 1918 prices; now worth about USD 5 billion) were deposited in Moscow.

After the war ended, the Treaty of Versailles was signed on June 28, 1919. It included provisions for 'the victors' complete discretion as to the disposal of sequestrated alien property. It made "Germany [to] assume the obligation of reimbursing her own nationals for the losses of their property abroad and the Allied and Associated Powers were authorized to compensate their nationals from the sequestered property."(Potterf (1927), pp. 469) The U.S. failed to sign the Treaty of Versailles but negotiated the German-American Treaty of Peace which was signed on August 25, 1921. Similarly to the Treaty of Versailles provisions, the U.S. retained all the property it had seized (Coates (2018)). The peace treaty actually provided "that the United States should keep all seized German property until such time as Germany should make 'suitable provision for the satisfaction of all claims against' the German Government." (Potterf (1927), p. 471) In the context of the Treaty of Brest-Litovsk the Soviets and Germany signed an additional agreement on August 27, 1918, in which the Soviets agreed to pay a compensation for German losses of property.

Sources: Huberich (1917), Huberich (1918), Zollmann (1923), Potterf (1927), James A. Gathings (1940), Roberts-Moore (1986), Lindner (1991), van Meurs (1994), McDermott (1997), McMeekin (2009), Coates (2018), Mulder (2020)

E.2 Freezes of Assets During World War II (1939-1945)

During the interwar period, many scholars (e.g. Borchard (1924)) criticized the widespread confiscation of private property during the First World War, as private property was originally deemed by many as inviolable under international law. These complaints had, however, little impact. In fact, World War II exhibited asset freezes on an even bigger scale. The freezing and confiscation of assets was also extended beyond private property and now also affected government property, including central bank assets (for instance, the British Trading With the Enemy Act 1939 now defined an 'enemy' also explicitly as 'any State or Sovereign of a State' instead of just 'any firm or person'[65]). The sequencing of implemented measures differed amongst countries, also depending on the time of formally entering war as well as on different objectives (e.g. asset freezes as a means of coercion or to protect occupied – but originally allied – countries' assets from falling into the enemy's hands). While Germany precipitated the war, the U.K. were the first to enact legislation concerning the treatment of enemy property.[66] They were subsequently followed by Germany (and later Italy and Japan) as well as by

[63] See NBR, "One century of the unfinished history of the NBR's Treasure in Moscow", https://bnr.ro/One-century-of-the-unfinished-history-of-the-NBR's-Treasure-in-Moscow-18935-Mobile.aspx.

[64] According to McMeekin (2009), Lenin decreed "that the reserves might be returned if the 'Romanian proletariat' ever came to power." In the early 1920s, the Soviets offered repeatedly their recognition of Romanian sovereignty in exchange for the confiscated gold reserves; a deal Romania refused to accept (van Meurs (1994), pp. 80).

[65] "Official Notice", The London Gazette, No. 29512, March 17, 1916, p. 2982.

[66] France issued a decree which allowed for the sequestration of enemy property on September 1, 1939, and hence two days before their declaration of war (Lindner (1991)). However, a few months later, large parts of France were under

Canada and the United States. Although neutral, also Brazil and Mexico promulgated legislation on the property and business of enemies after some of their ships were attacked by Nazi Germany.

United Kingdom: In the U.K., detailed planning for economic warfare, including legislation on the TWEA, was already in preparation for quite some time while work accelerated after 1933 (Foreign and Commonwealth Office (1998)). On September 3, 1939, a British ultimatum demanding that Germany withdraw its troops from Poland was issued and following its expiration Britain was again at war with Germany. The provisions of the Trading with the Enemy Act 1939 were ready for enactment and immediately came into effect. The U.K. then started to take control over German property. The TWEA provided that any debts due to enemies of the Crown were to be paid to a Custodian of Enemy Property appointed by the Board of Trade. The latter was given wide-ranging power to vest all enemy property (including bank balances and securities) in the Custodian. The intention was "to prohibit commercial or financial dealings with the enemy, and to preserve enemy assets in the U.K. in order to prevent the enemy from benefiting from them" (Foreign and Commonwealth Office (1998)). Contrary to the First World War, the 1939 TWEA in the U.K. not only targeted Germany (e.g. Mulder (2020)). The 'enemy territory' rather grew as the TWEA legislation was progressively extended to each country overrun by Nazi Germany (so-called 'technical enemies') as well as to other aggressors who joined Germany such as Italy (defined as 'belligerent enemies').[67] All these countries' residents' assets in the U.K. were then subject to the control of the Custodian of Enemy Property. The vested property was originally intended to be for preservation, not seizure and liquidation. However, as the war dragged on and the British financial situation worsened, implementation of the TWEA legislation was tightened with an amendment("Defence Regulation") to the TWEA passed on June 17, 1940. The legislation now allowed for a liquidation of enemy property and hence led to a sale of belligerent countries' property (mostly securities and currency) helping to finance the war efforts. Property of 'technical enemies' remained blocked but untouched. This different treatment of foreign property was maintained after the war came to an end. Various settlements with 'technical enemies' led to unblocking of their assets which were subsequently transferred to the respective citizens and governments. Property of 'belligerent enemies' was seized, however, and its treatment governed by reparations agreements (Potsdam and Paris reparations agreements in the case of Germany). The latter usually incorporated clauses that made belligerent governments responsible for compensating their own citizens for losses from racial or religious persecution (Foreign and Commonwealth Office (1998)).

Canada: On August 21, 1940, an order-in-council entitled "Consolidated Regulations respecting Trading with the Enemy (1939)" was enacted (Carroll (1943)). As a result, the Custodian of Enemy Property that was established in World War I started to take up its work again. According to Roberts-Moore (1986), the TWEA "not only included Germany and Italy as enemy countries, but expanded the prohibition on trade to include the German-occupied countries of the Netherlands, Belgium, Denmark, and Norway." On December 16, 1941, the legislation was further amended and Japan was added to the list of enemies. Apparently, the government decided to also vest and control property of all Japanese Canadians, even those Japanese that were born in Canada. The Bank of Canada, which was only founded in 1935, did

German occupation.

[67]More precisely on: September 3, 1939: Austria and Germany; September 8, 1939: Czechoslovakia; January 1, 1940: Poland (Western areas); April 4, 1940: Denmark; May 5, 1940: Luxembourg, Netherlands, and Norway; May 31, 1940: Belgium; June 11, 1940: Italy; June 24, 1940: France (occupied zone; July 10, 1940: unoccupied zone); July 19, 1940: Albania; February 2, 1941: Romania; March 3, 1941: Bulgaria; April 8, 1941: Hungary; April 18, 1941: Yugoslavia; April 30, 1941: Greece; June 29, 1941: Lithuania; July 7, 1941: Latvia; July 19, 1941: Poland (Eastern areas); August 2, 1941: Finland; October 28, 1941: Estonia; December 8, 1941: Japan; December 25, 1941: Hong Kong; May 9, 1942: Philippines; December 12, 1942: Thailand.

not hold a lot of reserves (gold) on behalf of foreign countries' central banks (so-called 'earmarked gold holdings'). The practice of earmarking gold at the Bank of Canada actually began in 1936 with the first account opened on behalf of the Bank of England (McDowall (1997)). While this account saw little activity in 1937, the Bank of England started to ship large amounts of gold to Ottawa in 1938 when the concerns about tensions in Europe started to mount. In early 1939, other European central banks – namely, those of Belgium, France, and Switzerland – also expressed interest in bringing their gold reserves to Ottawa where it could not fall into the hands of the enemy. While in the case of Belgium and Switzerland it remained an inquiry for the time being, France hurried to start shipping gold to Ottawa in April 1939. When Germany started its *blitzkrieg* in 1940, more earmark clients emerged quickly trying to protect their gold reserves from Germany's hands. The first were Norwegians, followed by the Polish central bank, the Netherlands, and the Banque Nationale de Belqique. In all these cases, the Bank of Canada protected the reserves from falling into Axis countries' hands, but made the gold finally available at the request of respective in-exile governments (McDowall (1997)). This was apparently different in the case of gold reserves earmarked for the Banque de France. The Allies saw France as an occupied country and the Vichy government as a puppet. This notwithstanding, the British government urged Canada to free the gold for the purpose of helping to finance the Allied war. Prime Minister King resisted this pressure and told the British government that "only in absolute dire circumstances could French gold be employed by the Allies" (McDowall (1997), p. 15). Canada insisted that the gold was covered by the passed legislation which stipulated that "all French assets domiciled in or controlled from Canada should be placed under the control of the custodian of enemy property" (McDowall (1997), p. 14). The gold reserves remained frozen until 1944 and returned when Banque de France had re-established herself in Paris.

Germany: On October 11, 1939, Germany issued a decree which subjected enemy property to the regime of its civil law. The decree – known as the curatorship-in-absence – was not a legislation that allowed for a broad-based sequestration of enemy property but rather provided for the appointment of a curator in case the persons legally authorized to represent the company/ enterprise were absent (Carroll (1943)). Eventually, a decree on the treatment of enemy property (similar to the one enacted in the U.K.) was issued on January 15, 1940. The decree provided for the appointment of administrators of enemy-owned or -dominated enterprises in Germany. Enemy-countries under the law were the U.K. and France (including their colonies and dominions) as well as Norway, Netherlands, Belgium, and Luxembourg. In 1941, it was extended to the Soviet Union and on April 9, 1942, to the United States (which by then had already amended their TWEA of 1917 authorizing the President to direct the vesting of enemy property). The amount of sequestrated assets in Germany were largest for the U.K. (around USD 352 million including colonies and dominions), followed by the U.S. (around USD 200 million), the Netherlands (USD 149 million) and France (USD 108 million including French colonies) (Lindner (1991), pp. 60). Until the end of the war, the German TWEA legislation never deviated from the pure enemy property preservation and hence did not contain provisions to liquidate. Apparently, there was an active debate in the German administration on this particular question which lasted from 1940-1943. After very intense negotiations, it was finally decided not to deviate from the principle of preservation. Hence, Germany never decided to liquidate or vest the sequestrated enemy property. The reason behind this decision seems to have been mainly rooted in a concern of retaliatory measures and resulting consequences for German property abroad (which was seen by many as being much larger than enemy property in the German territory). Many high-level government officials allegedly argued that in case Germany would lose the war, it would need to compensate Allied countries. If they would win the war, however, the property could easily been kept anyways. A similar debate ensued on how to deal with windfall profits of enemy-owned companies in Germany who

benefited from public war-related consumption/ expenses. Discussion focused inter alia on excess-profit taxes as well as on channeling the excess profits to a publicly-administered fund. In this debate, one of the main questions that again arose was how to avoid that any measure would constitute a seizure of property which the majority in the administration was eager to avoid given fears of retaliation (Lindner (1991)). A respective legislation was never passed. This notwithstanding, Germany took control of gold reserves in the countries it occupied. Even though attempts were made to make these measures appear to be legal and mutually agreed transactions (e.g. by "purchasing" the gold reserves in Reichsmark and handing over respective receipts), the seizure of occupied countries' gold reserves was actually what one would call looting. According to ICE (1998), the looted gold from the central banks of the Netherlands, Belgium, Luxembourg, Hungary, Greece, F.R. Yugoslavia, Albania, and Czechoslovakia amounted to around USD 0.5 billion. At the end of the war, Allied forces confiscated the German gold reserves and channeled it to the Tripartite Commission for the Restitution of Monetary Gold which was established in order to compensate Germany's victims and return the gold to its rightful owners.

United States: In response to Germany's invasion of Denmark and Norway on April 10, 1940, President Roosevelt invoked the TWEA and issued Executive Order 8389 to freeze their assets held in the U.S. to prevent the Nazis from making use of them. As during WWI, the Office of Alien Property Custodian (an office within the Department of Justice) served as a custodian to vested property.[68] As other countries were invaded or dominated by the Axis, freezing was successively extended to their assets during 1940 and the first half of 1941.[69] Mostly out of fear of retaliation as well as a possible further escalation of the war, the U.S. was initially reluctant to extend the the asset freeze to the aggressors Germany and Italy. Together with insufficient control of measures in place for other countries, this 'delay' allowed Germany and Italy to move most of their assets out of the U.S. (Polk (1941)). Eventually, the asset freeze was then extended to the aggressors Germany and Italy (on June 14, 1941), and, with the exception of Turkey, to the rest of Continental Europe and neutral countries. On July 26, 1941, the asset freeze was extended to Japan after its invasion of Indochina, and to China on the same day, at the request of General Chiang Kai-Shek. The 1941 freeze was extended to Thailand on December 9, and to Hong Kong on December 26, 1941. The total frozen holdings of foreign assets in the U.S. were estimated at around USD 7.5 billion. The vast majority of these assets (around 80 percent) was concentrated among the five countries Netherlands (22 percent), France (21 percent), Switzerland (20 percent), Belgium (10 percent), and Sweden (7 percent) (Polk (1941)). After the U.S. declared war on December 7 and 11, 1941, Congress approved the First War Powers Act (on December 18, 1941) which amended the TWEA of 1917 and granted the president vaster powers, including the ability to license, liquidate or sell foreign property (Coates (2018)) - something that the Custodian then presumably made use of. Apparently, "[t]he most important part of the Custodian's holdings consisted of more than 40,000 alien-owned patents and patent applications" Littauer (1943), including those belonging to non-enemies ('technical enemies'). How much of total frozen and vested assets were actually owned by governments and central banks seems difficult to tell. Some estimates put the respective share to about two-thirds of the total, while pointing to considerable heterogeneity of these proportions

[68]Foreign property was subject to either "freezing" or "vesting". The former involved "the prohibition of transfers of American property interests owned by a designated country or by its nationals, unless the transfer is licensed by the Treasury Department." The latter instead involved a transfer of title to the custodian "for positive use or direct management." (Littauer (1945))

[69]More precisely on: April 8, 1940: Norway and Denmark; May 10, 1940: The Netherlands, Belgium, and Luxembourg; June 17, 1940: France (including Monaco); July 10, 1940: Latvia, Estonia, and Lithuania; October 9, 1940: Romania; March 4, 1941: Bulgaria; March 13, 1941: Hungary; March 24, 1941: Yugoslavia; April 28, 1941: Greece; and June 14, 1941: Albania, Andorra, Austria, Czechoslovakia, Danzig, Finland, Germany, Italy, Liechtenstein, Poland, Portugal, San Marino, Spain, Sweden, Switzerland, and Union of Soviet Socialist Republics.

for different countries (Polk (1941)). Others question those numbers pointing to some information for France according to which government- and central bank-owned assets only made up a very small fraction of the total amount (Littauer (1945)). After the end of the war, former owners of seized and vested property from non-enemy countries had the right to seek return or compensation of their property under the TWEA subject to certain criteria (such as "being in the interest of the United States"). Apparently, return procedures were subject to certain discretion and at times criticized as "[...] uncoordinated efforts to rectify erroneous seizures and facilitate postwar readjustments " and "piecemeal approach" (Yale Law Journal (1953), p. 1234). For instance, negotiations with the newly-formed Socialist Federal Republic of Yugoslavia were protracted and involved multiple agreements regarding (pecuniary) claims of the U.S. and its nationals (e.g. in 1948 and 1964/65).[70] Property owned by former enemies was retained and sold and part of reparation payments agreed under respective peace treaties. Enemy countries had to compensate their citizens on their own.

Italy: About two weeks after the declaration of war on Britain and France, Italy on June 28, 1940, "[...]signed a decree governing control, sequestration, and liquidation of all industrial or commercial enterprises in the Kingdom of Italy operated or dominated by subjects of enemy States." (Carroll (1943), p. 613) The country was thus one of the first to allow for the seizure and liquidation of enemy property. In the Treaty of Paris between Italy and the Allied Powers of 1947 Italy accepted to undo the seizures of enemy property and to compensate all natural and juridical persons whose property was taken during the war. Moreover, Italy had to waive any of their claims against Allied and Associated Powers.

Japan: On December 22, 1941, Japan proclaimed and enforced the "Enemy Property Custoday Law" which foresaw severe controls on enemy property. The list of belligerents was long and included all Allied and Associated powers.[71] According to Ohira (1966) Japan's policy was initially only aimed at preservation of private property. As in other countries, this policy, however, gradually shifted towards confiscation. After the end of the war, Japan accepted the Potsdam declaration and committed to compensate their enemies for the measures taken during the war and immediately started with the return and restitution of Allied national property located in Japan. Total enemy property was estimated at JPY 456 million (about USD 106 million at the prevailing 1941 exchange rate).

Brazil and Mexico: While originally neutral, Brazil and Mexico issued decrees regarding the treatment of enemy property on March 11, 1942, and June 11, 1942, respectively, after Germany had attacked some of their ships. The legislation authorized that the property rights of German, Japanese, and Italian "physical or judicial persons" could be used to compensate the victims of German acts of aggression for their damage. While Germany was causing the initial damages, Italy and Japan were made jointly responsible through their alliances with Germany.

Sources: Borchard (1924), Polk (1941), Carroll (1943), Lourie (1943), Littauer (1943), Littauer (1945), US Treasury Department (1945), Yale Law Journal (1953), Jessup (1955), Ohira (1966), Roberts-Moore (1986), Lindner (1991), McDowall (1997), ICE (1998), Foreign and Commonwealth Office (1998), US Presidential Advisory Commission (2000), Coates (2018), Mulder (2020), Executive Order 8389 Protecting Funds of Victims of Aggression, April 10, 1940, https://www.presidency.ucsb.edu/documents/executive-order-8389-protecting-funds-victims-aggression, Executive Order 8785 Freezing the Assets of Certain European Countries, June 14, 1941, https://www.presidency.ucsb.edu/docume

[70]The agreement which entered into force on July 19, 1948, involved the issue of a license by the U.S. which unfroze the gold reserves of Yugoslavia (about USD 47 million) that were held at the Fed New York; see https://www.justice.gov/sites/default/files/pages/attachments/2014/08/05/yugoslavia_i.pdf.

[71]More specifically: U.S., U.K., Netherlands, France, Canada, India, Australia, New Zealand, South Africa, Belgium, Norway, Greece, Turkey, Syria, Lebanon, Pakistan, Argentina, Mexico, Philippines, and Chile.

nts/executive-order-8785-freezing-the-assets-certain-european-countries, Executive Order 8832, July 26, 1941, https://history.state.gov/historicaldocuments/frus1931-41v02/d185

E.3 Seizure of French Central Bank Assets by the U.S. (1941-1945)

Before the outbreak of World War II, the Polish Central Bank sent their gold in a long journey (via Istanbul and Beirut) to France and asked the Banque de France to evacuate the gold reserves to the U.S. German troops advanced more rapidly than expected on French territory and the gold which was supposed to be transported across the Atlantic ended up in West Africa (France only managed to evacuate their own gold). On June 22, 1940, France signed a truce agreement with Germany, which signified its de facto surrender. The local French authorities in Dakar recognized this act. In this situation, the Poles undertook diplomatic and legal efforts to regain control over their own gold resources but failed. General Charles de Gaulle's Free French movement (a political entity that claimed to be the legitimate (in-exile)-government of France after the Fall of France in WWII) tried to occupy Dakar (and promised to return the gold if he succeeds) but also failed. In what followed, the Poles then resorted to a judicial action and on September 3, 1941, filed a lawsuit against Banque de France at a U.S. court in New York. The court promptly seized a part of the French gold (with a value of USD 64 million) deposited in the Federal Reserve Bank in New York. In May 1942, the trial was suspended because due to the war Banque de France's attorneys were not able to represent it (a court's condition for setting a date for the hearing). At the same time, the Poles also signed a confidential memorandum with the representatives of the Free French movement (the Gaullists) in London on October 27, 1941. The memorandum provided for the return of the gold to Bank Polski. After the Allied Forces managed to invade North-West Africa (operation "Torch"), the issue was reopened, even though it was at first unclear whether the gold was still in Africa or already transported to Germany. It turned out, however, that Bank Polski's gold was indeed still located in the territory of French West Africa. The Gaullists conditioned the release of the gold "on the prior regulation of mutual relations on a national level, that is, the recognition of the French Committee of National Liberation by the Polish authorities" (NBP (2014)). On December 17, 1943, an agreement on the return of the gold to Bank Polski was concluded in Algiers and a few days later (on December 28) the New York court was informed by the Poles that both parties had agreed to terminate the lawsuit. In January 1944 in New York, the representatives of the central banks of Poland and France concluded a settlement agreement based on the Algiers agreement. As a result, on March 22 the court in New York closed the trial and lifted the seizure of Banque de France's gold (NBP (2014)).

A similar fate awaited also the gold of the Belgian central bank. In late 1939 and early 1940, also Belgiun entrusted the Banque de France with part of their gold reserves with a view to evacuate it to the U.S. Together with the Polish gold, also the Belgian gold ended up in West Africa at a port in Dakar. As the Polish in-exile officials, also Belgian officials were upset when they heard about the location of their gold reserves and asked France to return it. However, France at that time was under heavy pressure from Germany and just about to sign the Armistice of June 22, 1940. In this context, France agreed to deliver the Belgian gold to Nazi Germany (as an "atoning sacrifice" in the hope of Germany releasing some French prisoners). As a result, also Belgium went to the New York Court (already in February 1941) and received a writ of attachment of USD 260 million (Condlon (1941)). However, the lawsuit was never settled and it was not until April 1943 that the main hearing started. The court suspended the final decision because the war prevented the French from calling any witnesses or submitting any evidence. In April 1945, American troops found a large

part of looted German gold in a salt mine near the small Thueringian town of Merkers. As mentioned before, this gold was collected into the pool created by the Tripartite Commission for the Restitution of Monetary Gold. Also the Belgian central bank filed a claim for compensation and recovered around two-thirds of the gold which it had lost (Bultinck (2021)).

Sources: Condlon (1941), NBP (2014), Bultinck (2021).

E.4 Freezes of Baltic States' Central Bank Assets by the U.K. (1940-1992)

On July 13, 1940, after the occupation of the Baltic States by the USSR, the Baltic Central Banks asked for their gold held at the Bank of England (BoE) to be transfered to the Soviet Union. The Treasury told the BoE to reject this instruction and instead keep the gold in their vault. Following this incidence, on July 24, 1940, 2A of the Defence (Finance) Regulations came into force. The regulation was applicable to the Baltic States and empowered the Treasury "to prohibit payments or transfer of gold or securities when the instructions emanated from a state (e.g. the Baltic States) under pressure from another state or from any corporation controlled by such a state." (Foreign and Commonwealth Office (1998), p. 73) In response to this asset freeze, the USSR retaliated by suspending repayments to British holders of so-called Lena and Tetihue bonds which were issued in 1934 "as compensation for the nationalisation of the Lena gold mines and the Tetiuhe Mining Corporation after the 1917 revolution." (Foreign and Commonwealth Office (1998), p. 73) In the post-war period, the British government did not recognize the Soviet annexation of the Baltic States (at least not *de jure*) and this issue continued to be part of complex discussions between the Soviet Union and the U.K. about residual U.K. claims against the Soviet Union which arose from the 1917 Russian revolution (see also subsection E.2). Eventually, the British government decided in 1967 to sell the Baltic gold and apply the proceeds to a settlement of British claims under an Anglo-Soviet claims and financial agreement (Foreign and Commonwealth Office (1998), p. 54). After the fall of the Iron Curtain and the regained independence of the Baltic States in 1991, the question was reopened. In 1992-93, the British governnment decided to transfer gold "equal in quantity to that deposited with the BoE in 1940" back to Baltic Central Banks (Foreign and Commonwealth Office (1998), p. 58).

Sources: Foreign and Commonwealth Office (1998)

E.5 Confiscation of Czechoslovakia's Central Bank Assets by the U.K. (1940)

In December 1940, the British government and the Czechoslovak Government-in-exile signed a Financial Agreement which *inter alia* provided that the gold of the Czechoslovak National Bank should be sold by the Custodian and the sterling used for the prosecution of the Allied war effort. The Czechoslovak Government-in-exile indemnified the U.K. for any claims in respect of these assets (Foreign and Commonwealth Office (1998), p.81). The gold was estimated to have a value of around USD 27 million. In 1949, an agreement regarding compensation for British property rights and interests was reached under which the Czechoslovak government had to commit to a series of compensation payments. The final settlement agreements on certain outstanding claims were reached in 1982 and it was only by 1984 that Czechoslovakia was no longer been treated

as enemy territory.

The asset freeze was implemented already in 1939 after Germany's invasion of Czechoslovakia. Despite this fact, the Bank of England allowed for the transfer of gold in the amount of about USD 28 million which belonged to the Czechoslovak National Bank and was held in the Bank of England in the name of the Bank for International Settlements (BIS) to the ownership of the German Reichsbank. According to Blaazer (2005), the reason behind the Bank of England's decision to not prevent this transaction was that "[Governor] Norman's (and the other Bank officials') responses to the BIS were in strict accordance with the Bank's wider objectives, which, put simply, were to maintain and develop the mechanisms of international finance, more particularly, to maintain the Bank of England's (and sterling's) pivotal place within them."

Sources: Foreign and Commonwealth Office (1998), Blaazer (2005)

E.6 Asset Freeze of German Assets by Neutral Countries (1944)

When the end of the World War II seemed to come closer, the Allies were concerned about German assets in – or moving to – neutral (i.e. third-party) countries such as Spain, Portugal, Switzerland, Sweden, and Ireland. Against this backdrop, the U.S. (supported by U.K. and France) developed the Safehaven program. The objective was to immobilize and seize German assets abroad in order to make it impossible for Germany to start another war and to ensure that German assets would be available for postwar reparations and reconstruction of Europe. The program was formally launched at the United Nations Monetary and Financial Conference at Bretton Woods in 1944 where the Bretton Woods Resolution VI was passed. The resolution called for "[...] immediate measures by neutral nations to prevent any disposition, transfer, or concealment of looted gold or other assets from the occupied nations of Europe" (Slany (1997)). In August and September 1944, U.S. embassies throughout Europe (and the Americas) were tasked with taking steps to implement the operation. The idea was that the neutral — third-party – countries immediately immobilize all German assets (including the looted gold which supposedly had been used by Germans to pay for the trade with these countries) and conduct a detailed census of all the German assets in their jurisdiction (including on gold coming from Germany). After the war had ended, the neutral countries were then supposed to seize all the assets and make them available for reparation and reconstruction efforts of the Allies (Lorenz-Meyer (2007)).

The U.S. was determined to use all their diplomatic and economic power to pressure the neutral countries to immediately implement respective legislation and take action. In August and October 1944, and hence already before the final end of the war marked by Germany's unconditional surrender on May 7, 1945, the Allies started to send notes to the prominent neutral powers (i.e. Argentina, Ireland, Portugal, Spain, Sweden, Switzerland, and Turkey).[72] All those countries were reluctant highlighting their neutrality, but Allied countries tried to increase their pressure (sometimes considering to even threaten with the imposition of economic and financial sanctions). The first neutral country which agreed to immobilize German assets in their jurisdiction (and conduct a census) was Switzerland on February 17, 1945. This was a result of the fact that the Allied countries focused their efforts on advancing negotiations with the Swiss authorities, given that Switzerland was one of the most important Safehaven countries; about 70 percent of all German external assets in European neutral countries were estimated to be in Switzerland (Zabludoff (2001)). Shortly before the end of the war on May 5, 1945, Spain issued a decree law implementing measures to freeze and immobilize all assets with Axis interests (the law

[72] Note that Turkey abandoned its neutrality shortly before the end of the war (i.e. in February 1945).

was ratified by the Government in July). Portugal resisted the Allied pressure as long as the war was ongoing but issued a respective decree law a week after the German surrender on May 14, 1945. By the summer of 1945, also Sweden passed a series of decrees to control German property and started to include all types of German property into their census. Turkey informed the Allies in late 1946 that they had taken necessary measures to protect German assets (Slany (1997), p.143). The Irish authorities resisted the Allied demands for years insisting on their neutrality but also pointing to the fact that German assets in their jurisdiction were negligibly small. Finally, a respective agreement was reached in August 1948, even though this was largely symbolic and no assets have been transferred to Allied countries (Hale (2009)). Argentina resisted Allied wartime demands and by 1947 it was concluded to not further pursue respective negotiations given that "German assets were not identifiable by the Argentine Government and no looted gold had reached Buenos Aires" (Slany (1997), p. xxxi). The amounts of German assets that U.S. officials estimated to be in these countries were sizable, even though neutral countries conceded that they were far too high. Estimates of German external assets in Switzerland ranged from USD 250 million to USD 750 million, of which USD 300 million was looted gold that the Swiss had acquired during the war. The Swiss authorities presented estimates in the range of about USD 250 million. In Spain, Allies suspected about USD 30 million in gold and between USD 30 million to USD 39 million of other assets. Private and state assets in Portugal were assumed to be about USD 20 million while monetary goold was estimated to be in the range of USD 105 million to 137 USD million. Looted gold in Sweden was estimated at about USD 17 million, other assets amounted to about USD 66 million. Allied estimates of German assets in Turkey amounted to USD 44 million and USD 5 million of looted gold. Negotiations to find agreements about the amount that neutral countries had to transfer to the Allies for distribution by the Inter-Allied Reparations Agency, the International Refugee Organization, or the Tripartite Gold Pool dragged on for years, sometimes even decades. Final amounts ultimately transferred were relatively small, given that the neutral countries demanded to keep most of the liquidation proceeds as their own compensation for outstanding claims vis-à-vis Germany or denied the presence of large amounts of assets altogether. Over time, other political considerations in the context of the Cold War became more pressing such that incomplete negotiations started to become diluted and largely symbolic of nature (e.g. Portugal) while some negotiated agreements were never fully implemented (e.g. Turkey). In the end, only a fraction of the liquidated German assets were actually transferred for the purpose of reconstruction and reparation for occupied nations.[73]

Apart from complex political negotiations, the Safehaven program was also facing a lot of legal difficulties. For instance, complications arose from international law caused by the Allied plan to expropriate German assets in the neutral countries as reparations. While even heavily debated amongst Allied countries themselves, the U.S. eventually prevailed by pushing for the issuance of a vesting decree to be sent to neutral countries on behalf of the Allied Control Council (Law No. 5). The decree was finally issued in November 1945. The legality of such a measure and the viability of such an assertion under international law were strenuously debated. Such a policy had never before been realized. As Lorenz-Meyer (2007) has put it: "The legal claim to these assets that the Allies – and again, primarily the United States – put forth when they approached the neutral countries caused tremendous and continuing complications and was, despite much argument by the

[73]Switzerland paid USD 58 million of monetary gold and USD 28 million of other assets. Sweden returned about USD 66.5 million of private and state assets and USD 15 million of gold. Spain transferred USD 0.12 million of gold and about USD 36 million from the liquidation of German assets. While Turkey agreed to settle the issue of gold for USD 1 million, no gold was ever returned. Portugal finally returned slightly more than USD 4 million of gold in October 1959. However, this only came after Germany agreed to pay Portugal USD 132.5 million for the gold it would turn over to the Tripartite Gold Commission also with a view to setlle former Portuguese claims (Slany (1997), p. 137).

United States to the contrary, never recognized."

Sources: Slany (1997), Lorenz-Meyer (2007), Hale (2009)

E.7 China (1950-1979)

On December 17, 1950, when the People's Republic of China (PRC) intervened in the Korean War, President Truman invoked the TWEA and blocked all assets of "Chinese nationals" subject to U.S. jurisdiction. At the same time, the Division of Foreign Assets Control (the predecessor of what finally became the Office of Foreign Assets Control (OFAC) on October 15, 1962) was established by a Treasury Department order. Initially, the blocking order also included assets belonging to citizens of Taiwan, even though this was changed later on once the U.S. non-recognition policy of the PRC became clear. Taiwanese nationals were then allowed to obtain their assets while those assets considered to belong to "Chinese nationals" remained blocked. In some cases, the ownership of certain assets was subject to dispute. The OFAC was charged with ruling on any application of unblocking certain assets. Especially assets of Chinese government agencies deposited in the U.S. involved complex decisions. Insofar as OFAC considered those assets to belong to the Republic of China government (which the U.S. still recognized as the legitimate government of China), the funds were awarded (Lee (1975), pp. 258). The amount of (initially) frozen Chinese assets amounted to about USD 192 million. After unblocking assets not belonging to PRC, still about USD 76.5 million remained blocked in 1970 (Lee (1975), p. 263). After a policy of non-recognition of the PRC for more than a quarter century, U.S.-China relations eventually improved and on May 11, 1979, the U.S. China Claims Agreement was signed. The PRC committed to pay to the U.S. a full and final settlement of USD 80.5 million. The U.S. government in turn agreed to unblock all Chinese assets by October 1, 1979.

Sources: Lee (1975), Code of Federal Regulations: Foreign Assets Control Regulations, 31 C.F.R. (1973), https://www.loc.gov/item/cfr1973074-T31CVP500/, U.S. China Claims Agreement, May 11, 1979, https://www.justice.gov/sites/default/files/pages/attachments/2014/06/27/china_as.pdf

E.8 North Korea (1950)

The U.S. sanctions imposed on North Korea also date back to the year 1950. Throughout the years, they have been imposed for a variety of reasons such as North Korea's support of international terrorism, its maintenance of a communist, non-market economy, the proliferation of weapons of mass destruction, and currency counterfeiting and money laundering. On December 17, 1950, President Truman invoked the TWEA and (amongst other measures) blocked all North Korean assets subject to U.S. jurisdiction (together with the asset freeze imposed on China). The asset freeze was laid out in the Foreign Assets Control Regulations (FACR) that were established and authorized under the TWEA. Since then, there have been numerous modifications to the Korea-related FACR to take into consideration new circumstances (i.e. transactions relating to technology not in existence at the time the regulations were issued) or to ease restrictions in response to changing conditions such as an announced moratorium on missile testing (Rennack (2006)). Hence, while regulations continue to forbid transactions with North Korea, several exceptions have been issued over the last several decades. For instance, after South Korea joined the Nuclear Non–Proliferation Treaty (NPT) on April 25, 1975, the U.S. Treasury issued additional Foreign Assets Control Regulations that unblocked assets of North Koreans who emigrated and established U.S. residency

in the following year (41 F.R. 16554). The move was meant to serve as a conciliatory measure. The 80s and 90s were marked by several developments on the issue of nuclear weapons and respective efforts by the U.S. to make North Korea sign the Nuclear Non-Proliferation Treaty – which it eventually did in 1985 – and stick to its commitments made. After several missile tests and failures to comply with the NPT, North Korea pledged to pause long-range missile tests in 1999 which led to the first significant easing of sanctions since the 50s. However, on April 6, 2000, the U.S. imposed again new sanctions against a North Korean firm, Changgwang Sinyong Corporation, for having exported missile systems to Iran. After George W. Bush took office in 2001, the new U.S. administration launched a complete overhaul of the North Korea policy. In what followed, the U.S. hardened their position against North Korea and imposed several additional sanctions. These sanctions failed, however, to prevent North Korea from continuing to pursue their Nuclear weapons program.

Until the early 2000s the U.S. imposed sanctions on North Korea only unilaterally. In 2004, however, North Korea caused international outcry by testing and firing several missiles, some of which failed and fell into the Sea of Japan where several fishing vessels from South Korea, Japan, and Russia were close and not notified by North Korea (as opposed to their own fishing vessels). On July 15, 2004, the U.N. Security Council (UNSC) adopted Resolution 1540 which required U.N. members not to supply to North Korea "anything related to North Korea's programs on missiles and weapons of mass destruction" (Chang (2006), p. 134).[74] After the beginning of North Korea's nuclear weapons tests in 2006, the Security Council started to adopt additional resolutions. Resolution 1718 adopted on October 14, 2006, contained an asset freeze on persons involved in the nuclear program. In addition to their unilateral sanctions, the U.S. also participated in international sanctions required by the UNSC.

The sanctions imposed on North Korea since 1950 were based on the TWEA[75] where the President is required to annually make a determination that the country poses a threat to national security. On June 26, 2008, President George W. Bush removed North Korea from the list of state sponsors of terrorism, and terminated the exercise of authorities based on authorities derived from the terrorism designation or those under the Trading With the Enemy Act. At the same time, the President found that maintaining certain restrictions was necessary but "replaced those with more circumscribed economic restrictions related to proliferation concerns" (CRS (2023a)). By means of Executive Order 13466 of June 26, 2008, the President changed the underlying legislative foundation of the sanctions by declaring a national emergency with respect to North Korea pursuant to the International Emergency and Economic Powers Act (IEEPA). The IEEPA was enacted in 1977 to clarify and restrict presidential power offered by the 1917 TWEA and to prohibit the declaration of national emergencies originating domestically.[76] A series of additional executive orders followed subsequently with a view to take additional steps against North Korea and complement existing restrictions. Up until now, North Korean assets under U.S. jurisdiction of designated individuals and entities (including the Central Bank of the Democratic People's Republic of Korea) remain frozen.

Sources: Chang (2006), Rennack (2006), CRS (2023a), Code of Federal Regulations: Foreign Assets Control Regulations, 31 C.F.R. (1973), https://www.loc.gov/item/cfr1973074-T31CVP500/, Executive Order 13466 Continuing

[74]The United Nations accepted both South Korea and North Korea as members only on September 18, 1991.

[75]Note that other relevant legislation was added over the course of the second half of the twentieth century such as the Export Administration Act of 1979 under which North Korea was branded as a terrorist state (Chang (2006))

[76]One example was President Nixon's order of an extra 10 percent tariff be levied on all dutiable imports after he directed the suspension of the dollar's convertibility into gold. The order was based on the 1917 TWEA and the declaration that the economic and fiscal situation represented a threat to national security (Irwin (2013)).

Certain Restrictions With Respect to North Korea and North Korean Nationals, June 26, 2008, https://www.federalregister.gov/documents/2008/06/27/08-1399/continuing-certain-restrictions-with-respect-to-north-korea-and-north-korean-nationals, Executive Order 13551 Blocking Property of Certain Persons With Respect to North Korea, August 30, 2010, https://www.govinfo.gov/link/cpd/executiveorder/13551, Executive Order 13570 Prohibiting Certain Transactions with Respect to North Korea, April 18, 2011, https://obamawhitehouse.archives.gov/the-press-office/2011/04/18/executive-order-13570-prohibiting-certain-transactions-respect-north-kor, Executive Order 13678 Imposing Additional Sanctions With Respect to North Korea, January 2, 2015, https://www.govinfo.gov/link/cpd/executiveorder/13687, Executive Order 13722 Blocking Property of the Government of North Korea and the Workers' Party of Korea, and Prohibiting Certain Transactions With Respect to North Korea, March 15, 2016, https://www.presidency.ucsb.edu/documents/executive-order-13722-blocking-property-the-government-north-korea-and-the-workers-party, Executive Order 13810 Imposing Additional Sanctions With Respect To North Korea, September 20, 2017, https://www.govinfo.gov/link/cpd/executiveorder/13810

E.9 Egypt (1956-1959)

After the nationalization of the Suez Canal Company by the Egyptian President Nasser on July 26, 1956, France and the U.K. reacted immediately (between July 28 and August 1, 1956) by freezing all assets belonging to Egypt and the Canal which were located in their jurisdictions (including Egyptian assets in the central banks of France and U.K. (Richardson (1992)).[77] The U.K. tried to convince the U.S. administration to join their efforts and also exert pressure on the Nasser government. Despite its reluctance, the U.S. followed and issued the Egyptian Assets Control Regulations on July 31, 1956, which blocked all transactions involving property in which Egypt, or the Suez Canal Company, had any interest which effectively also froze all assets of the Egyptian government and the Suez Canal Company under U.S. jurisdiction. The amount of frozen assets was estimated at about USD 420 million in the U.K. and USD 50 million in the U.S. (Domke (1957), p. 1039)). From the beginning, though, the U.S. was skeptical about imposing tough sanctions and opposed the military action by France, U.K., and Isreal in autumn 1956 (Richardson (1992)). Apparently, the U.S. State Department always insisted that the assets had only been frozen as a precaution for potential litigation risks stemming from the possibility that U.S. shippers, after paying Suez tolls to Egypt, might later learn that the tolls were legally owed to the old Suez Co.[78]

The military operation in Egypt only lasted a couple of months and on November 2, the U.N. General Assembly overwhelmingly approved a U.S. resolution calling for a cease-fire and withdrawal of forces. The U.S. also exerted immense financial pressure especially on the U.K. whose foreign exchange reserves were declining rapidly posing a growing threat to the Sterling. One of the ways in which the U.S. tried to push the U.K. to withdraw their troops and reaching a settlement with Egypt was by blocking access to IMF credit and preventing U.K. from using U.S. government securities as collateral against new commercial borrowing (Boughton (2001b)). It has even been purported that President Eisenhower

[77] Exchange Control (Payments) (Egyptian Monetary Area) Order, 1956, and Exchange Control Order, and Control of Gold and Securities (Suez Canal Company) Direction, 1956, S.I. 1956. No. 1164 (see Domke (1957)). After the U.K. and France also took military action, the Egyptian government apparently retaliated in November 1956 inter alia by implementing measures of sequestration of assets affecting individuals and corporate entities of British and French nationality (Domke (1957), p. 1039).

[78] See The Time, "Suez: Paying for the Canal", May 5, 1958, https://content.time.com/time/subscriber/article/0,33009,863324,00.html.

was threatening to dump U.S.' holdings of Sterling bonds unless the U.K. withdrew from the Suez (Katz (2013)). Given a lack of alternatives, the U.K. weighed in and agreed to a full troop withdrawal in December.

Eventually, the Anglo-Egyptian Financial Agreement was agreed on February 28, 1959. The agreement settled their respective financial claims where the United Arab Republic (a political union between Egypt and Syria) accepted to pay compensation for Egyptianized property and restore other frozen assets. The U.K. government in turn agreed to unfreeze blocked Sterling balances. Once an agreement was reached, the U.S. followed suit.

Sources: Domke (1957), Richardson (1992), Boughton (2001b), Hufbauer et al. (2009), Katz (2013), Egyptian Assets Control Regulations, July 31, 1956, https://fraser.stlouisfed.org/title/federal-reserve-bank-new-york-circulars-466/4354-egyptian-assets-control-regulations-11814, Anglo-Egyptian Financial Agreement, February 28, 1959, https://hansard.parliament.uk/Commons/1959-03-02/debates/b9f48cac-4c99-4304-8d4c-12be34a0304a/Anglo-EgyptianFinancialAgreement

E.10 Cuba (1963)

After the Cuban Revolution and deteriorating Cuban-U.S.-relations marked by an expropriation of U.S. assets by the Cuban government as well as a U.S. trade embargo on Cuba, on July 8, 1963, President John F. Kennedy invoked the TWEA and froze all Cuban assets in the U.S. (then through the Cuban Assets Control Regulations, 31 CFR part 515). The total amount of frozen assets (including those of the Banco Nacional de Cuba) is estimated at about USD 33 million (Hufbauer et al. (2009)). According to other estimates (see Mulder (2024b)), the total amount of assets frozen amounted to USD 148.8 million of which USD 19.6 million were government assets. The order also transferred the enforcement of the Cuban sanctions from the Department of Commerce to the Treasury Department (Hufbauer et al. (2009)). The Department of the Treasury's Office of Foreign Assets Control (OFAC) has amended the Regulations on numerous occasions. The initial purpose of sanctions was to destabilize the Castro regime and eventually help its overthrow. Despite repeated resolutions passed by the U.N. General Assembly in the past decades calling for an end to the U.S. embargo against Cuba, sanctions on Cuba – including the asset freeze of 1963 – are still in place up to this day.

Sources: Hufbauer et al. (2009), Mulder (2024b), Cuban Assets Control Regulations, July 9, 1963, https://www.ecfr.gov/current/title-31/subtitle-B/chapter-V/part-515

E.11 Vietnam (1964-1994)

On May 5, 1964, the U.S. imposed a complete trade embargo on Communist North Vietnam and added North Vietnam to the list of countries to which the Foreign Assets Control Regulations (issued in 1950 in the context of the asset freeze on China and North Korea) apply. Hence, all government and privately owned assets of North Vietnam were frozen. After the fall of Saigon to Communist forces, South Vietnam was added to the list on April 17, 1975. Apparently, the vast majority of Vietnamese assets located in U.S. jurisdiction and hence subject to the asset freeze belonged to (former) South Vietnam. Originally, they amounted to USD 79 million (Hufbauer et al. (2009)). About 94 percent of those assets were held by some U.S. commercial banks and the Federal Reserve Bank of New York on behalf of the National Bank of Vietnam which used to be the central bank of the Republic of Vietnam (Leich and Vassar (1990)). As of early 1988, the blocked

assets already totaled over USD 218 million as interest on these assets had accrued over time. The Foreign Assets Control Regulations granted U.S. holders of blocked deposits the "[...] permission to act upon the directions of foreign account parties if the deposits remain blocked at domestic U.S. banks, the ultimate beneficial owners are not changed, and the assets are handled in a sound fiduciary manner" (Leich and Vassar (1990), p. 543). Hence, the funds were invested in time deposits, T-bills, and renewable two-year World Bank debt securities (Leich and Vassar (1990), p. 544). The asset freeze remained in place for two decades also given that in January 1979 Vietnamese forces invaded Kampuchea (Cambodia). It was only in September 1989 that Vietnam withdrew its last troops. This marked a turning point in U.S.-Vietnamese relations and culminated in February 1994 when President Clinton lifted the U.S. embargo against Vietnam (and hence unfroze the blocked assets).

Right after the withdrawal of Vietnamese troops from Kampuchea (and before the lifting of sanctions), the U.S. Congress discussed a bill which would have allowed for the seizure of Vietnamese assets in order to reimburse U.S. nationals which held claims against Vietnam. However, this bill was never passed. At a hearing on this bill on November 17, 1989, Richard Newcomb, the Director of the Office of Foreign Assets Control (OFAC) at the Department of the Treasury, strongly advocated against the seizure of blocked assets. He warned that such a measure would be a permanent – non-reversible – transfer of title and counter to the objective of facilitating an eventual claims settlement. Moreover, he cautioned that "a unilateral vesting of blocked property could damage the reputation of the United States as a safe location for the investment of foreign capital, as many foreign investors would view the action as arbitrary, unjustified, and counter to standard international practice" (Leich and Vassar (1990), p. 545).

Sources: Leich and Vassar (1990), Stauch (1994), Boughton (2001a), Hufbauer et al. (2009), Code of Federal Regulations: Foreign Assets Control Regulations, 31 C.F.R., https://www.loc.gov/item/cfr1973074-T31CVP500/

E.12 Kampuchea (Cambodia) (1975-1992)

On April 17, 1975, the capital of Phnom Penh fell to the National United Front of Kampuchea composed of nationalist elements under Prince Sihanouk and communist Khmer Rouge, which declared the Democratic Republic of Kampuchea (Hufbauer et al. (2009)). The U.S. refused to recognize the new government. On May 16, 1975, President Ford imposed a total trade embargo and added Kampuchea to the list of countries of the Foreign Assets Control Regulations. Hence, all its government- and privately-owned assets subject to U.S. jurisdiction of about USD 9 million were blocked. In late 1978, Vietnamese troops invaded Kampuchea. About ten years later, the Paris International Peace Conference on Cambodia were convened and Vietnam withdrew the last of its troops from Cambodia (Hufbauer et al. (2009)). After the final end of the civil war, President Bush lifted the U.S. embargo (and hence the asset freeze) in January 1992.

Sources: Stauch (1994), Hufbauer et al. (2009), Code of Federal Regulations: Foreign Assets Control Regulations, 31 C.F.R., https://www.loc.gov/item/cfr1973074-T31CVP500/

E.13 Rhodesia (Zimbabwe) (1965-1979)

On November 11, 1965, the Government of Prime Minister Ian Smith issued a Unilateral Declaration of Independence where it announced that South Rhodesia (so far British territory) regards itself as an independent sovereign state. In

response to that, the U.K. imposed financial sanctions together with a ban on imports as well as an embargo of oil shipments to Rhodesia. Under the legal basis of the Exchange Control Act of 1947, initial steps were taken to place Rhodesian Sterling accounts under special exchange control and try to exclude Rhodesia from access to London capital markets.[79] On December 1, 1965, further limitations on the use of Sterling accounts were placed which effectively amounted to a freeze of Rhodesian assets under British jurisdiction. A couple of days later on December 3, 1965, the U.K. placed USD 25 million of official reserve assets (amounting to about half of total external assets of the Reserve Bank of Rhodesia) under their control. For that purpose, a new board of directors for the Reserve Bank of Rhodesia was established and directors appointed by the U.K. government. This measure effectively removed all Rhodesian gold and exchange holdings in London from the control of the Rhodesian government of prime Minister Smith. Given the resulting uncertainty as to who legitimately represented the Reserve Bank of Rhodesia, also other countries, namely Switzerland and South Africa, froze the Rhodesian reserve holdings held at their central banks (in the case of South Africa, the amount was estimated at USD 17 million; about one third of Reserve Bank of Rhodesia's external assets). On December 17, 1965, all commercial Sterling balances in London were also frozen (CIA (1965)). On December 21, 1979, the Lancaster Agreement was signed and British colonial authority restored until free elections would have taken place. This resulted in lifting of U.K. sanctions.

Sources: CIA (1965), Hufbauer et al. (2009)

E.14 Iran (1979-81)

On November 14, 1979, the U.S. decided to block all property and interests in property of the Government of Iran, including of its Central Bank, and froze Iranian deposits in U.S. banks and foreign subsidiaries. This action was implemented by an Executive Order of President Carter invoking the International Emergency Economic Powers Act (IEEPA). The U.S. decision was taken ten days after demonstrators during the Iranian Revolution had overrun the U.S. embassy in Tehran and taking dozens of hostages, 52 of whom were Americans. The asset freeze was basically in the spirit of a countermeasure as the purpose was to force Iran's release of American hostages. At the same time, it was meant to serve a dual purpose by also helping to protect the property claims of U.S. individuals and corporations against Iran. It is estimated that the asset freeze – together with related measures taken later – deprived Iran of the use of more than USD 12 billion in bank deposits, gold and other property. The U.S. ended up imposing sanctions unilaterally after its proposal in the U.N. Security Council to vote similar sanctions was blocked by a Soviet veto on January 13, 1980.

About 14 months later, on January 20, 1981, Iran agreed to the Declarations of Algiers and released the 52 American hostages in exchange for a (partial) transfer of Iranian assets. The Declaration consisted of two parts – the "General Declaration" and the "Claims Settlement Declaration". In this context, the newly-established Iran-United States Claims Tribunal was decided to hold jurisdiction over the settlement of both private and official claims. The unblocking of frozen assets involved highly complex negotiations as the bulk of Iran's assets was on deposit in overseas branches of U.S. banks, mostly in the U.K. Many of those banks had substantial legal arguments for refusing to return those blocked assets until Iran agreed to settle their claims in particular those arising from syndicated and non-syndicated loans extended by U.S. and other foreign banks. By that time, the Iran-Iraq war had started which had led to a rapidly worsened economic situation

[79] On November 20, 1965, the U.N. Security Council (UNSC) passed Resolution 217 which called on member states to withhold recognition of Rhodesia, impose an oil embargo, and stopping aid assistance to the Smith government. The U.N. resolution (as well as subsequent UNSC resolutions) did, however, not call for an asset freeze (Hufbauer et al. (2009)).

and added to the real economic impact of U.S. export sanctions against Iran that were imposed on April 7, 1980. Under the final settlement, Iran ended up with most of its foreign loans paid off, and with a little less than USD 3 billion (out of the total amount of USD 12 billion originally frozen) in cash.[80]

Back then, the asset freeze imposed by the U.S. was not uncontentious even amongst close allies. Over USD 5 billion of the frozen assets were deposited in other countries, mostly in the form of dollar deposits (so-called "Eurodollars"). Banking transactions involving these Eurodollars had to be cleared through New York involving U.S. correspondent banks. Hence, the original freezing order effectively also blocked those funds. Many lawsuits were brought forward by Iran asking to unblock the Eurodollar deposits. Given the relatively fast settlement of the whole situation, litigation over this overseas blocking of funds was, however, becoming obsolete. Had the whole asset freeze dragged on for much longer, it could well have been possible that especially the U.K. would not have permitted up to USD 6 billion of assets held in bank offices in the U.K. to be blocked indefinitely or even seized solely on the basis of legislation enacted in a another country. Moreover, the asset freeze also directly expanded to deposits held in other currencies as long as it was held at a branch of a U.S. bank. The latter were, however, unblocked after other governments expressed their objections to such an extraterritorial reach.

Later on, the Iranian Central Bank (Bank Markazi) claimed at the Iran-U.S. Claims Tribunal (Bank Markazi Iran v. the Federal Reserve Bank of New York, IUSCT Case No. 823) certain additional interest on the funds that were maintained at the Fed New York (before and during the 'freeze period'). While the Fed New York kept reinvesting the Iranian assets in line with 'standing instructions' and transferred these interest revenues after the freezing sanctions were lifted, Bank Markazi claimed that they could have invested their funds into higher-yield Eurodollars. They further argued that they were prevented from doing so because the money was frozen. As a result, the 'damage' incurred was claimed from the Fed New York. The claims were rejected by the tribunal arguing that the counterfactual investment returns were hypothetical and that the Fed New York did not breach their obligations towards Bank Markazi because they were not responsible for the asset freeze and continued to (re-)invest their proceeds while respecting the requirements of preserving safety and liquidity.

Sources: Carswell (1981), Hufbauer et al. (2009), Executive Order 12170 Blocking Iranian Government Property, November 14, 1979, https://www.archives.gov/federal-register/codification/executive-order/12170.html, Bank Markazi Iran v. the Federal Reserve Bank of New York, IUSCT Case No. 823, https://jusmundi.com/en/document/decision/en-bank-markazi-iran-v-the-federal-reserve-bank-of-new-york-award-award-no-595-823-3-tuesday-16th-november-1999

E.15 Argentina (1982)

After Argentina's invasion of the Falkland Islands, the UNSC approved Resolution 502 on April 3, 1982, which demanded an immediate cease-fire and Argentine withdrawal. On the same day, the U.K. decided to impose economic sanctions and froze all Argentine financial assets in the U.K. The amount of frozen assets was estimated at about USD 1.5 billion. In order to avoid an explicit extraterritorial reach of their sanctions (see also subsection E.14), overseas branches of British banks

[80] The U.S.-Iran Claims Tribunal at The Hague continues to arbitrate government-to-government cases resulting from the 1980 break in relations and freezing of some of Iran's assets (CRS (2022)).

were exempted from the measures taken. Argentina reacted to these sanctions by freezing all British assets[81] in Argentina (about USD 4 billion) and by suspending all payments to British banks (including interest and principal payments on their debt). The latter resulted in widespread fears also in the British financial sector about the potential disruptions that a failure to make loan repayments resulting in a formal default of Argentina could trigger (including through cross-default clauses). Argentina was equally concerned and announced that it would pay any repayments falling due to an escrow account established at the New York Fed. The move worked out in a sense that despite a technical default, no British creditor declared Argentina in formal default. Moreover, Argentina was also trying to reassign U.K. bank positions to other lenders in order to avoid problems in syndicating new credit. That said, the ability of Argentina to refinance their external debt (mostly through syndicated loans from London) was severely hampered.

The British government asked also other states including the U.S. and members of the European Economic Community (ECC) to impose similar economic sanctions. While all of them eventually conceded and took some action (e.g. temporary import and export bans), none of these countries was willing to follow the U.K. in freezing Argentine assets (apparently, the U.K. did also not request this step from its partners given that West German officials had signaled that they would oppose such a measure; Martin (1992)). Finally, after progress in the resolution of the Falkland Island conflict, both sides agreed to lift the asset freeze on September 14, 1982, also weighing in on pressure from the U.S. and private banks.

Sources: Daoudi and Dajani (1983), Martin (1992), Hufbauer et al. (2009)

E.16 Libya (1986-2004)

After a spate of terrorist attacks (e.g. Rome and Vienna) allegedly sponsored by the Libyan government, U.S. President Ronald Reagan invoked the IEEPA on January 8, 1986, and issued Executive Order 12544 which imposed unilateral sanctions and froze all Libyan government assets under U.S. jurisdiction. The amount of frozen assets was estimated at about USD 1 billion. About USD 400 million were assets of the Central Bank of Libya (Hufbauer et al. (2009)). This time the U.S. Treasury was more conscious about the potential extraterritorial effect of its sanctions (see also subsection E.14) and tried to frame the regulations more carefully.[82] This notwithstanding, the U.S. asset freeze still affected the Eurodollar market in London and led the Libyan Arab Foreign Bank – an offshore bank owned entirely by the Central Bank of Libya – filing a lawsuit in London for the return of its deposits at overseas branches of American banks. The British court ruled in Libya's favor and required the payment by the debtor banks (Bankers Trust Co. and Manufacturers Hanover Trust Co.) which was subsequently authorized by the U.S. Treasury (Weisburg (1987)).

The explosion of the Pan Am Flight 103 over Lockerbie, Scotland, which killed 270 people, at first seemed to be a turning point with Gadhafi reportedly cutting back funding to numerous rebel movements (Hufbauer et al. (2009)). However, new tensions arose over the next couple of years including when the U.S., U.K., and France called on Libya to surrender for trial those charged in the Pan Am bombing. The European Community (EC) called on Libya to comply with these demands on December 2, 1991, and threatened to also impose economic sanctions. Reportedly, this led the Libyan

[81] To the best of our knowledge, the asset freeze on the side of Argentina affected especially private assets from British companies and no foreign reserves by the Bank of England. Thus, the Argentine retaliatory measure is not included as an episode of a freeze of central bank assets in our database.

[82] To avoid that the freeze also expanded to any American entities' subsidiaries overseas, the regulation referred to "U.S. persons" and was "restricting only those business entities which were juridical person[s] organized under the laws of the United States, or any person in the United States" (Gerstenhaber (1992)).

government to move their liquid assets held in EC member states toward Switzerland and Gulf states (Rose (1998)). In response to Libya's refusal to extradite suspects, the UNSC adopted Resolution 748 on March 31, 1992. The resolution decided that, from April 15, 1992, all member states should impose a set of economic sanctions which, however, did not include an asset freeze. On November 11, 1993, the UNSC then voted to freeze non-petroleum-related Libyan government assets abroad (Hufbauer et al. (2009)). On April 5, 1999, an agreement was reached on delivering the suspects of the 103 bombing from Libya to The Hague for trial. As a result, U.N. sanctions against Libya were suspended. The unilateral U.S. sanctions, however, remained in force, stating as requirements for lifting inter alia a compensation to the victims' families and the acceptance of responsibility. After an agreement on compensation was reached, the UNSC finally lifted their (suspended) sanctions on September 12, 2003. However, U.S. sanctions continued in place given their allegations regarding the proliferation of weapons of mass destruction. After Libya agreed to dismantle their respective weapons program, President George W. Bush lifted the asset freeze on September 20, 2004. On December 16, 2004, the Central Bank of Libya confirmed the receipt of assets frozen by the U.S. government. Even though the original frozen amount was USD 400 million, the amount finally released totaled USD 1 billion due to accrued interest (Hufbauer et al. (2009)).

Sources: Weisburg (1987), Gerstenhaber (1992), Rose (1998), Hufbauer et al. (2009), Executive Order 12544 Blocking Libyan Government property in the United States or held by U.S. persons, January 8, 1986, https://www.archives.gov/federal-register/codification/executive-order/12544.html,

E.17 Panama (1988-1990)

In early 1988, U.S. relations with Panama worsened not least in light of a U.S. indictment of General Noriega for drug trafficking and racketeering. After President Delvalle's failed attempt to oust Manuel Noriega, he took legal action to gain control of Panamanian assets in the U.S. Given that Delvalle was formally recognized as the legitimate government of Panama by the U.S. Secretary of State, U.S. banks were advised not to disburse funds to the Noriega regime. U.S. courts then issued restraining orders that effectively froze the funds (estimated at about USD 35 to USD 40 million; GAO (1989)) for the Noriega regime and effectively seized them by making them available to the recognized President Delvalle. The legal basis for this action was the Federal Reserve Act Section 25B which was passed during World War II in 1941 and which states that upon direction of the Secretary of State as to who is the recognized legal government of a foreign country, the banking system is instructed as to what authority has control over the funds.[83]

On March 11, 1988, the U.S. tried to further reduce the flow of U.S. dollars to Panama and initiated a program which required that all payments due to Panama from the operation of the Panama Canal Commission be deposited into an escrow account established at the Fed New York. A few weeks later (March 31, 1988) the U.S. administration directed that all U.S. government payments due to Panama be placed in the escrow account (GAO (1989)). On April 8, 1988, additional sanctions were imposed when President Reagan invoked the IEEPA and issued Executive Order 12635 which froze all property and interests of the government of Panama in the U.S. and prohibited all U.S. payments to the Noriega government (Hufbauer et al. (2009)). According to GAO (1989), as of July 17, 1989, a total of USD 296.8 million in blocked property and assets were held in the U.S. (of those USD 150.7 million in cash deposited in the Fed New York, USD 79.8 million in other U.S. banks, and USD 66.1 million recorded on the books of U.S. companies as unfunded liabilities). Given

[83] See https://www.federalreserve.gov/aboutthefed/section25b.htm.

that Panama is a dollarized economy, [84] the asset freeze inflicted significant damage to the economy and made it difficult for the government to pay their current expenses such as salaries. It even led the Noriega regime to issue IOUs in the form of small denomination, semi-negotiable checks that were meant to supplement cash salary payments to the military and civil servants (GAO (1989)).

After the U.S. invasion of Panama which ended early 1990, President George H.W. Bush lifted economic sanctions and "used some of the frozen funds to repay debts owed by Panama to foreign creditors, with remaining funds turned over to the successor government" (CRS (2023b), p. 28). After offsetting these funds, the total amount released was about USD 200 million ((CRS (2023b)). On April 5, 1990, the U.S. President terminated the national emergency with respect to Panama.

Sources: GAO (1989), GAO (2004), Hufbauer et al. (2009), CRS (2023b), Executive Order 12635 Prohibiting certain transactions with respect to Panama, April 8, 1988, https://www.archives.gov/federal-register/executive-orders/1988.html,

E.18 Iraq (1990 & 2003)

After the Iraqi invasion of Kuwait on August 2, 1990, U.S. President George Bush declared a national emergency under the IEEPA and issued Executive Order 12722 which froze the assets of the Government of Iraq, including those of the central bank. According to GAO (2004), the amount of Iraqi assets frozen in the U.S. was about USD 1.9 billion. On August 6, the UNSC adopted Resolution 661 which imposed a set of economic and financial sanctions under Chapter VII of the UN Charter. The U.S. also placed the additional restrictions contained in the Resolution on Iraq through Executive Order 12724 issued on August 9 , 1990.[85] After the U.S.-led military intervention, Iraq signed a permanent cease-fire in April (as called for by the UNSC). In order to compensate Kuwait for the damage, the UNSC established the United Nations Compensation Commission (UNCC) to process claims against Iraq (Hinrichsen (2023)). The compensations were drawn from the also newly-established United Nations Compensation Fund which was funded through oil exports under the oil-for-food program which allowed USD 2 billion in Iraqi oil sales for every period of 180 days. The resulting revenues were then allowed for humanitarian and for compensatory purposes by dedicating a certain share of the proceeds (Houtte et al. (2006)). The annual reparation claims awarded for damages were not allowed to exceed 30 percent of total oil exports (this share was later reduced to 5 percent after the U.S.-led invasion in 2003). The last compensation claim resulting from Iraq's invasion of Kuwait was finally processed in December 2022 and the UNCC was closed accordingly. According to the U.N., approximately 1.5 million claimants were awarded USD 52.4 billion in compensation.[86]

In the wake of the U.S. invasion of Iraq in 2003, the U.S. President for the first time ever made use of its vesting power that is embedded in the IEEPA and authorized the confiscation of certain blocked property of the Government of Iraq

[84] Note that given the exchange rate regime, Panama does not have an official central bank. That said, any frozen government assets abroad had effectively an even more direct impact on government finances than a freeze of central bank reserves. Despite the absence of an official central bank, we thus treat this episode as a central bank asset freeze/ seizure in our database.

[85] The Executive Orders were then implemented by the Iraqi Sanctions Regulations, 31 CFR part 575, which are administered by the Office of Foreign Assets Control (OFAC).

[86] See https://www.ungeneva.org/en/news-media/press-release/2022/12/closure-united-nations-compensation-commission.

and its agencies (including its central bank).[87] The vested property was not intended to be used for reparation payments to Kuwait. The proceeds were instead meant to be used for the sanctioned country itself, i.e. for humanitarian purposes and the reconstruction of Iraq.[88] On May 22, 2003, the UNSC adopted Resolution 1483 which lifted multilateral economic sanctions and set up the Development Fund for Iraq (DFI) which was administered by the U.S. and later on handed over to the Iraqi Transitional Government.[89] The Resolution also called on all UN members to immunize proceeds stemming from Iraq's oil sales from creditor attachment (Hinrichsen (2023)). In this context, the U.S. issued additional Executive Orders which declared national emergency regarding the reconstruction of Iraq and which aimed at blocking property of the former Iraqi Regime, its senior officials, and their family members. In line with the UNSC Resolution, these funds were also vested and transferred to the DFI (CRS (2023b)).[90]

Sources: GAO (2004), Hufbauer et al. (2009), Hinrichsen (2023), Executive Order 12722 Blocking Iraqi Government Property and Prohibiting Transactions with Iraq, August 2, 1990, https://www.presidency.ucsb.edu/documents/executive-order-12722-blocking-iraqi-government-property-and-prohibiting-transactions-with, Executive Order 12724 Blocking Iraqi Government Property and Prohibiting Transactions With Iraq, August 9, 1990, https://www.presidency.ucsb.edu/documents/executive-order-12722-blocking-iraqi-government-property-and-prohibiting-transactions-with, Executive Order 13290 Confiscating and Vesting Certain Iraqi Property, March 20, 2003, https://www.govinfo.gov/link/cpd/executiveorder/13290, Executive Order 13303 Protecting the Development Fund for Iraq and Certain Other Property in Which Iraq Has an Interest, May 22, 2003, https://www.federalregister.gov/documents/2003/05/28/03-13412/protecting-the-development-fund-for-iraq-and-certain-other-property-in-which-iraq-has-an-interest, Executive Order 13315 Blocking Property of the Former Iraqi Regime, Its Senior Officials and Their Family Members, and Taking Certain Other Actions, August 28, 2003, https://www.federalregister.gov/documents/2003/09/03/03-22543/blocking-property-of-the-former-iraqi-regime-its-senior-officials-and-their-family-members-and

E.19 Kuwait (1990)

After the Iraqi invasion of Kuwait U.S. President George Bush declared a national emergency under the IEEPA and issued Executive Order 12723 on August 2, 1990, which froze the assets of the Government of Kuwait, including those of the central bank. The asset freeze was a precautionary measure to fence off Kuwaiti funds from Iraq. Most of the foreign assets of Kuwait were managed by the Kuwait Investment Authority, one of the oldest sovereign wealth funds in the Middle East. The precise amounts of foreign assets frozen (including those of the central bank) were not revealed. However, according to IMF data (International Financial Statistics), total foreign reserves of the Central Bank of Kuwait stood at USD 3.1 billion by the end of 1989 (and at USD 3.4 billion at the end of 1991). The asset freeze was revoked on July 25, 1991.

Sources: Executive Order 12723 Blocking Kuwaiti Government Property, August 2, 1990, https://www.presidency.ucsb.edu/documents/executive-order-12723-blocking-kuwaiti-government-property

[87] See Executive Order 13290, March 20, 2003, https://www.govinfo.gov/link/cpd/executiveorder/13290.

[88] See https://www.govinfo.gov/link/cpd/executiveorder/13290.

[89] The DFI now serves as Iraq's sovereign wealth fund.

[90] The Executive Order 13303 which was issued on May 22, 2003, also aimed at ensuring that the DFI is protected from any legal attachments or liens and protects Iraqi oil products from attachment. The Executive Order continues to be in place.

E.20 Haiti (1991-1994)

In response to the Haitian coup d'état that took place on 29 September, 1991, U.S. President George Bush declared a national emergency under the IEEPA and issued Executive Order 12775 on October 4, 1991, which froze the assets of the Government of Haiti, including those of its central bank – the Banque de la Republique d'Haiti.[91] Estimates of the amount of frozen assets range from USD 30 million to about USD 121 million.[92] On October 8, 1991, the U.S. sanctions were backed by the Organization of American States (OAS) which unanimously voted for a resolution urging all member states to impose economic and financial sanctions, including a freeze of all Haitian assets in their countries (Hufbauer et al. (2009)).[93] On July 31, 1994, the UNSC approved Resolution 940 which authorized "[...] to use all necessary means to facilitate the departure from Haiti of the military leadership"[94] which gave the U.S. international support for a possible invasion. Under this looming threat, a diplomatic solution to the conflict was eventually possible. On October 14, 1994, the U.S. President issued an Executive Order terminating the emergency with respect to Haiti and announcing to lift all economic sanctions against Haiti after President Aristide returns. One day later, the U.N. also lifted their sanctions.

Sources: GAO (2004), Hufbauer et al. (2009), Executive Order 12775 Prohibiting Certain Transactions With Respect to Haiti, October 4, 1991, https://www.presidency.ucsb.edu/documents/executive-order-12775-prohibiting-certain-transactions-with-respect-haiti

E.21 F.R. Yugoslavia (1992-2003)

After Serbians' heavy bombardment of Sarajevo in May 1992, the UNSC adopted Resolution 757 on May 30, 1992, and imposed mandatory economic sanctions against the rump Federal Republic of Yugoslavia, i.e. Serbia and Montenegro. On the same day U.S. President George Bush invoked the IEEPA and issued Executive Order 12808 which froze all property of the "Yugoslav Government" (i.e. the Government of the Socialist Federal Republic) as well as of the governments of Serbia and Montenegro – including the assets of the National Banks of Yugoslavia, Montenegro, and Serbia. On April 17, 1993, the UNSC adopted Resolution 820 which tightened sanctions on the Federal Republic of Yugoslavia (Serbia and Montenegro) under Chapter VII of the UN Charter, including a freeze of the Yugoslav government's assets abroad.

After many years of conflict, the Dayton Peace Agreement was completed in November 1995 which provided for a single state of Bosnia-Herzegovina, with two separate entities. On November 21, 1995, the UNSC passed resolutions 1021 and 1022 which suspended economic sanctions against Serbia-Montenegro conditional on signing the Dayton Peace agreement. Sanctions were foreseen to be lifted after the first free and fair elections are held in Bosnia-Herzegovina. After the peace agreement was signed, President Clinton suspended U.S. economic sanctions, but kept the asset freeze in place

[91] Additional Executive Orders were issued over the following couple of years which inter alia expanded the asset freeze to individuals and Haitian institutions that supported the military regime or were involved in the coup.

[92] There is some information that – similar to the case of Panama – part of the frozen assets (about USD 55 million) were released "[...] during the period of sanctions at the request of the recognized government of Haiti, and with the certification of the Department of State, for expenditures related to the operations of the Haitian government in the United States and worldwide" (GAO (2004), p. 37). However, given that this information was not possible to verify from other sources, we decided not to include this as an episode of seizure in our database.

[93] In 1993 the UNSC also approved a Resolution which called on members to impose economic sanctions, including freezing of overseas bank accounts and other financial assets of more than 100 people involved in the coup. Another Resolution in May 1994 urged all U.N. members states to freeze targeted Haitians' assets (Hufbauer et al. (2009)).

[94] See https://digitallibrary.un.org/record/191651?ln=en.

until outstanding claims against the assets had been resolved (Hufbauer et al. (2009)). Similarly, the UNSC terminated all economic sanctions on October 1, 1996, after Bosnia-Herzegovina held orderly presidential elections. However, Yugoslavia's assets abroad remained frozen with a view to keep them as leverage in the ongoing efforts of pushing for cooperation with the U.N. war crimes tribunal, improving the situation in the Kosovo region, and reaching a settlement of the different assets claims between the former Yugoslav republics (Hufbauer et al. (2009)).

In response to the situation in Kosovo, the Contact Group (an informal grouping of countries – including the U.S., U.K., France, Germany, Italy, and Russia which first came together in response to the crisis in Bosnia) minus Russia decided on April 29, 1998, to impose new sanctions on Yugoslavia including an immediate freeze of Yugoslav government funds held abroad. Accordingly, on June 8, 1998, the EU Council of Foreign Ministers implemented sanction measures, including a freeze of Yugoslav and Serbian government assets. Montenegro was exempt from the new sanctions. On June 9, 1998, U.S. President Clinton issued Executive Order 13088 which also blocked the property of the governments of the Federal Republic of Yugoslavia (Serbia and Montenegro), the Republic of Serbia, and the Republic of Montenegro. However, according to (Hufbauer et al. (2009)) the (continued) asset freeze had little effect because Yugoslavia moved its external bank accounts when the Contact Group threatened the freeze some time before.[95] After the resignation of Milosevic and swearing-in of Vojislav Kostunica as new president of Federal Republic of Yugoslavia, EU foreign ministers lifted some of the economic sanctions on October 9, 2000, but kept restrictions on financial assets in place. On June 19, 2001, the European Council then adopted Council Regulation (EC) 1205/2001 which unblocked most of the frozen assets whereby restrictive measures that remained in place were confined to the former President of the FRY, Milosevic, his family, and persons indicted by the International Criminal Tribunal for the Former Yugoslavia. On January 19, 2001, U.S. President Clinton lifted the remaining trade, financial and investment restrictions on Yugoslavia. The U.S. lifted most of their sanctions but also kept assets frozen until tangible progress in Serbia's democratic transition and the fulfillment of its international obligations (Hufbauer et al. (2009)). However, property and assets of the Federal Republic of Yugoslavia, Serbia and Montenegro remained blocked until May 28, 2003, when they got finally unfrozen by President George W. Bush after he terminated the state of emergency and revoked all previous blocking orders. According to CRS (2023b), the U.S. released the frozen funds that had belonged to the Central Bank of the Socialist Federal Republic of Yugoslavia to the central banks of the successor states.[96]

Sources: GAO (2004), Hufbauer et al. (2009), CRS (2023b), Executive Order 12808 Blocking "Yugoslav Government" Property and Property of the Governments of Serbia and Montenegro, May 30, 1992, https://www.presidency.ucsb.edu/documents/executive-order-12808-blocking-yugoslav-government-property-and-property-the-governments, Executive Order 13088 Blocking Property of the Governments of the Federal Republic of Yugoslavia (Serbia and Montenegro), the Republic of Serbia, and the Republic of Montenegro, and Prohibiting New Investment in the Republic of Serbia in Response to the Situation in Kosovo, June 9, 1998, https://www.govinfo.gov/link/cpd/executiveorder/13088

[95] According to Hufbauer et al. (2009), Switzerland decided to also freeze the assets of the Serbian Republic in July 1998 in order to show solidarity with international sanctions.

[96] In June 2001, the BIS had canceled the shares of the former Yugoslavia in the capital of the BIS and issued an equivalent number of new shares which were divided among the central banks of the five successor states to the former Socialist Federal Republic of Yugoslavia (SFRY). In this context, the total assets of the former Yugoslavia held at the BIS which comprised gold and foreign currency amounting to approximately USD 414 million were divided according to the new shares (https://www.hnb.hr/en/-/division-of-shares-of-the-former-sfry-in-the-bis).

E.22 Sudan (1997-2017)

In August 1993, the U.S. placed Sudan on the State Department list of countries designated as supporters of international terrorism. After a series of events (including an attack on the Egyptian President Hosni Mubarak's limousine in Ethiopia), U.S. President Clinton invoked the IEEPA and issued Executive Order 13067 on November 3, 1997, which imposed unilateral sanctions on Sudan and froze all property of the Sudanese Government, including the assets of the Bank of Sudan. According to GAO (2004), the overall amount of frozen assets was estimated at about USD 28.4 million. After twenty years, the asset freeze measures were finally revoked on October 12, 2017, recognizing positive actions by the Government of Sudan. More recently, the situation in Sudan deteriorated significantly as reflected by the military's seizure of power in October 2021 and the outbreak of inter-service fighting in April 2023. In response to these developments, U.S. President Biden issued Executive Order 14098 on May 4, 2023, which imposed sanctions on "certain persons destabilizing Sudan and undermining the goal of a democratic transition" – including an asset freeze. However, the latter did not involve a broad-based freeze of all government assets but was rather targeted at certain individuals or entities (not including the central bank).

Sources: GAO (2004), Hufbauer et al. (2009), Executive Order 13067 Blocking Sudanese Government Property and Prohibiting Transactions With Sudan, November 3, 1997, https://www.govinfo.gov/link/cpd/executiveorder/13067, Executive Order 14098 Imposing Sanctions on Certain Persons Destabilizing Sudan and Undermining the Goal of a Democratic Transition, May 4, 2023, https://ofac.treasury.gov/media/931716/download?inline

E.23 Afghanistan (1999-2002)

In May 1997, the U.S. labeled Afghanistan as not cooperating fully with U.S. terrorism efforts (the State Department deliberately refrained from placing Afghanistan on the list of countries designated as supporters of international terrorism since this would have meant a recognition of the Taliban as the legitimate government). In order to put pressure on the Taliban leadership in Afghanistan to surrender Osama bin Laden, U.S. President Clinton invoked the IEEPA and issued Executive Order 13129 on July 4, 1999, which froze all Taliban assets in the U.S., including the assets of Da Afghanistan Bank (DAB). According to GAO (2004), the overall amount of frozen assets was estimated at about USD 217 million. On October 15, 1999, the UNSC adopted resolution 1267 which called for surrendering bin Laden and threatened to impose economic and financial sanctions (including an asset freeze). The sanctions eventually took effect on November 14, 1999 (Hufbauer et al. (2009)). After 9/11 and the NATO-led military strikes in Afghanistan, an interim government led by Pashtun tribal leader Hamid Karzai was established in December 2001. On January 11, 2002, the UNSC excluded the DAB from the list of entities subject to financial sanctions, thus paving the way for an unblocking of frozen funds.[97] A few days later, the UNSC lifted most of the sanctions and called for unblocking frozen assets (with the exception of financial assets of Osama bin Laden as well as people and groups associated with him). Accordingly, the U.S. released USD 193 million in gold reserves and USD 24 million in cash held at the Fed New York to the Afghan Central Bank (Hufbauer et al. (2009)).

Sources: GAO (2004), Hufbauer et al. (2009), Executive Order 13129 Blocking Property and Prohibiting Transactions

[97] See https://press.un.org/en/2002/sc7263.doc.htm.

With the Taliban, July 4, 1999, https://www.govinfo.gov/content/pkg/FR-1999-07-07/pdf/99-17444.pdf

E.24 Burma (2003-2016)

On July 28, 2003, U.S. President George W. Bush invoked the IEEPA and issued Executive Order 13310 which froze the assets of the Government of Burma, including its central bank. The EU also strengthened its sanctions – including by imposing an asset freeze – in June 2003 (though they were originally intended to enter force only at the end of October) in response to the arrest of Aung San Suu Kyi and other senior members of the National League for Democracy. There seems to be no reliable estimate on the amount of assets that were frozen during this episode. The asset freeze lasted until 2016, when U.S. President Obama terminated the national emergency with respect to Burma, revoked the Burma sanctions Executive Orders, and waived other statutory blocking and financial sanctions. The EU had started to lift its sanctions (except an arms embargo) already in 2012.

Sources: GAO (2004), Executive Order 13310 Blocking Property of the Government of Burma and Prohibiting Certain Transactions, July 28, 2003, https://www.govinfo.gov/link/cpd/executiveorder/13310, Executive Order 13448 Blocking Property and Prohibiting Certain Transactions Related to Burma, October 18, 2007, https://www.presidency.ucsb.edu/documents/executive-order-13448-blocking-property-and-prohibiting-certain-transactions-related-burma

E.25 Libya (2011)

After the outbreak of the Libyan civil war in 2011, U.S. President Obama invoked the IEEPA and issued Executive Order 13566 on February 25 which froze the assets of the Libyan Government, including those of the Central Bank of Libya. On March 17, the UNSC adopted Resolution 1973 which called on members to also impose a freeze on assets owned by the Libyan authorities in order to block such assets for the benefit of the Libyan people. The asset freeze was estimated to have blocked about USD 100 billion[98] of Libyan central bank assets abroad (about USD 30 billion under U.S. jurisdiction). In December of 2011, the UNSC lifted the sanctions on the central bank and made the frozen assets available for access by the Libyan authorities.

Sources: Executive Order 13566 Blocking Property and Prohibiting Transactions Related to Libya, February 25, 2011, https://obamawhitehouse.archives.gov/the-press-office/2011/02/25/executive-order-13566-libya, Fact Sheet: Lifting Sanctions on the Government of Libya, December 16, 2011, https://home.treasury.gov/news/press-releases/tg1387

E.26 Syria (2011)

After the outbreak of the Syrian civil war in 2011, U.S. President Obama invoked the IEEPA and issued Executive Order 13582 on August 18 which froze the assets of the Government of Syria, including those of the Central Bank of Syria (CBS). The EU Council had decided on a sanctions package on May 9 which imposed a ban on the provision of internal repression equipment, and the freezing of funds and economic resources of certain individuals and entities. The EU asset freeze was extended to Syrian central bank in early 2012.[99] The asset freezes remain in effect up to this day. There seems no public

[98] See https://www.reuters.com/article/us-libya-sanctions-idUSTRE81F1M120120216/.

[99] In November 2011 the Arab League also approved sanctions against Syria, including an asset freeze and an embargo on investments.

figure of the amount of CBS assets blocked abroad. According to the IMF (2010), Syria's total gross reserves (including the net foreign assets of the state-owned Commercial Bank of Syria) stood at about USD 17 billion in early 2010.

Sources: Executive Order 13582 Blocking Property of the Government of Syria and Prohibiting Certain Transactions with Respect to Syria, August 18, 2011, https://obamawhitehouse.archives.gov/the-press-office/2011/08/18/executive-order-13582-blocking-property-government-syria-and-prohibiting, EU Council Regulation No 442/2011, May 9, 2011, https://eur-lex.europa.eu/eli/reg/2011/442/oj, EU Council Regulation No 36/2012, January 18, 2012, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012R0036, EU Council Decision 2013/255/CFSP, May 31, 2013, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0255

E.27 Iran (2012 & 2018)

On January 23, 2012, the Council of the European Union decided to freeze the assets of the Iranian central bank (CBI, or Bank Markazi) within the EU. On February 5, 2012, U.S. President Obama issued Executive Order 13599 under the IEEPA which blocked all assets of the Islamic Republic, including those of its central bank. These measures reportedly led to a freeze of about USD 100 billion of CBI assets (e.g. IMF (2015), Appendix II). These assets included USD 1.8 billion in assets belonging to the Iranian central bank held in a Citibank account in New York. Shortly after, the U.S. adopted the Iran Threat Reduction and Syria Human Rights Act and included a section which enabled these specific assets of the CBI to be blocked, seized, and distributed amongst the plaintiffs in the Peterson case against Iran (Ruys and Deweerdt (2023)). In 2001, victims of a 1983 bombing of a U.S. Marine Corps barracks in Beirut had sued the Iranian government in Peterson v. Islamic Republic of Iran. The U.S. District Court for the District of Columbia found the Iranian government legally responsible in 2003 and, in 2007, it issued a default judgment, awarding the victims' families a total of over USD 2.66 billion in damages. The victims brought actions attempting to enforce the judgment, including against assets owned by the CBI that were held in bonds in New York. The case made it to the Supreme Court, which ruled in favor of the victims in April 2016. In response to these U.S. actions, Iran launched the case with the ICJ in June 2016 for violation of the Treaty of Amity. The complaint argued that the U.S. was "attempt[ing] unlawfully to permit or assist the seizure and attachment of the assets and interests of Iran and Iranian State-owned companies, including" the Central Bank of Iran. The violations alleged included, inter alia, expropriation of the property of Iranian state-owned entities, including the CBI. Concerning the central bank assets, the ICJ found it did not have jurisdiction over the claims concerning the CBI. However, it did not uphold the U.S.' actions and it ruled against the U.S. on several major points. Especially in light of the split votes on the jurisdictional question and strident dissents on topics such as unilateral sanctions, future opinions on related matters could call the legality of related U.S. tactics into question.[100] The ICJ considered the central bank not a company but part of the state. Given that the Iranian government had gone to the ICJ claiming that the central bank fell under the 1955 Treaty of Amity between the U.S. and Iran protecting companies, the ICJ ruled that it had no jurisdictions over the claims by the CBI. As pointed out by Ruys and Deweerdt (2023), it exhibits some irony that the two countries put forth arguments diametrically opposed to the positions previously adopted in the context of the domestic proceedings before the U.S. Courts, particularly the Peterson case. In fact, Bank Markazi had consistently portrayed the activities in question in front of U.S. courts as relating to its sovereign functions as a central bank, rather than characterizing them as commercial transactions.

[100] See https://www.atlanticcouncil.org/blogs/iransource/what-the-icj-ruling-on-the-central-bank-of-iran-means-for-the-us-and-the-islamic-republic-and-those-seeking-reparations-for-state-sponsored-atrocities/.

U.S. authorities tried to argue instead that Bank Markazi's investment activities were commercial in nature which would have made it not possible to uphold the immunity claim brought forward by Iran (Ruys and Deweerdt (2023)). However, this admittedly confused reasoning may indirectly provide further impetus to the trend of granting a more far-reaching immunity to central bank assets, also as compared to other State property. Conversely, it may – again indirectly – further complicate plans to confiscate assets of the Russian central bank on account of their supposedly commercial character.

In 2015, the P5+1 (China, France, Germany, Russia, the U.K., and the U.S.), the European Union (EU), and Iran reached a Joint Comprehensive Plan of Action (JCPOA) in which Iran agreed to significantly curb its nuclear program in exchange for sanctions relief. As a result, the asset freeze by the U.S. and the EU was suspended in 2016 which allowed Tehran to regain access to the more than USD 100 billion in assets abroad. However, just two years later, U.S. President Trump reinstated the asset freeze after unilaterally withdrawing from the JCPOA. In addition, secondary sanctions were imposed which effectively restricts CBI's access to (almost) all of its assets abroad. Accordingly, after the re-imposition of U.S. financial sanctions, IMF data on gross international reserves (that by convention have to be readily available and controlled by Iranian monetary authorities) shows a drop from USD 122 billion in 2018 to USD 15 billion in 2019.[101] The asset freeze remains in place as of now.

Sources: IMF (2015), Ruys and Deweerdt (2023), Executive Order 13599 Blocking Property of the Government of Iran and Iranian Financial Institutions, February 5, 2012, https://www.govinfo.gov/content/pkg/DCPD-201200083/pdf/DCPD-201200083.pdf, Council of the EU - Iran: New EU sanctions target sources of finance for nuclear programme, January 23, 2012, http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/EN/foraff/127444.pdf

E.28 Venezuela (2019)

On August 5, 2019, U.S. President Trump issued Executive Order 13884 which blocked the assets of the Government of Venezuela, including those of the central bank.[102] In January 2019, the Trump Administration officially recognized Venezuelan opposition leader Juan Guaidó as Venezuela's interim president and permitted him access to the frozen Venezuelan government assets that were held at the Fed New York (CRS (2023b), p. 29). According to some newspaper sources, the account held approximately USD 347 million.[103] One estimate puts the overall amount of central bank assets frozen abroad at close to USD 5 billion.[104] This figure includes about USD 1.95 billion in Central Bank of Venezuela's gold reserves which are held at the Bank of England and retained from Venezuela. The Maduro government has filed a lawsuit in the U.K. to regain access to these funds. On July 29, 2022, London's High Court rejected President Nicolas Maduro's efforts to gain control of the gold reserves stored in the Bank of England, given the U.K. government's recognition of Guaidó as the constitutional interim President of Venezuela. However, the ultimate thrust of the case remains to be decided as the disputes over the gold are still ongoing. They have already produced a series of court judgments on preliminary issues and

[101] See https://data.imf.org/?sk=d2b9ea5b-a993-408f-8505-16581ce1ae4b&sid=1392690810143

[102] Already in 2015, U.S. President Obama had issued Executive Order 13692 which froze the assets of those involved in actions or policies undermining democratic processes or institutions and which included current or former leaders of any entity engaged in those activities, as well as current or former government officials (CRS (2023b))

[103] See https://www.bloomberg.com/news/articles/2023-05-04/venezuela-opposition-regains-access-to-us-accounts-frozen-by-sanctions.

[104] See https://www.bloomberg.com/news/articles/2023-06-30/venezuela-s-2-billion-uk-gold-case-sent-back-to-lower-court?embedded-checkout=true.

the effect of the U.K. Government's changing recognition.[105]

Sources: Executive Order 13884 Blocking Property of the Government of Venezuela, August 5, 2019, https://www.govinfo.gov/content/pkg/FR-1999-07-07/pdf/99-17444.pdf

E.29 Burma (2021)

After the February 2021 coup, in which the military overthrew the democratically elected civilian government of Burma and arrested and detained government leaders, U.S. President Biden invoked the IEEPA and issues Executive Order 14014 on February 10, 2021. Apparently, this Executive Order came after Myanmar's military rulers attempted in the name of the Central Bank of Myanmar to move about USD 1 billion held at the Fed New York days after seizing power. This prompted U.S. officials to put a freeze on the funds. The transaction was then stalled until the aforementioned Executive Order gave legal authority to block these assets indefinitely.[106]

Sources: Executive Order 14014 Blocking Property With Respect to the Situation in Burma, February 10, 2021, https://www.federalregister.gov/documents/2021/02/12/2021-03139/blocking-property-with-respect-to-the-situation-in-burma

E.30 Afghanistan (2022)

On February 11, 2022, the U.S. decided to block all property and interests in property of Afghanistan's central bank (Da Afghanistan Bank, DAB) that are held in the U.S. by any U.S. financial institution, including the Fed New York. The U.S. financial institutions were required to transfer this property into a consolidated account held at the Fed New York. This action was implemented by an Executive Order of President Biden invoking the International Emergency Economic Powers Act (IEEPA). The U.S. decision was taken following the Taliban's takeover of the government in August 2021 with a view to prevent the Taliban – who lack governmental recognition – from accessing the funds and hence protecting the property of DAB for the benefit of the people of Afghanistan. The frozen assets amounted to about USD 7 billion. Half of those assets (i.e. USD 3.5 billion) were transferred to someone designated by the Secretary of State who was tasked to use these assets for the benefit of the Afghan people. This transaction has been initiated by the Office of Foreign Assets Control (OFAC) relying on parts of Section 25B of the Federal Reserve Act. According to this act federal reserve banks have to follow the determination of the Secretary of State when deciding who represents a foreign government or central bank (Brunk (2023a), p. 11). In September 2022, the U.S. Treasury, the State Department, and the Swiss Government then established a new legal entity in Switzerland, the so-called "Afghan Fund", to which the funds were subsequently transferred. The Afghan Fund is governed by the Board of Trustees, currently constituted of representatives from the U.S. government, the Swiss government, and two Afghan economic experts. The Fund is supposed "[...] to protect, preserve, and - on a targeted basis - disburse its assets for the benefit of the Afghan people" (see https://afghanfund.ch). Disbursements require a unanimous decision of the board in Switzerland (Brunk (2023b)). As argued by Brunk (2023b), the disbursement of central bank assets through this Fund would not raise issues of immunity since the "ownership" of assets remains unchanged. The assets will technically be turned over to a "recognized" representative of the Afghan government.

[105] See https://nzdrc.co.nz/going-for-gold-latest-ruling-from-english-court-of-appeal-in-tug-of-war-over-venezuelan-gold-reserves/.

[106] See https://www.reuters.com/article/idUSKCN2AW2MC/.

The other half of the USD 7 billion (USD 3.5 billion) were frozen by the U.S. administration to potentially allow plaintiffs who hold terrorism-related default judgments against the Taliban to execute these judgments. The litigation on this matter is still pending. Brunk (2023a) argues that such action would, however, violate the immunity to which those assets are entitled to under international law as the money would be turned over to private litigants in the U.S. rather than to a recognized representative of the Afghan government. According to Brunk (2023a), the judgment creditors could only prevail if the requirements of the Terrorism Risk and Insurance Act (TRIA) are met. The TRIA allows to enforce a terrorism-related judgment against assets belonging to "a terrorist party". According to the TRIA, a "terrorist party" is defined as "a terrorist, a terrorist organization [...], or a foreign state designated as a state sponsor of terrorism." Afghanistan has, however, never been designated as a state sponsor of terrorism. The question thus boils down as to whether the DAB assets belong to the Taliban (the "terrorist party") who are unrecognized as government - or not.

Sources: Brunk (2023a), Brunk (2023b), Executive Order 14064 Protecting Certain Property of Da Afghanistan Bank for the Benefit of the People of Afghanistan, February 11, 2022, https://www.federalregister.gov/documents/2022/02/15/2022-03346/protecting-certain-property-of-da-afghanistan-bank-for-the-benefit-of-the-people-of-afghanistan, Terrorism Risk Insurance Act, 2002, https://www.govinfo.gov/content/pkg/PLAW-107publ297/html/PLAW-107publ297.htm

F Model

F.1 Model setup

There are three economies in the model, indexed by $c \in \{US, S, RoW\}$, each with size n_c. Within each country, households consume, save, hold real balances, supply labor to firms and invest in firms' capital. Firms produce undifferentiated final goods which are bundled together by retailers and sold on final markets with monopoly power. Under the Calvo formalism, retailers can update prices only with probability ξ_c and final prices are sticky. Goods and bonds are traded across countries and determine the exchange rate. We assume that bond markets are incomplete, hence the UIP condition does not hold across countries, and that U.S. bonds deliver a convenience yield. For this reason, in steady-state, U.S. bonds have lower returns.

Central banks control money supply with central bank liabilities (i.e. money) matching central bank assets. These assets constitute gold reserves and international bonds and are chosen optimally by central bank reserve managers. Gold is traded in the currency of the first country. Seignorage profits are transferred to the government. The government sets the level of public consumption and taxes and borrows on national and international markets.

F.2 Households

Households derive utility from consumption, holdings of real balances (cash and US bonds) and leisure:

$$U_{c,t} = e^C_{c,t} \ln\left(C_{c,t} - h_c C_{c,t-1}\right) - \frac{\chi_{c,l}}{1+\phi_{c,l}} L_{c,t}^{1+\phi_{c,l}} + \frac{\chi_{c,m}}{1-\sigma_{c,m}} \left(\frac{M_{c,t}}{P_{c,t}}\right)^{1-\sigma_{c,m}} + \frac{\chi_{c,b}}{1-\sigma_{c,b}} \left(\frac{B_{US,c,t}}{P_{c,t} NER_{US,c,t}}\right)^{1-\sigma_{c,b}} \tag{F.1}$$

with c the country index. The budget constraint is:

$$\begin{aligned} &P_{c,t}C_{c,t} + \frac{B_{c,c,t}}{R_{c,t}} + \sum_{l \neq c} \frac{B_{l,c,t}}{R_{l,t} NER_{l,c,t}} + P_{c,t} I_{c,t} + M_{c,t} \leq w_{c,t} L_{c,t} + B_{c,c,t-1} + \\ &+ \sum_{l \neq c} \frac{B_{l,c,t-1}}{NER_{l,c,t}} - \sum_{l \neq c} \frac{\phi^B_c}{2} \left(\frac{B_{l,c,t}}{R_{l,t} P_{c,t} NER_{l,c,t}}\right)^2 P_{c,t} + P_{c,t} R^k_{c,t} K_{c,t-1} + M_{c,t-1} + \Pi_{c,t} \end{aligned} \tag{F.2}$$

C_c is aggregate consumption, L_c aggregate labor and $e^C_{c,t}$ is a consumption preference shock. I_c, K_c R^k_c, w_c are investments, capital, capital returns, nominal wages. P_c is an aggregate price level. $NER_{l,c,t}$ is the nominal exchange rate between country c and country l (expressed in units of currency of l per currency of c), $B^F_{l,c,t}$ are bonds issued in country l and held in country c (i.e. foreign bond holdings) and $R_{l,t}$ is the (foreign) interest rate on bonds issued in country l. M_c are money balances; $\frac{\chi_{c,m}}{1-\sigma_{c,m}} M_{c,t}^{1-\sigma_{c,m}}$ and $\frac{\chi_{c,b}}{1-\sigma_{c,b}} \left(\frac{B_{US,c,t}}{NER_{US,c,t}}\right)^{1-\sigma_{c,b}}$ capture the utility value of holding money or foreign bonds, that reflects, for example, liquidity services. Finally, $\Pi_{c,t}$ includes lump-sum taxes as well as profits transferred from retailers to households. The law of motion of capital in each sector is:

$$K_{c,t+1} = \left\{ (1-\delta_c) K_{c,t} + I_{c,t} \left[1 - \frac{\phi^K_c}{2} \left(\frac{I_{c,t}}{I_{c,t-1}} - 1 \right)^2 \right] \right\} \tag{F.3}$$

δ_c the depreciation rate of capital and ϕ^K_c the capital adjustment cost. Households optimize utility (Equation (F.1)) under

the budget constraint (Equation (F.2)) and the law of motion of capital (Equation (F.3)). First order conditions are:

$$\frac{e^C_{c,t}}{C_{c,t} - hC_{c,t-1}} - E_t \frac{\beta_c e^C_{c,t+1} h_c}{C_{c,t+1} - h_c C_{c,t}} = \lambda_{c,t} \quad \text{(F.4a)}$$

$$\chi_c L^{\phi_c}_{c,t} = \lambda_{c,t} \frac{w_{c,t}}{P_{c,t}} \quad \text{(F.4b)}$$

$$\beta_c E_t \left(\frac{\lambda_{c,t+1}}{\pi_{c,t+1}} \right) = \frac{\lambda_{c,t}}{R_{c,t}} \quad \text{(F.4c)}$$

$$\lambda_{c,t} \left[\frac{1}{R_{US,t}} + \phi^B_c \left(\frac{B_{US,c,t}}{P_{US,t} RER_{US,c,t}} \right) \right] = \beta_c E_t \left(\frac{\lambda_{c,t+1}}{\pi_{c,t+1}} \frac{NER_{US,c,t}}{P_{US,t} NER_{US,c,t+1}} \right) + \chi_{c,m} \left(\frac{B_{US,c,t}}{P_{US,t} RER_{US,c,t}} \right)^{-\sigma_{c,b}} \quad \text{(F.4d)}$$

$$\lambda_{c,t} \left[\frac{1}{R_{l,t}} + \phi^B_c \left(\frac{B_{l,c,t}}{P_{l,t} RER_{l,c,t}} \right) \right] = \beta_c E_t \left(\frac{\lambda_{c,t+1}}{\pi_{c,t+1}} \frac{NER_{l,c,t}}{NER_{l,c,t+1}} \right) \quad \text{(F.4e)}$$

$$Q_{c,t} \left\{ \left[1 - \frac{\phi^K_c}{2} \left(\frac{I_{c,t}}{I_{c,t-1}} - 1 \right)^2 \right] - \frac{I_{c,t}}{I_{c,t-1}} \phi^K_c \left(\frac{I_{c,t}}{I_{c,t-1}} - 1 \right) \right\} +$$

$$+ \beta_c E_t \left[Q_{c,t+1} \phi^K_c \left(\frac{I_{c,t}}{I_{c,t-1}} - 1 \right) \left(\frac{I_{c,t+1}}{I_{c,t}} \right)^2 \right] = \lambda_{c,t} \quad \text{(F.4f)}$$

$$\beta_c E_t \left[Q_{c,t+1} (1 - \delta_c) + \Lambda_{c,t+1} R^k_{c,t+1} \right] = Q_{c,t} \quad \text{(F.4g)}$$

$$-\lambda_{c,t} + \lambda_{c,t+1} \frac{\beta_{c,t}}{\pi_{c,t+1}} + \chi_{c,m} \left(\frac{M_{c_t}}{P_{c,t}} \right)^{-\sigma_{c,m}} \quad \text{(F.4h)}$$

Q_c is the price of capital in country c and $\{\lambda_{c,t}\}_{t=0}^{\infty}$ the sequence of Lagrangian multipliers associated to the optimization problem. Equation (F.4a) is the Euler equation for consumption, defining the marginal utility of consumption (λ_c). Equation (F.4b) defines labor supply which equals the value, in terms of consumption, of the real wage. Equation (F.4c) determines the demand for domestic bonds while Equation (F.4e) and Equation (F.4d) defines the demand for foreign bonds. Equation (F.4d) reports the special case of demand for U.S. bonds outside the U.S., which is is augmented by a component capturing the value of holding U.S. assets, $\frac{\chi_{c,m}}{\lambda_{c,t}} \left(\frac{B_{US,c,t}}{RER_{US,c,t}} \right)^{-\sigma_{c,b}}$, that is the convenience yield. Notice that bond markets are not complete (because of cross border transactions costs for $\phi^B_c > 0$), therefore combining Equation (F.4c) and Equation (F.4e) does not lead to perfect UIP. Moreover, as each country has two trade partners, there is one Equation (F.4e) for each of them. Finally, Equation (F.4f) is the Tobin's Q equation and Equation (F.4h) the money demand equation. First order conditions are exactly symmetric in each country excluding the U.S. for which the Euler condition on domestic bonds is:

$$\beta_c E_t \left(\frac{\lambda_{c,t+1}}{\pi_{c,t+1}} \right) + \chi_{c,m} \left(\frac{B_{c,c,t}}{P_{c,t}} \right)^{-\sigma_{c,b}} = \frac{\lambda_{c,t}}{R_{c,t}} \quad \text{(F.5)}$$

F.3 Production

In each country there is a *continuum* of perfectly competitive firms, indexed by k. Firms' production function is:

$$X_{c,t}(k) = A_{c,t} \left(K_{c,t}(k) \right)^{\alpha_c} \left(L_{c,t}(k) \right)^{1-\alpha_c} \quad \text{(F.6)}$$

where A_c is a total factor productivity shock. Total output is the sum of output consumed domestically and exported, formally $X_t(k) = \sum_{l=US,S,RoW} X^b_{c,l,t}(k)$ with domestic demand being for $X^b_{c,c,t}(k)$. Cost minimization implies:

$$R^k_{c,t}(k) = A_{c,t} MC_{c,t}(k) \alpha_c \left(K_{c,t}(k)\right)^{\alpha_c - 1} \left(L_{c,t}(k)\right)^{1-\alpha_c} \tag{F.7a}$$

$$W_{c,t}(k) = A_{c,t} MC_{c,t}(k)(1-\alpha_c) \left(K_{c,t}(k)\right)^{\alpha_c} \left(L_{c,t}(k)\right)^{-\alpha_c} \tag{F.7b}$$

where MC_c is the Lagrangian multiplier associated to the optimization problem of firms and W_c real wages.

F.4 Retailers and aggregation

Retailers aggregate intermediate goods and transform them into final goods. Define $Y_{c,c}$ and $Y_{l,c}$ as domestic demand and export, to country l, of final goods. We adopt the following aggregators for domestic demand:

$$C_{c,c,t} + I_{c,c,t} + G_{c,c,t} = Y_{c,c,t} \tag{F.8}$$

where $C_{c,c}$, $I_{c,c}$, $G_{c,c}$ denote final consumption, investment and government spending in country c of goods produced in country c. Exports aggregators are defined as:

$$\sum_{l \neq c} C_{l,c,t} + I_{l,c,t} + G_{l,c,t} = Y_{l,c,t} \tag{F.9}$$

where $C_{l,c}$, $I_{l,c}$, $G_{l,c}$ denote final consumption, investment and government demand in country l of goods produced in country c. In other terms, these are total exports from country c to country l. $Y_{c,c}$ and $Y_{l,c}$ are produced aggregating across undifferentiated intermediate goods produced by domestic and foreign firms respectively. The demand function for these goods are:

$$Y_{c,c,t} = \left[\int_0^1 X_{c,c,t}(k)^{\frac{\nu_c - 1}{\nu_c}} dk\right]^{\frac{\nu_c}{\nu_c - 1}}, \quad Y_{l,c,t} = \left[\int_0^1 X_{l,c,t}(k)^{\frac{\nu_c - 1}{\nu_c}} dk\right]^{\frac{\nu_c}{\nu_c - 1}} \tag{F.10}$$

where ν_c is the elasticity of substitution across different goods produced by country c.

Price aggregators are:

$$P_{c,c,t} = \left[\int_0^1 P_{c,c,t}(k)^{1-\nu_c} dk\right]^{\frac{1}{1-\nu_c}}, \quad P_{l,c,t} = \left[\int_0^1 P_{l,c,t}(k)^{1-\nu_c} dk\right]^{\frac{1}{1-\nu_c}} \tag{F.11}$$

with $P_{c,c,t}$ and $P_{l,c,t}$ being the prices of domestically consumed and exported goods. Demand functions for individual varieties are:

$$X_{c,c,t}(k) = \left[\frac{P_{c,c,t}(k)}{P_{c,c,t}}\right]^{-\nu_c} Y_{c,c,t}, \quad X_{l,c,t}(k) = \left[\frac{P_{l,c,t}(k)}{P_{l,c,t}}\right]^{-\nu_c} Y_{l,c,t} \tag{F.12}$$

Final consumption goods are created by combining goods from each country. Aggregate consumption C_c then is:

$$C_{c,t} = \left\{\sum_l \omega_{c,l} \left(C_{c,l,t}\right)^{\rho_c}\right\}^{\frac{1}{\rho_c}} \tag{F.13}$$

$C_{c,l}$ is intermediate consumption consumed in country c and produced in l, so that for example $C_{c,c}$ is domestic consumption of domestically produced goods. $\omega_{c,l} \in [0,1]$ captures the share of goods produced in country l in total consumption, with

$\omega_{c,c}$ the home bias. Similarly, aggregate government spending and investment are:

$$G_{c,t} = \left\{ \sum_{l} \omega_{c,l} \left(G_{c,l,t} \right)^{\rho_c} \right\}^{\frac{1}{\rho_c}} \tag{F.14}$$

$$I_{c,t} = \left\{ \sum_{l} \omega_{c,l} \left(I_{c,l,t} \right)^{\rho_c} \right\}^{\frac{1}{\rho_c}} \tag{F.15}$$

where $G_{c,c}$ ($I_{c,c}$) is government consumption (investment) of domestically produced goods while $G_{c,l}$ ($I_{c,L}$) is government consumption (investment) of goods produced in country l. Cost minimization defines the demand function for consumption of domestic and imported goods:

$$\begin{aligned}
C_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} C_{c,t}, \quad & C_{c,l,t} &= \left(\frac{P_{c,l,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} C_{c,t} \\
G_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} G_{c,t}, \quad & G_{c,l,t} &= \left(\frac{P_{c,l,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} G_{c,t} \\
I_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} I_{c,t}, \quad & I_{c,l,t} &= \left(\frac{P_{c,l,t}}{P_{c,t}} \right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} I_{c,t}
\end{aligned} \tag{F.16}$$

whereby, demand in country c for goods produced in country l depends on their price relative to the aggregate price level and by total consumption in country c. The aggregate price level is then obtained by substituting Equation (F.16) into Equation (F.13):

$$P_{c,t} = \left\{ \sum_{l} \omega_{c,l} \left(P^{b}_{c,l,t} \right)^{\frac{\rho_c}{1-\rho_c}} \right\}^{\frac{\rho_c - 1}{\rho_c}} \tag{F.17}$$

F.5 Monopolists

Goods are sold on the final market by monopolists who set prices with some degree of market power. We assume there are frictions in price setting à-la Rotemberg. Formally, monopolists optimize:

$$E_t \sum_{d=0}^{\infty} (\beta_c)^d \Lambda_{c,t+d} \left\{ \frac{NER_{l,c,t} P_{l,c,t}}{P_{c,t}} X_{l,c,t}(k) - TC_{c,t} - \frac{\phi_{c,r}}{2} \left(\frac{P_{l,c,t}}{P_{l,c,t-1}} - 1 \right)^2 \right\} \tag{F.18}$$

where TC are total costs and $\phi_{c,r}$ the Rotemberg parameter. $l = c$ is the case of domestic goods sold in the domestic economy and the exchange rate $NER_{c,c,t}$ is 1. First order conditions are:

$$\begin{aligned}
&(1 - \nu_c) + \frac{MC_{c,t} \nu_c}{P_{l,c,t} NER_{l,c,t}} - \phi_{c,r} \left(\pi_{l,c,t} - 1 \right) \frac{\pi_{l,t}}{P_{l,c,t-1} NER_{l,c,t}} + \\
&\beta_c E_t \left[\frac{\lambda_{t+1}}{\lambda_t} \frac{Y_{l,c,t+1}}{Y_{l,c,t}} \phi_{c,r} \left(\pi_{l,c,t+1} - 1 \right) \frac{\pi_{l,c,t+1}}{P_{l,c,t} NER_{l,c,t}} \right] = 0
\end{aligned} \tag{F.19}$$

Inflation rates are $\pi_{c,l,t} = \frac{P_{c,l,t}}{P_{c,l,t-1}}$ and $\pi_{c,t} = \frac{P_{c,t}}{P_{c,t-1}}$. Notice that the Rotemberg parameter $\phi_{c,r}$ can be written as a function of the probability of updating prices ξ_c as: $\phi_{c,r} = \frac{(\nu_c - 1)\xi_c}{(1-\xi_c)(1-\beta_c \xi_c)}$

F.6 Public sector

The central bank sets the policy rate and manages its own balance sheet. The policy rate follows a Taylor-type rule of the form:

$$R_{c,t} = R_{c,t}^{\gamma_{c,r}} \left[R_{c,ss} \left(\frac{Y_{c,t}}{Y_{c,t-1}} \right)^{\theta_Y} \pi_{c,t}^{\theta_\pi} \right]^{1-\gamma_{c,r}} \tag{F.20}$$

where Y_c is total output. The central bank also runs a consolidated balance sheet that aggregates gold and US and domestic bonds according to the preferences:

$$\frac{M_{c,t}}{P_{c,t}} = \left[\psi_{c,b} \left(\frac{B_{US,c,t}^{CB}}{P_{US,t}} \frac{1}{RER_{US,c,t} r_{US,t}} \right)^{\gamma_{c,CB}} + \psi_{c,g} \left(\frac{P_t^G \mathcal{G}_{c,t}}{P_{US,t} RER_{US,c,t}} \right)^{\gamma_{c,CB}} + \psi_{c,d} \left(\frac{B_{c,c,t}^{CB}}{P_{c,t}} \frac{1}{r_{c,t}} \right)^{\gamma_{c,CB}} \right]^{\frac{1}{\gamma_{c,CB}}} \tag{F.21}$$

We assume that the CES aggregator captures the policy objective of the central bank, that is preferences over the substitutability of reserve assets and coverage ratios. In the case of the U.S. $RER_{US,US} = 1$. P^G is the dollar price of gold. Demand for bonds and gold are:

$$1 = \psi_{c,b} \mathcal{M}_{c,t} \left(\frac{M_{c,t}}{P_{c,t}} \right)^{1-\gamma_{c,CB}} \left(\frac{B_{US,c,t}^{CB}}{r_{US,t} P_{US,t} RER_{US,c,t}} \right)^{\gamma_{c,CB}-1} \tag{F.22}$$

$$1 = \psi_{c,g} \mathcal{M}_{c,t} \left(\frac{M_{c,t}}{P_{c,t}} \right)^{1-\gamma_{c,CB}} \left(\frac{P_t^G \mathcal{G}_{c,t}}{P_{US,t} RER_{US,c,t}} \right)^{\gamma_{c,CB}-1} \tag{F.23}$$

$$1 = \psi_{c,d} \mathcal{M}_{c,t} \left(\frac{M_{c,t}}{P_{c,t}} \right)^{1-\gamma_{c,CB}} \left(\frac{B_{c,c,t}^{CB}}{r_{c,t} P_{c,t}} \right)^{\gamma_{c,CB}-1} \tag{F.24}$$

Central bank profits in real terms are:

$$\begin{aligned} V_{c,t}^{CB} = \frac{M_{c,t}}{P_{c,t}} + \frac{B_{c,c,t-1}^{CB}}{\pi_{c,t} P_{c,t-1}} + \frac{r_{US,t-1} B_{US,c,t-1}^{CB}}{\pi_{c,t} P_{US,t-1} RER_{US,c,t}} + \frac{P_t^G \mathcal{G}_{c,t-1}}{P_{US,t-1} RER_{US,c,t} \pi_{c,t}} + \\ - \frac{M_{c,t-1}}{P_{c,t} \pi_{c,t}} - \frac{P_t^G \mathcal{G}_{c,t}}{P_{US,t} RER_{US,c,t}} - \frac{B_{c,c,t}^{CB}}{P_{c,t} r_{c,t}} - \frac{B_{US,c,t}^{CB}}{P_{US,t} r_{US,t} NER_{US,c,t}} \end{aligned} \tag{F.25}$$

The stock of gold evolves according to:

$$\mathcal{G}_{c,t} = (1 - \delta_{c,g}) \mathcal{G}_{c,t-1} + IG_{c,t} \tag{F.26}$$

where IG are new gold purchases. We assume that in each period the supply of new gold is fixed, so that the gold market clears as:

$$\mathcal{G}_{supply} = \sum_c n_c IG_{c,t} \tag{F.27}$$

The government sets public consumption exogenously. The government also follows a tax rule aimed at stabilizing debt as share of GDP relative to steady state ($\frac{Debt_{c,t}}{Y_{c,t}} - \frac{Debt_{c,ss}}{Y_{c,ss}}$):

$$\ln \left(\frac{T_{c,t}}{T_{c,ss}} \right) = \varrho_T \ln \left(\frac{T_{c,t-1}}{T_{c,ss}} \right) + (1 - \varrho_T) \kappa_T \left[\frac{Debt_{c,t}}{Y_{c,t}} - \frac{Debt_{c,ss}}{Y_{c,ss}} \right] \tag{F.28}$$

where $\varrho_T \in [0, 1]$ measures the persistency of taxation and κ_T the strength of the fiscal adjustment. The government

budget is:

$$G_{c,t} + Debt_{c,t-1} = T_{c,t} + \frac{Debt_{c,t}}{R_{c,t}} + \Pi^{CB}_{c,t} \tag{F.29}$$

Π^{CB}_{c} are profit (or losses) from central bank balance sheet operations. Total debt is the sum of outstanding debt:

$$Debt_{c,t} = \sum_{c} n_c B_{l,c,t} \tag{F.30}$$

in the case of the U.S. it also includes central bank purchases of U.S. securities as reserve assets.

All shocks follow an AR(1) process.

F.7 Moment matching

We collect data on U.S. and Russia real consumption, GDP, CPI inflation, M1 money, policy rates, population and the dollar/rouble exchange rate from Haver Analytics between Q1 1998 and Q4 2019. For the exchange rate data we rely on the bilateral exchange rates computed by the BIS. During the Zero Lower Bound period in the U.S. we rely on the Wu-Xia shadow rate. The estimation sample ends in 2019 as the period of the Covid-19 pandemic and recovery and the invasion of Ukraine are likely not representative of historical patterns.

Consumption, money and GDP data are expressed in real, per-capita terms and indexed to Q1 2001. CPI and interest rates are transformed to quarterly changes while interest rates are annualized. All series are de-meaned. Data are related to the model through the following observable equations:

$$\begin{bmatrix} \Delta \ln(GDP_{c,t}) \\ \Delta \ln(Consumption_{c,t}) \\ \Delta \ln(Money_{c,t}) \\ \Delta \ln(CPI_{c,t}) \\ Rate_{c,t} \end{bmatrix} = \begin{bmatrix} \log(Y_{c,t}) - \log(Y_{c,t-1}) \\ \log(C_{c,t}) - \log(C_{c,t-1}) \\ \log(M_{c,t}) - \log(M_{c,t-1}) \\ \pi_{c,t} - 1 \\ r_{c,t} - r_{c,ss} \end{bmatrix} \tag{F.31}$$

parameters (ϱ_{US}, ϱ_{S}, ν_{US}, ν_{S}, $_{US}$, $_{S}$, $\gamma_{US,r}$, $\gamma_{S,r}$, $\theta_{US,\pi}$, $\theta_{S,\pi}$, $\theta_{US,Y}$, $\theta_{S,Y}$) are estimated by minimizing the squared distance between model-generated moments and moments in the data. We target the following moments: i) the standard deviation of all series; ii) the correlations of consumption with output; iii) the cross-country correlations of prices, output and consumption. Table C.3 reports the estimated parameters.