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**The Effects of Sanctions on Russian Banks
in TARGET2 Transactions Data**

Constantin Drott, Stefan Goldbach, Volker Nitsch

Nr. 245

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The Effects of Sanctions on Russian Banks in TARGET2 Transactions Data¹

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Abstract

This paper examines the effect of financial sanctions at the most disaggregated level possible, individual bank accounts. Using data from the Eurosystem's real-time gross settlement system TARGET2, we provide empirical evidence that sanctions imposed by the European Union on Russian banks following Russia's aggression against Ukraine in 2014 and 2022 have sizably reduced financial transactions with sanctioned Russian bank accounts, both along the extensive and intensive margins. Among the various sanction measures taken, exclusion from SWIFT, a global provider of secure financial messaging services, turns out to have the largest effects.

Keywords: financial flows; transactions; restrictions

JEL Classification Codes: F38; F51; G28

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1. Introduction

The effectiveness of sanctions is, despite their ongoing popularity in practice, still a matter of debate. An obvious issue is the difficulty in assessing whether sanctions have been ultimately successful in leading to a change in policies of the sanctioned country. Potential challenges include the identification of the exact aim of sanctions, the definition of what qualifies as a policy change and the evaluation of the extent to which sanctions actually contributed to this policy change. However, even analyses which follow a more modest approach, aiming to examine the impact of sanctions on targeted cross-border activities, have to deal with a number of issues. For one thing, sanctions are often designed to be smart, targeting specific products, entities or individuals, thereby making it difficult to identify their impact in aggregate data. More notably, the effects of sanctions are likely to vary also at granular level, being dependent, for instance, on the type of restriction that is implemented.

In this paper, we examine the relevance of sanctions-related features in more detail. In particular, we study the effects of different forms of financial sanction on capital flows and payment transactions. While financial sanctions generally aim to put restrictions on a target's cross-border financial activities, including access to financial markets, funds, resources and services, the range of measures that are implemented in practice is often broad and diverse. In our analysis, we explore the set of financial restrictions that the European Union (EU) has imposed on Russian banks in response to Russia's aggression against Ukraine in 2014 and 2022. Specifically, using information from TARGET2, the real-time gross settlement system owned and operated by the Eurosystem, we examine the impact of those measures on cross-border financial flows at the most disaggregated level possible, individual bank accounts.

In our empirical analysis, we make use of a number of features which are relatively unique for identifying the impact of different types of sanctions. First, the EU has imposed restrictive measures on only a few, selected banks in Russia. Since Russian banks facing restrictions are clearly identified, we are able to distinguish between sanctioned and non-sanctioned entities in a country targeted by sanctions. Second, sanction measures differ across banks; they have also been modified (or, more precisely, strengthened) over time. As a result, there is considerable variation in the application of restrictions to capital flows and payment transactions. Third, bank transaction data are available at daily frequency, which helps to identify the direct impact of sanctions. It also allows us to explore possible anticipation effects between the announcement of sanction measures and their actual implementation. Finally, given that payments data are available for a sufficiently long period of time, we are able to

compare the effects of financial sanctions imposed on Russian banks in 2014, after the Russian annexation of Crimea, and in 2022, after the Russian invasion of Ukraine.

Previewing our main results, we find that financial sanctions substantially reduce payment flows from accounts of sanctioned Russian banks. More importantly, the effects differ across different types of financial restriction and turn out to be larger for stricter and more severe measures, which may also explain why the effects of the 2022 sanctions on financial flows are stronger than that of the 2014 sanctions on Russian banks. We conclude that financial restrictions severely restrain the financial activities of targeted financial institutions.

This paper contributes to at least two literatures. A growing number of studies already analyze various aspects of sanctions against Russia, including Ahn and Ludema (2019, 2020), Miromanova (2023), Crozet and Hinz (2020), Gullstrand (2020), and Mamonov, Pestova and Ongena (2021). In contrast to most of this work, however, which often examines patterns of trade, our analysis focuses on financial activities. Another set of papers studies the effects of financial sanctions on financial flows, but typically analyzes more aggregate data. Besedeš, Goldbach, and Nitsch (2017), for instance, examine data from the German balance of payments statistics, which is only available at monthly frequency.

The remainder of the paper is organized as follows. In Section 2, we provide some institutional background and describe the forms of financial sanction that have been imposed on Russian banks. Section 3 presents our data and methodology, followed by a discussion of our empirical results. The paper ends with a brief summary and conclusion in Section 5.

2. Financial Sanctions in Practice

The EU has progressively adopted various sanction measures on Russia since 2014.² These measures include individual sanctions, economic sanctions, restrictions on media, and diplomatic measures; they also include restrictions on Russia's access to the EU's capital and financial markets and services.³

² In the European Union (EU), member states have committed themselves to a Common Foreign and Security Policy. Restrictive measures or 'sanctions' are an essential tool of this policy (see, for instance, <https://www.consilium.europa.eu/en/policies/sanctions/>), which means that regulations are directly applicable in all EU member states and binding in their entirety. Besedeš, Goldbach, and Nitsch (2021) provide a more detailed description of the institutional background of the EU's sanctions policies.

³ For an overview, see <https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-against-russia-over-ukraine/>.

In our empirical analysis, we distinguish between three types of financial sanctions against Russian banks: capital market sanctions, exclusion from SWIFT, and prohibitions on dispositions (also known as “freezing of funds”). For each type of financial sanction, Table 1 reports the underlying EU regulations and lists the Russian banks targeted by these measures (along with the date of implementation of the sanctions).⁴

Among the set of restrictions early imposed by the EU are capital market sanctions, tabulated in the column on the left of Table 1. These restrictions mainly imply a ban on EU market participants of buying or selling transferable securities and money market instruments issued by the sanctioned institutions and no new loans/credit of any maturity can be granted to them.⁵ Consequently, targeted Russian banks are no longer able to refinance themselves in the EU via capital market instruments. Since this measure does not target payments directly, however, it does not prevent sanctioned banks from buying or selling securities from other issuers.⁶

Initially adopted in 2014, the EU expanded the list of Russian banks targeted by capital market sanctions and rapidly imposed further financial restrictions after Russia’s military aggression against Ukraine in 2022. The middle column of Table 1 shows that by now ten Russian banks have been disconnected from SWIFT, the specialized payment messaging services handled by the Society for Worldwide Interbank Financial Telecommunication (SWIFT).⁷ SWIFT serves as a global communication network that enables banks to securely transmit transaction information and instructions in a standardized format, without which they cannot transfer money or settle payments across borders.⁸ While affected institutions can, in principle, continue making international credit transfers via alternative payment systems, such as the Chinese Cross-Border Interbank Payment System (CIPS), or via other communication channels, such as secure fax lines, the number and volume of financial transactions are likely to decline considerably in practice due to this exclusion.

Another very severe restriction was imposed on eight Russian banks, which are subject to a full transaction ban (or prohibitions on dispositions). With this intervention (reported in the column on the right of Table 1), all funds and economic resources owned or controlled by

⁴ Further details about sanctions regulations are provided in an appendix.

⁵ See, for instance, <https://www.whitecase.com/insight-alert/new-eu-sanctions-asset-freezes-tightened-capital-market-sanctions-and-broad-trade>.

⁶ In our empirical analysis, we focus exclusively on the date of first implementation of a sanction and, therefore, ignore possible variations in the intensity of sanctions; see Besedeš, Goldbach, and Nitsch (2017) for a more extensive discussion of this issue.

⁷ For more information, see <https://www.swift.com/about-us/discover-swift>.

⁸ See Perez (2022) for a more detailed description.

natural or legal persons, entities or organizations associated with these institutions are frozen. Moreover, no funds or economic resources may be made available to or be used by the affected parties either directly or indirectly.

3. Data and Methodology

In order to analyze the effect of financial restrictions on cross-border financial activity, we make use of detailed (and confidential) financial transactions data, which allows us to track individual payment flows between bank accounts. The data is obtained from the Eurosystem's real-time gross settlement system, the Trans-European Automated Real-time Gross Settlement Express Transfer System or TARGET2. This payment system, owned and operated by the Eurosystem, settles euro payments in central bank money and thereby enables EU banks to transfer money between each other in real time. With about 350,000 payments per day, it is one of the largest payment systems in the world; more than 1,000 banks use the platform to initiate transactions in euro and, taking into account branches and subsidiaries, more than 52,000 banks worldwide can be reached via this payment system. In fact, among the various access options through which a financial institution can connect to TARGET2, an addressable Bank Identifier Code (BIC) is sufficient, meaning that any financial institution that holds a BIC, irrespective of its place of establishment, that is a correspondent of a direct participant in TARGET2 can send and receive payments.⁹

In principle, banks can process payments also outside of TARGET2, using, for instance, other real-time gross settlement systems, cheque clearinghouses or bilateral bank-bank settlement agreements.¹⁰ In practice, however, these alternative options are of limited relevance. At global scale, the trend of increasingly processing payments through real-time gross settlement systems continues. According to a recent World Bank survey (World Bank, 2020), 100 countries and jurisdictions around the world (out of 112 that responded to the survey) channel more than half of the total value of payments through their real-time gross settlement systems. For European banks, the overwhelming majority of transactions involving central bank money is processed in the Eurosystem's real-time gross settlement system, TARGET2.

Our data set contains information on the originator and beneficiary of a euro payment, including the accounts of the direct TARGET2 participants, as well as the date and value of the

⁹ For more details, see <https://www.ecb.europa.eu/paym/target/target2/html/index.en.html>.

¹⁰ See Summers (1994) for a general overview.

transaction.¹¹ Out of the universe of all daily payments processed in TARGET2¹², we identify financial flows with Russia as (i) outgoing payments initiated by a Russian bank (originator) and settled via the correspondent bank account in the EU and (ii) incoming payments being designated for a Russian bank (beneficiary) and settled via the correspondent bank account in the EU. In practice, we first extract the payments settled in TARGET2 which are related to a Russian bank account, identified by having country code “RU” at the fifth and sixth digit of the Bank Identifier Code (BIC) following the BIC standard ISO 9362¹³, and then divide banks, again based on the BIC, into treatment (sanctioned banks) and control groups (non-sanctioned banks), according to the classification in Table 1. Our sample period ranges from January 2, 2014, before the Russian occupation of Crimea which began on February 20, 2014, to March 20, 2023, when TARGET2 was replaced by a new system (T2).¹⁴

Figure 1 provides a first look at the data. The four graphs in panel (a) plot the business day-to-day aggregate inflows of funds in TARGET2 via the accounts of Russian banks, separately for sanctioned and non-sanctioned entities, around the time of the implementation of sanction measures; the graphics in panel (b) of Figure 1 present the analogues for outflows. As shown in the top pair of graphs in both panels, Russian banks subject to capital market sanctions tend to engage less in TARGET2 activities already before the imposition of restrictions, while the difference turns out to become even larger afterwards.¹⁵ Moreover, and perhaps not surprisingly, business activities in TARGET2 dry up almost completely after a bank is excluded from SWIFT or faces a ban on transactions.¹⁶

While insightful, the graphical analysis does not provide any conclusive evidence about the causal impact of sanctions on financial flows. Therefore, to identify the effects of financial sanctions on cross-border payment flows of targeted banks in Russia, we apply a difference-in-

¹¹ Technically, our data set comprises TARGET2 transaction data across all TARGET2 components. Although TARGET2 may run, in principle, on a single shared platform, it is made up of multiple component systems operated by the national central banks and the ECB.

¹² See <https://www.ecb.europa.eu/paym/target/target2/facts/html/index.en.html> for facts and figures about TARGET2.

¹³ A BIC consists of eight or eleven alphanumeric characters and shows a four-part structure: a bank code, a country code, a location code and an optional branch code. SWIFT is the registration authority for BICs.

¹⁴ In our actual implementation, we typically choose symmetric time windows around the imposition of sanctions.

¹⁵ After Russia’s aggression against Ukraine, overall cross-border business activity declines due to the increase in uncertainty.

¹⁶ Since only banks from inside the European Economic Area are allowed to directly participate in TARGET2, Russian banks cannot act as correspondent banks for TARGET2 transactions. Therefore, Russian banks may, in principle, continuously show up as originators and beneficiaries of payment flows in TARGET2 even after exclusion from SWIFT.

differences approach. In particular, we estimate variants of the following baseline equation using pseudo-Poisson-maximum likelihood (PPML):

$$(1) \quad \text{Financial flows}_{sbt} = \exp [\sum_s \beta_s \times \text{Sanctions}_{sbt} + \sigma_b + \tau_t] \times \varepsilon_{bt},$$

where *Financial flows*_{sbt} represents the respective gross payment flows (either inflows or outflows) of Russian bank account *b* on day *t* settled in TARGET2, *Sanctions*_{sbt} is a binary variable which is one if the Russian bank account *b* on day *t* is subject to EU financial sanctions *s* (and zero otherwise), and σ_b and τ_t are comprehensive sets of bank-specific and time-specific (that is, day-month-year-specific) fixed effects, respectively. Since our sample only covers payments related to Russian bank accounts, time fixed effects capture shocks and factors common to all Russian payments in TARGET2, such as, for instance, macroeconomic developments in Russia. Similarly, bank fixed effects control for systematic differences across Russian banks that do not change over time, such as their general business relationships with foreign partners. ε_{bt} is the statistical error term, assumed to be well behaved.

4. Results

The results of estimating our default specification are reported in Table 2. In the first two columns, we tabulate estimates of β for sanctions imposed in 2014; the remaining columns report results for the 2022 sanctions.

As shown in columns (1) and (2) of Table 2, the financial restrictions imposed on Russian banks in 2014, after Russia's occupation of Crimea, had a sizable impact on payment flows settled in TARGET2. The β coefficient is negative and statistically significant; the effect is also economically large. Taken at face value, the point estimate of -0.887 (-0.688) implies that inflows (outflows) in the accounts of sanctioned Russian banks have, on average, decreased by 59% (50%) after the restrictions took effect. Besedeš, Goldbach, and Nitsch (2017) estimate the effect of financial sanctions on German financial flows and find similar results; after the imposition of financial sanctions, German capital flows with the target country fall by about one-half.

In the next two columns of the table, we report analogous results for sanctions imposed on Russian banks in 2022. Not surprisingly, given that also stricter measures have been adopted by the EU, the (negative) effect of the sanctions on payments flows increases considerably in magnitude. According to our estimates, inflows (outflows) of payments of sanctioned Russian banks in TARGET2 were effectively reduced by about 92% (92%).

Next, we analyze the effects of the various types of financial restrictions on payments flows. In particular, we replace the pooled financial sanctions dummy with three separate dummy variables for the different types of sanctions as described before. The results turn out to be robust and remarkably consistent. As shown in columns (5) and (6) of Table 2, all coefficients take on the expected negative sign and are highly significant. More importantly, the results are in line with intuition, with more restrictive measures yielding more sizable reductions in payment flows. In fact, the largest estimated effects are observed for a bank's disconnection from SWIFT when inflows and outflows came close to full standstill (-99.9% each).

Finally, since a bank's exclusion from SWIFT was not implemented immediately, but only a few days after its official announcement, we are also able to assess possible anticipation effects by adding a binary variable that takes the value of one between the announcement of this restriction and its effective implementation. The results of this extension are tabulated in columns (7) and (8) of Table 2. According to our estimates, inflows and outflows of targeted Russian banks stopped almost completely (with a decline of about -99% each) even before the decision actually took effect. Again, this finding is in line with Besedeš, Goldbach, and Nitsch (2017) who similarly report evidence of anticipation effects, leading to a reduction in financial flows prior to the imposition of sanctions.

Overall, our estimation results strongly indicate that all types of financial sanctions have been effective in sizably reducing payment flows of Russian banks targeted by those measures. Moreover, the strengthening of sanctions (by taking additional restrictive measures) yields the intended results; some types of restrictions, such as a bank's exclusion from SWIFT, even allow to dry up payment flows nearly completely.

In the following, we examine the sensitivity of our results along various dimensions. In a first robustness check, we fully exploit the granular nature of our payments data. Instead of aggregating daily payments at the level of a (Russian) bank (identified by BIC¹⁷), we analyze payment flows at the level of BIC-BIC dyads. With this extension, the number of observations increases by several orders of magnitude; the specification also becomes more demanding since we now use dyad (instead of bank) fixed effects which implies that we exploit within-dyad variation.

¹⁷ It should be noted that banks can have more than one BIC.

Table 3 presents the results. Analogous to Table 2, we first report estimates for a pooled sanctions dummy, separately for the two sanctions episodes in our sample, before we provide more detailed results for the more recent set of financial sanctions against Russia. Reviewing the results, the estimated coefficients turn out to be slightly weaker for this specification, both economically and statistically. Still, our key findings remain qualitatively unchanged. Most importantly, tough restrictive measures severely restrain payment flows of targeted Russian banks.

With detailed information on BIC-pair dyads, we are also able to examine the effect of sanctions on the extensive margin of a bank's financial relationships. More specifically, we replace the value of payment flows settled in TARGET2 with a bank's number of dyads with positive payments. The results are presented in Table 4. Again, the structure of the table is similar to Table 2. In fact, the only difference to our baseline specification is the new dependent variable. Interestingly, the results are little affected by this perturbation. While the estimates of β are somewhat smaller in magnitude, there is clear evidence that financial sanctions severely restrain a bank's cross-border business relationships. Once sanctions are imposed, the number of pairwise bank-bank relationships of a targeted bank declines significantly, with the drop being largely similar in proportion to the observed decline in payment flows.

In another perturbation, we deal with the sequential imposition of sanctions after Russia's invasion of Ukraine in 2022. As noted before, the EU adopted several packages of sanction measures against Russia, which also imply a gradual tightening of financial restrictions. Therefore, to deal with the issue that some Russian banks have been treated multiple times, we follow the recent literature and apply staggered difference-in-differences estimation techniques. Table 5 reports the results for two estimators which have been recently frequently used (Callaway and Sant'Anna, 2021; Borusyak, Jaravel, and Spiess, 2021). Reassuringly, our results are reasonably robust to these alternative estimation procedures. As shown, the estimated effect of financial sanctions on the cross-border payment flows of targeted Russian banks remains negative and significant.¹⁸

Next, we extend our sample to also include Belarus. The imposition of sanctions against Russia has been accompanied by the imposition of financial restrictions against Belarus banks; the banks in Belarus targeted by those measures (along with the date of their implementation)

¹⁸ In unreported results, we also analyze the impact of the different sanctions measures separately, without much effect.

are listed in Appendix 2.¹⁹ The results for a sample which includes Belarus are shown in Table 6.²⁰ Despite the increase in the number of observations (by about 10%), the estimated effects are almost indistinguishable from our baseline results (in Table 2). There is a robust, statistically significant negative effect of financial sanctions on cross-border payment flows of banks on which restrictive measures are imposed.

Finally, instead of enlarging our sample by including Belarus banks, we experiment with adding banks from various control countries. These countries are typically assumed to have close economic ties to Russia, including the member countries of the Eurasian Economic Union²¹, but are not targeted by sanctions.²² With this extension, we are able to utilize a triple-differences approach to examine the impact of sanctions. In particular, we are able to separate the effect of financial restrictions against selected Russian banks from the effect of doing business with Russian banks in general, thereby providing additional insights on the effectiveness of sanctions. In the practical implementation of this approach, we augment our extended specification from columns (7) and (8) of Table 2 with a binary variable which is one for (all) non-sanctioned banks from Russia after February 24, 2022 when Russia launched its attack on Ukraine (in addition to the comprehensive set of bank fixed effects).

Table 7 reports the results. Instead of pooling across groups of countries, we tabulate separate estimates for different individual control countries, without emphasizing any specific set of results. That is, each column of Table 7 presents estimates derived from a sample that contains banks from Russia (some of which are sanctioned) and from the country listed in the first line of the column.

Reviewing the results, at least two findings appear to be particularly noteworthy. First, the estimated coefficient on the dummy variable for non-sanctioned banks located in Russia is often indistinguishable from zero at conventional levels of statistical significance. This indicates that payment flows of Russian banks settled in TARGET2 do not systematically deviate from those of banks from many other countries (neighboring to Russia). Exceptions are banks from China, Turkey and the Baltic countries (Estonia, Latvia, and Lithuania), for which payment flows increase significantly relative to those of banks from Russia.

¹⁹ Belarus has been already put under sanctions since 2020 after the human rights violations escalated after the election fraud by president Lukashenko. We are grateful to an anonymous reviewer for making this point.

²⁰ Analogous results for Belarus banks only are tabulated in Appendix 3.

²¹ The member countries of the Eurasian Economic Union are Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia.

²² For the actual selection of countries, we largely follow Chupilkin, Javorcik, and Plekhanov (2023).

Second, the estimated effects of financial sanctions on payment flows of targeted Russian banks remain largely unaffected by this extension. The imposition of restrictive measures significantly reduces cross-border financial transactions from accounts of targeted Russian banks in comparison to other banks, both at home and abroad. Therefore, to the extent that there are any spillovers of targeted measures to non-targeted entities, these spillover effects are likely to be rather small.

We conclude that financial sanctions substantially reduce payment flows processed in TARGET2 from accounts of sanctioned Russian banks. The finding is robust to a battery of sensitivity exercises; it also confirms evidence from other sanctions episodes and less granular data for financial flows. Among the various sanction measures taken, exclusion from SWIFT, a global provider of secure financial messaging services, turns out to have the largest effects.

5. Conclusions

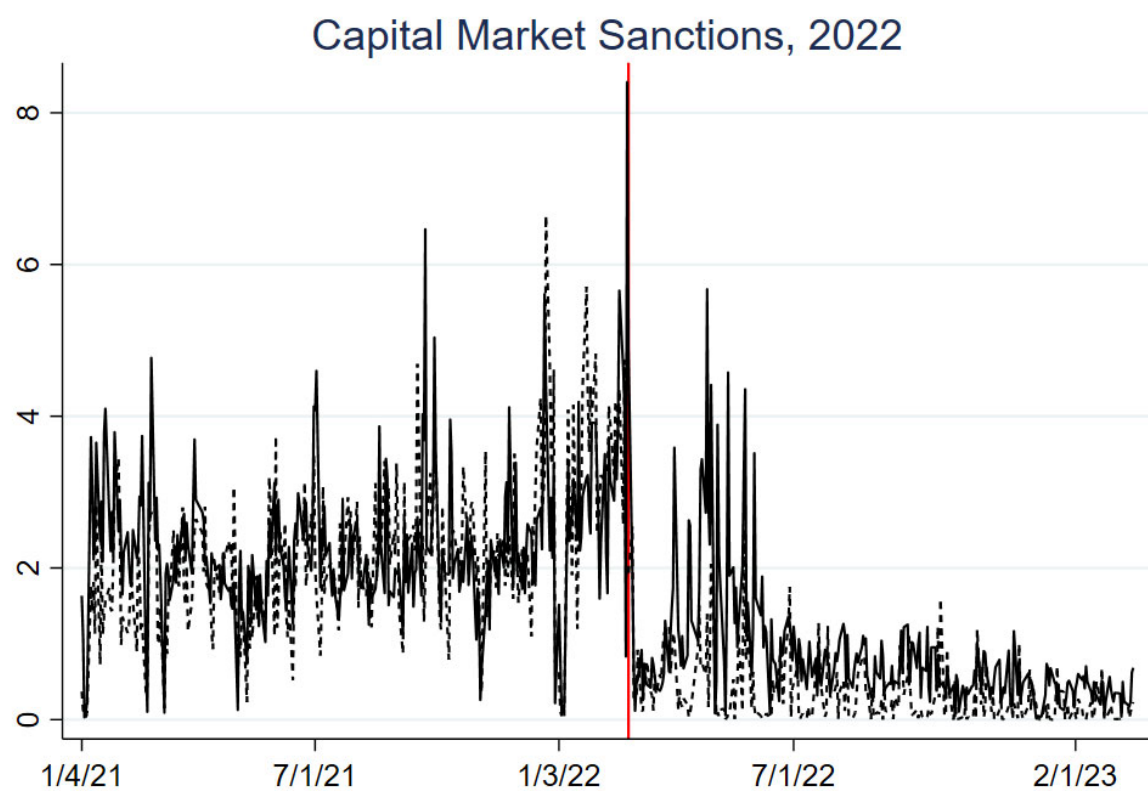
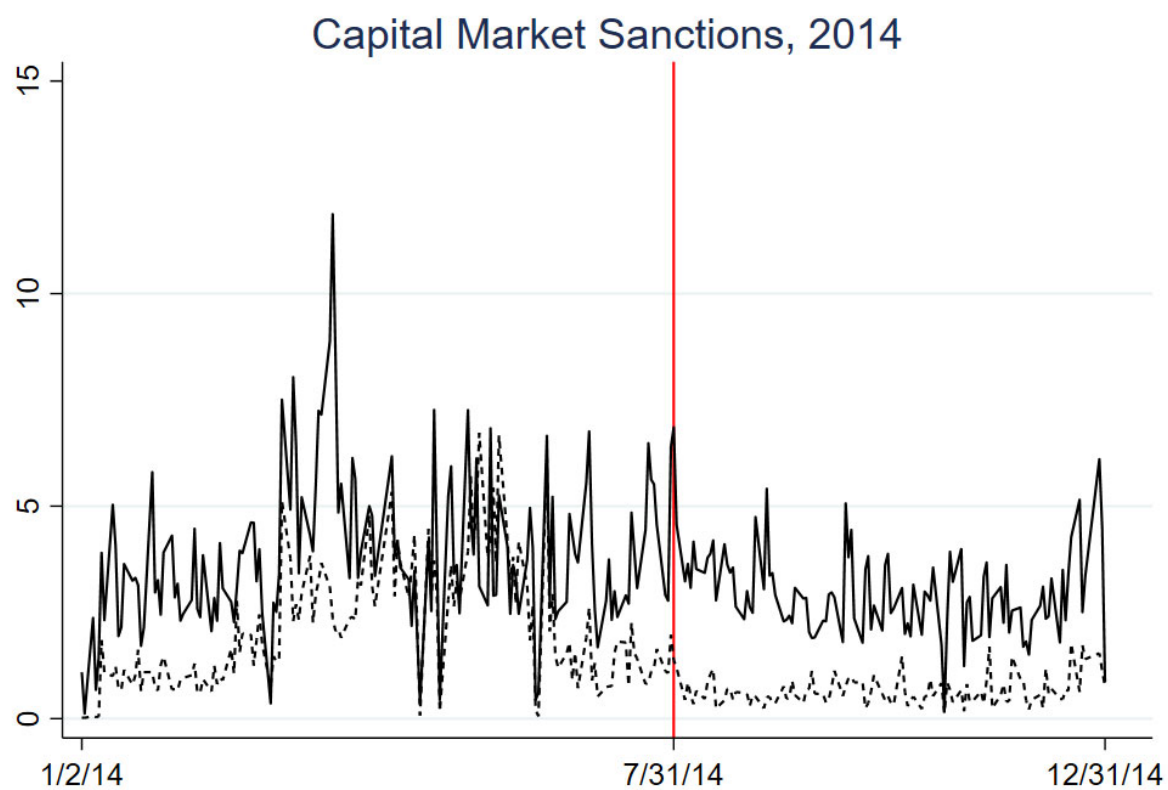
Financial sanctions have measurable economic effects. Analyzing highly disaggregated data on daily payments processed by the European TARGET2 payment system, we find that financial sanctions substantially reduce inflows to and outflows from sanctioned Russian bank accounts. The estimated effect of the 2022 sanctions on financial flows is stronger than that of the 2014 sanctions, which seems plausible since stricter measures have been implemented (including, for instance, exclusion from SWIFT). For sanctions-affected Russian banks, it is, if not impossible, expensive and complex to carry out international transactions (e.g., to facilitate payments for imports and exports). We end with a mild cautionary note when it comes to the interpretation of our results as evidence in favor of the effectiveness of sanctions. Since we only observe transactions settled in TARGET2, potential evasion of sanctions through other payment systems (such as CIPS) cannot be ruled out.

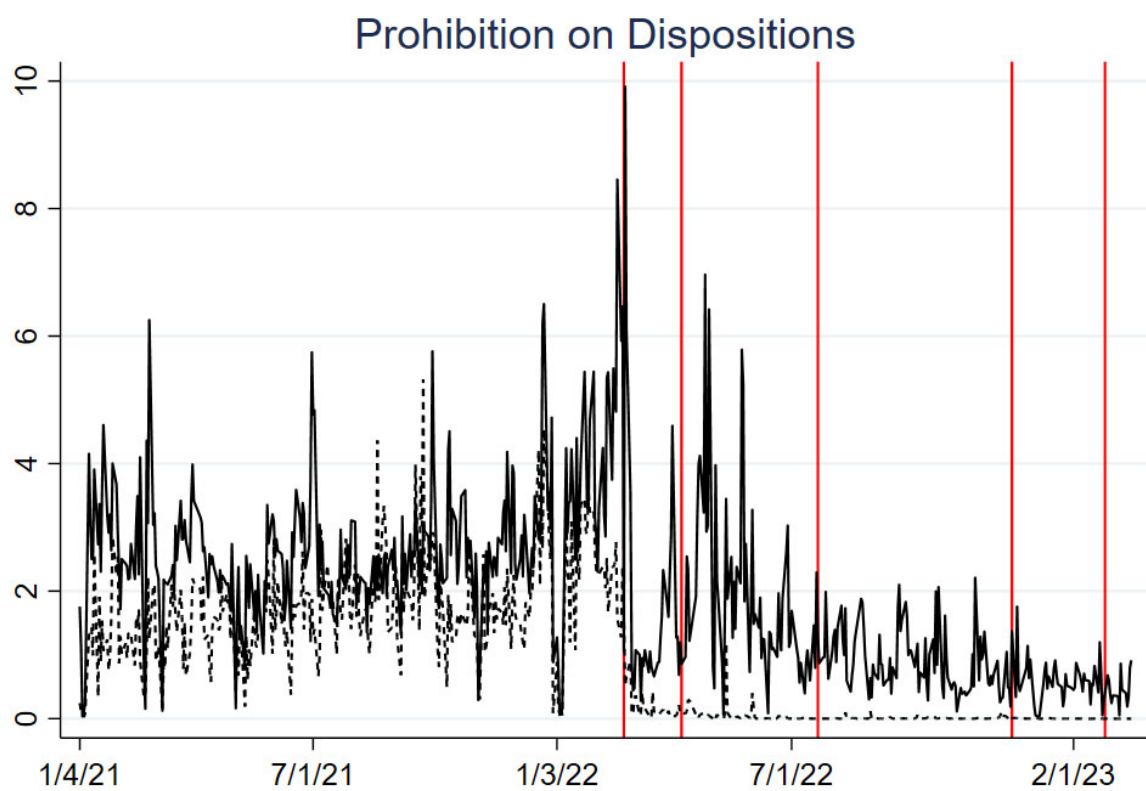
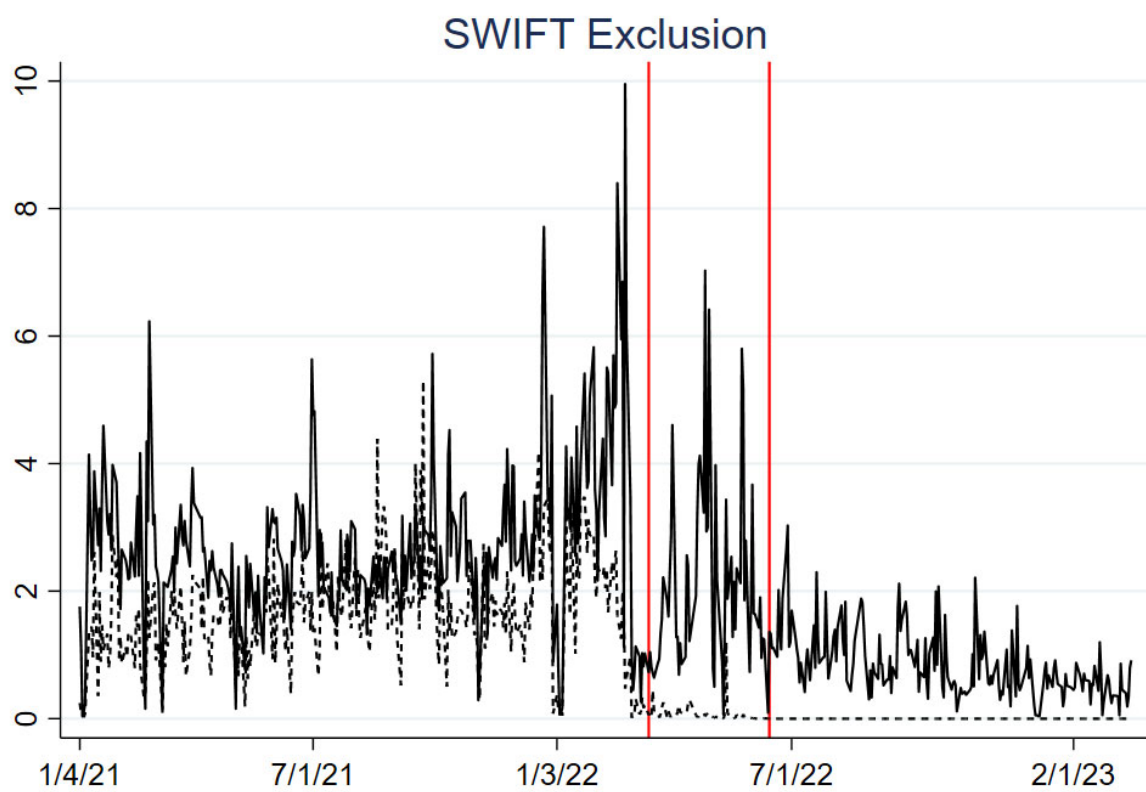
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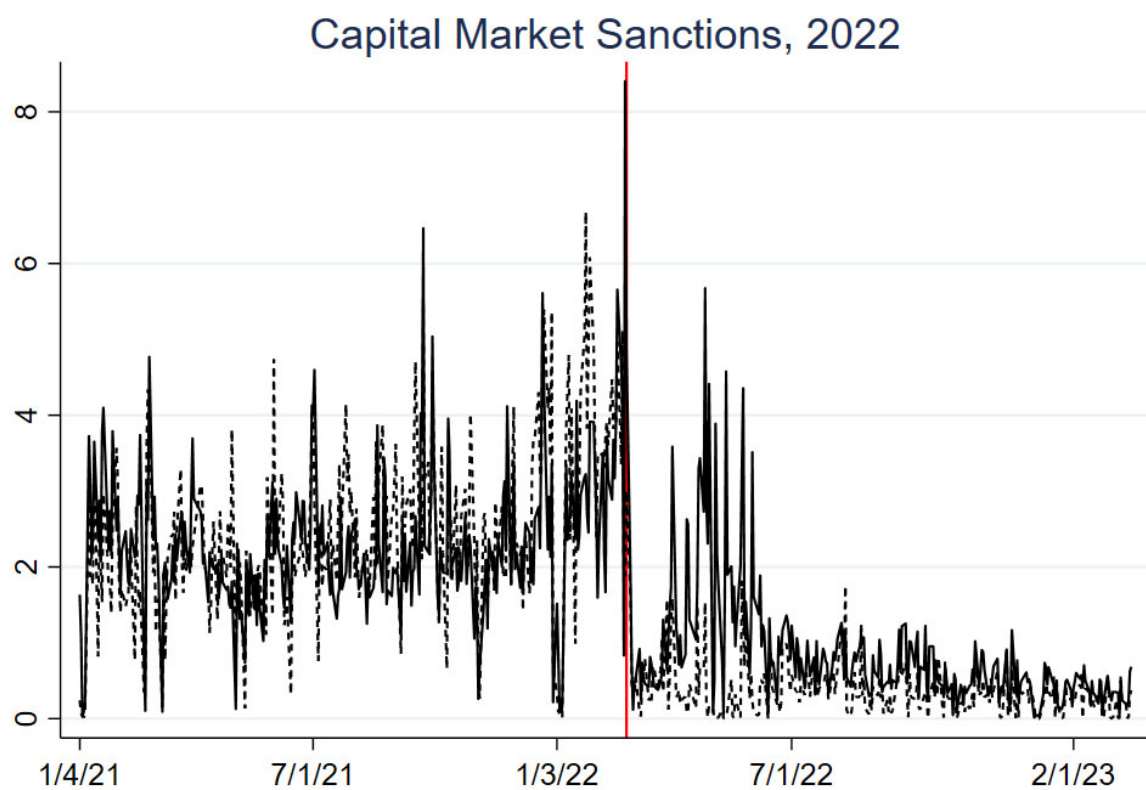
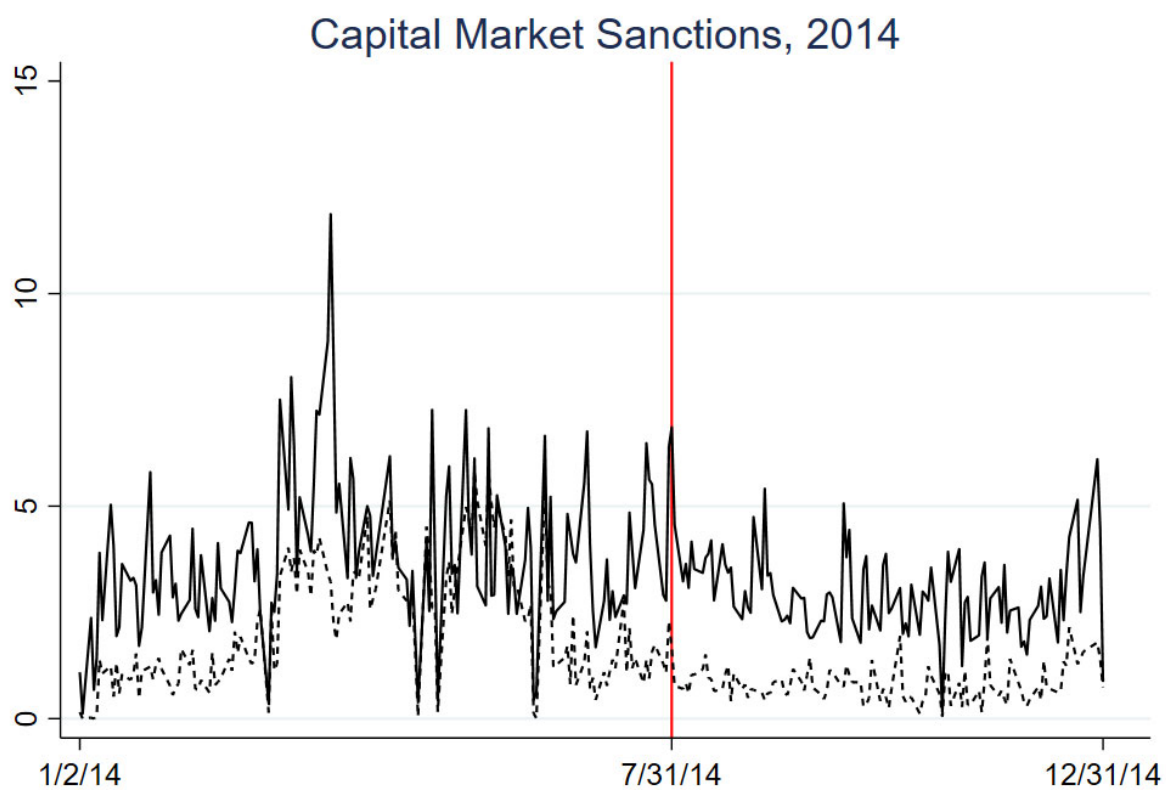
Figure 1: Daily TARGET2 Transactions of Russian Banks (in bn. €)

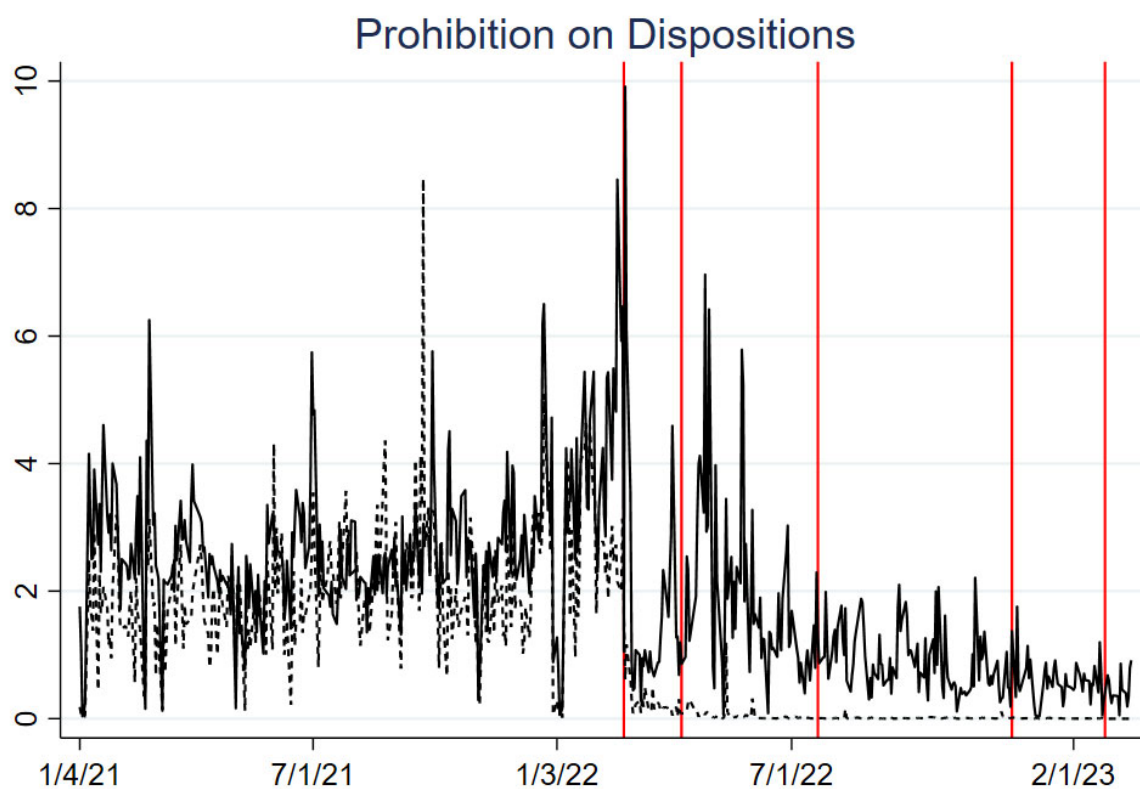
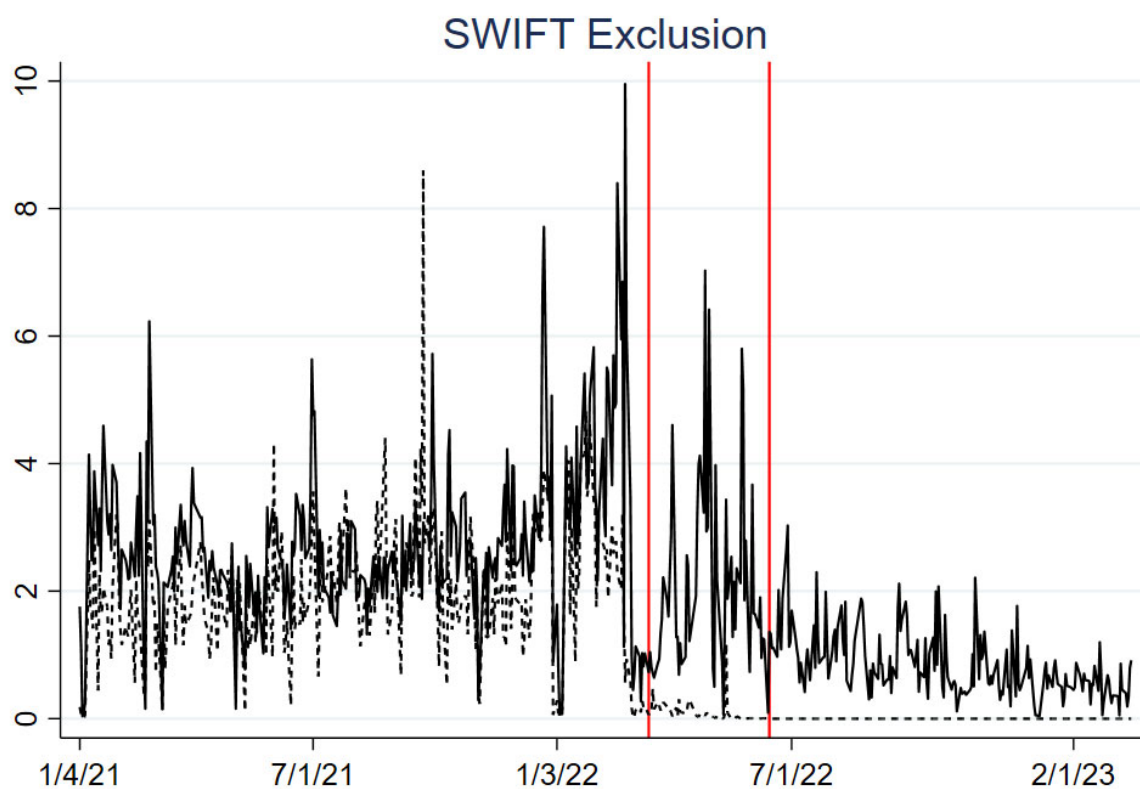
a) Inflows





b) Outflows





Note: The solid (dashed) black line represents the daily payments of non-sanctioned (sanctioned) Russian banks. Red vertical lines illustrate the dates when sanctions against Russian banks were implemented. Source: Own calculations based on TARGET2 transactions data.

Table 1: Financial Sanctions Against Russian Banks (as of March 17, 2023)

Capital Market Sanctions	Exclusion from SWIFT	Prohibitions on Dispositions
Council Regulation (EU) 833/2014 of 31 July 2014; Council Regulation (EU) 2022/328 of 25 February 2022	Council Regulation (EU) 2022/345 of 1 March 2022; Council Regulation (EU) 2022/879 of 3 June 2022	Council Implementing Regulation (EU) 826/2014 of 30 July 2014; Council Implementing Regulation (EU) 2022/260 of 23 February 2022; Council Implementing Regulation (EU) 2022/581 of 8 April 2022
Alfa Bank (2/25/2022)		
Bank Otkritie (2/25/2022)	Bank Otkritie (3/14/2022)	Bank Otkritie (4/8/2022)
Bank Rossiya (2/25/2022)	Bank Rossiya (3/14/2022)	Bank Rossiya (2/23/2022)
	Credit Bank of Moscow (6/14/2022)	Credit Bank of Moscow (12/16/2022)
Gazprombank (7/31/2014)		
		JSC Far Eastern Bank (12/16/2022)
	Novikombank (3/14/2022)	Novikombank (4/8/2022)
Promsvyazbank (2/25/2022)	Promsvyazbank (3/14/2022)	Promsvyazbank (2/23/2022)
		Public JSC Rosbank (2/25/2023)
Rosselkhozbank (7/31/2014)	Rosselkhozbank (6/14/2022)	
		Russian National Commercial Bank (7/30/2014)
Sberbank (7/31/2014)	Sberbank (6/14/2022)	Sberbank (7/21/2022)
	Sovcombank (3/14/2022)	Sovcombank (4/8/2022)
		Tinkhoff Bank JSC (2/25/2023)
VEB (7/31/2014)	VEB (3/14/2022)	VEB (2/23/2022)
VTB Bank (7/31/2014)	VTB Bank (3/14/2022)	VTB Bank (4/8/2022)

Source: European Union.

Table 2: The Effect of Sanctions on Financial Flows

	2014		2022					
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sanctions_{bt} × Post	-0.887*** (0.116)	-0.688*** (0.217)	-2.466*** (0.608)	-2.542*** (0.635)				
Capital Market Sanctions_{bt} × Post					-2.162*** (0.234)	-2.265*** (0.307)	-2.170*** (0.232)	-2.276*** (0.305)
Exclusion from SWIFT_{bt} × Post					-10.022*** (0.375)	-8.758*** (0.680)	-10.031*** (0.389)	-8.766*** (0.680)
Prohibitions on Dispositions_{bt} × Post					-4.864*** (0.778)	-4.955*** (0.880)	-4.864*** (0.779)	-4.955*** (0.880)
Anticipation of Exclusion from SWIFT							-4.709*** (0.671)	-4.912*** (0.562)
# BIC	1,121	1,687	541	588	541	588	541	588
# Business Days	255	255	570	570	570	570	570	570
Observations	285,855	430,185	308,370	335,160	308,370	335,160	308,370	335,160
Adj. R²	0.934	0.923	0.897	0.898	0.909	0.911	0.910	0.912

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January-December 2014 and from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 3: The Effect of Sanctions on Financial Flows at BIC-BIC Level

	2014		2022					
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sanctions_{bt} × Post	-0.549*** (0.211)	-0.409* (0.226)	0.014 (0.405)	-0.080 (0.362)				
Capital Market Sanctions_{bt} × Post					0.057 (0.435)	0.047 (0.417)	0.032 (0.434)	0.034 (0.416)
Exclusion from SWIFT_{bt} × Post					-6.109*** (0.505)	-5.262*** (0.599)	-6.163*** (0.515)	-5.295*** (0.609)
Prohibitions on Dispositions_{bt} × Post					-3.872*** (0.411)	-5.634*** (0.518)	-3.903*** (0.399)	-5.654*** (0.510)
Anticipation of Exclusion from SWIFT							-5.963*** (0.533)	-5.205*** (0.427)
# Dyads	19,300	56,066	19,029	42,942	19,029	42,942	19,029	42,942
# Business Days	255	255	570	570	570	570	570	570
Observations	5,088,015	14,606,282	11,612,086	26,234,186	11,612,086	26,234,186	11,612,086	26,234,186
Adj. R²	0.737	0.766	0.726	0.763	0.726	0.763	0.727	0.764

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a pair of banking accounts (BIC11) where at least one party involves a Russian ultimate sender or ultimate receiver at daily frequency. Data cover the period from January-December 2014 and from January 2021-March 2023, respectively. Dyad and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 4: The Effect of Sanctions on the Extensive Margin of Financial Flows

	2014		2022					
	# Inflows	# Outflows	# Inflows	# Outflows	# Inflows	# Outflows	# Inflows	# Outflows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sanctions_{bt} × Post	-0.050** (0.020)	0.017 (0.024)	-1.939*** (0.523)	-2.218*** (0.413)				
Capital Market Sanctions_{bt} × Post					-1.564*** (0.137)	-1.879*** (0.134)	-1.574*** (0.136)	-1.890*** (0.133)
Exclusion from SWIFT_{bt} × Post					-4.496*** (0.234)	-6.731*** (0.291)	-4.506*** (0.234)	-6.741*** (0.292)
Prohibitions on Dispositions_{bt} × Post					-1.981*** (0.322)	-4.641*** (0.488)	-1.982*** (0.322)	-4.640*** (0.488)
Anticipation of Exclusion from SWIFT							-2.086*** (0.294)	-2.606*** (0.371)
# Dyads	1,121	1,687	541	588	541	588	541	588
# Business Days	255	255	570	570	570	570	570	570
Observations	285,855	430,185	308,370	335,160	308,370	335,160	308,370	335,160
Adj. R²	0.740	0.763	0.812	0.813	0.837	0.843	0.838	0.844

Notes: PPML estimation. The dependent variable is the number of transactions specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January-December 2014 and from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 5: The Effect of Sanctions on Financial Flows with Staggered Difference-in-Differences Estimation

	Borusyak, Jaravel and Spiess (BJS)		Callaway and Sant'Anna (CS)	
	Log Inflows	Log Outflows	Log Inflows	Log Outflows
	(1)	(2)	(3)	(4)
Sanctions_{bt} × Post	-1.277** (0.530)	-2.490*** (0.542)	-0.715 (0.462)	-2.368*** (0.530)
Observations	29,970	29,970		

Notes: OLS estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 6: The Effect of Sanctions on Financial Flows with Belarus and Russia

	2022					
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)
Sanctions_{bt} × Post	-2.463*** (0.603)	-2.553*** (0.625)				
Capital Market Sanctions_{bt} × Post			-2.142*** (0.223)	-2.257*** (0.291)	-2.153*** (0.222)	-2.271*** (0.290)
Exclusion from SWIFT_{bt} × Post			-9.999*** (0.371)	-8.747*** (0.675)	-10.012*** (0.384)	-8.759*** (0.675)
Prohibitions on Dispositions_{bt} × Post			-4.880*** (0.783)	-4.973*** (0.885)	-4.882*** (0.784)	-4.974*** (0.885)
Anticipation of Exclusion from SWIFT					-4.977*** (0.561)	-4.443*** (0.548)
# BIC	590	616	590	616	590	616
# Business Days	570	570	570	570	570	570
Observations	336,300	351,120	336,300	351,120	336,300	351,120
Adj. R²	0.893	0.892	0.904	0.905	0.905	0.906

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Belarusian and a Russian (pooled) banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 7: The Effect of Sanctions on Financial Flows with Control Countries

Control Country	Armenia		Azerbaijan		China	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(7)	(8)
Russia × Post	0.229 (0.521)	0.229 (0.521)	0.140 (0.484)	-0.002 (0.543)	-0.696** (0.333)	-0.800** (0.370)
Russia × Capital Market Sanctions × Post	-2.039*** (0.436)	-2.039*** (0.436)	-2.118*** (0.388)	-2.308*** (0.454)	-3.009*** (0.101)	-3.160*** (0.121)
Russia × Exclusion from SWIFT × Post	-9.925*** (0.536)	-9.925*** (0.536)	-9.999*** (0.492)	-8.817*** (0.790)	-10.822*** (0.314)	-9.584*** (0.633)
Russia × Prohibitions on Dispositions × Post	-4.968*** (0.786)	-4.968*** (0.786)	-5.198*** (0.809)	-5.338*** (0.921)	-5.855*** (0.846)	-5.894*** (0.938)
Russia × Anticipation of Exclusion from SWIFT	-4.618*** (0.628)	-4.618*** (0.628)	-4.685*** (0.627)	-4.950*** (0.556)	-5.323*** (0.648)	-5.380*** (0.546)
# BIC	559	559	571	617	2,347	2,272
# Business Days	570	570	570	570	570	570
Observations	318,630	318,630	325,470	351,690	1,337,790	1,295,040
Adj. R²	0.906	0.906	0.902	0.904	0.935	0.936

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 7: The Effect of Sanctions on Financial Flows with Control Countries (Continued)

Control Country	Estonia		Georgia		Iran		Kyrgyzstan	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Russia × Post	-2.153*** (0.574)	-0.172 (0.456)	0.207 (0.509)	0.055 (0.571)	0.343 (0.595)	0.171 (0.647)	0.323 (0.582)	0.149 (0.632)
Russia × Capital Market Sanctions × Post	-4.512*** (0.508)	-2.495*** (0.329)	-2.063*** (0.420)	-2.264*** (0.489)	-1.923*** (0.525)	-2.142*** (0.583)	-1.942*** (0.510)	-2.164*** (0.565)
Russia × Exclusion from SWIFT × Post	-12.041*** (0.707)	-9.016*** (0.709)	-9.954*** (0.523)	-8.781*** (0.816)	-9.819*** (0.612)	-8.663*** (0.881)	-9.836*** (0.599)	-8.683*** (0.869)
Russia × Prohibitions on Dispositions × Post	-6.722*** (0.944)	-5.359*** (0.905)	-4.949*** (0.786)	-5.129*** (0.906)	-4.489*** (0.654)	-5.078*** (0.914)	-4.900*** (0.795)	-5.098*** (0.912)
Russia × Anticipation of Exclusion from SWIFT	-5.366*** (0.746)	-5.093*** (0.530)	-4.613*** (0.631)	-4.899*** (0.572)	-4.489*** (0.654)	-4.807*** (0.622)	-4.507*** (0.649)	-4.822*** (0.612)
# BIC	570	605	585	608	558	611	565	612
# Business Days	570	570	570	570	570	570	570	570
Observations	324,900	344,850	333,450	346,560	318,060	348,270	322,050	348,840
Adj. R²	0.891	0.896	0.906	0.908	0.910	0.912	0.910	0.912

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 7: The Effect of Sanctions on Financial Flows with Control Countries (Continued)

Control Country	Kazakhstan		Lithuania		Latvia		Tajikistan	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Russia × Post	0.028 (0.439)	-0.126 (0.487)	-2.170*** (0.538)	-0.325 (0.410)	-1.875*** (0.573)	-0.137 (0.453)	0.343 (0.596)	0.172 (0.649)
Russia × Capital Market Sanctions × Post	-2.245*** (0.325)	-2.451*** (0.375)	-4.545*** (0.479)	-2.654*** (0.248)	-4.224*** (0.497)	-2.462*** (0.325)	-1.923*** (0.526)	-2.142*** (0.585)
Russia × Exclusion from SWIFT × Post	-10.134*** (0.428)	-8.977*** (0.735)	-12.012*** (0.677)	-9.148*** (0.675)	-11.780*** (0.651)	-8.959*** (0.724)	-9.819*** (0.613)	-8.663*** (0.882)
Russia × Prohibitions on Dispositions × Post	-5.061*** (0.783)	-5.213*** (0.902)	-6.843*** (0.938)	-5.434*** (0.899)	-6.505*** (0.927)	-5.298*** (0.902)	-4.878*** (0.798)	-5.078*** (0.914)
Russia × Anticipation of Exclusion from SWIFT	-4.815*** (0.622)	-5.079*** (0.527)	-5.380*** (0.690)	-5.197*** (0.518)	-5.339*** (0.757)	-5.058*** (0.524)	-4.489*** (0.654)	-4.806*** (0.622)
# BIC	600	644	668	654	581	611	559	611
# Business Days	570	570	570	570	570	570	570	570
Observations	342,000	367,080	380,760	372,780	331,170	348,270	318,630	348,270
Adj. R²	0.898	0.900	0.916	0.900	0.884	0.902	0.910	0.912

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table 7: The Effect of Sanctions on Financial Flows with Control Countries (Continued)

Control Country	Turkmenistan		Turkey		Uzbekistan	
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)
Russia × Post	0.341 (0.594)	0.174 (0.650)	-1.166*** (0.370)	-1.252*** (0.401)	0.224 (0.523)	0.064 (0.579)
Russia × Capital Market Sanctions × Post	-1.925*** (0.524)	-2.139*** (0.586)	-3.474*** (0.181)	-3.618*** (0.191)	-2.045*** (0.438)	-2.253*** (0.499)
Russia × Exclusion from SWIFT × Post	-9.819*** (0.602)	-8.661*** (0.883)	-11.166*** (0.380)	-9.925*** (0.680)	-9.923*** (0.529)	-8.758*** (0.827)
Russia × Prohibitions on Dispositions × Post	-4.881*** (0.797)	-5.076*** (0.914)	-6.376*** (0.908)	-6.333*** (0.970)	-4.938*** (0.787)	-5.121*** (0.907)
Russia × Anticipation of Exclusion from SWIFT	-4.494*** (0.652)	-4.805*** (0.623)	-5.736*** (0.630)	-5.832*** (0.543)	-4.589*** (0.634)	-4.898*** (0.574)
# BIC	550	597	1,365	1,293	597	647
# Business Days	570	570	570	570	570	570
Observations	313,500	340,290	778,050	737,010	340,290	368,790
Adj. R²	0.910	0.912	0.944	0.947	0.906	0.908

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Russian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Appendix 1: Details of Sanctions Regulations (as of August 29, 2022)

Capital Market Sanctions	<p>The sanctions are defined in detail in Article 5 of Council Regulation (EU) 833/2014:</p> <p>“1. It shall be prohibited to directly or indirectly purchase, sell, provide investment services for or assistance in the issuance of, or otherwise deal with transferable securities and money-market instruments with a maturity exceeding 90 days, issued after 1 August 2014 to 12 September 2014, or with a maturity exceeding 30 days, issued after 12 September 2014 to 12 April 2022 or any transferable securities and money market instruments issued after 12 April 2022 by: (a) a major credit institution, or other major institution having an explicit mandate to promote competitiveness of the Russian economy, its diversification and encouragement of investment, established in Russia with over 50 % public ownership or control as of 1 August 2014, as listed in Annex III; or (b) a legal person, entity or body established outside the Union whose proprietary rights are directly or indirectly owned for more than 50 % by an entity listed in Annex III; or (c) a legal person, entity or body acting on behalf or at the direction of an entity referred to in point (b) of this paragraph or listed in Annex III.</p> <p>2. It shall be prohibited to directly or indirectly, purchase, sell, provide investment services for or assistance in the issuance of, or otherwise deal with transferable securities and money-market instruments issued after 12 April 2022 by: (a) any major credit institution, or other institution with over 50 % public ownership or control as of 26 February 2022 or any other credit institution having a significant role in supporting the activities of Russia, its government or the Central Bank and established in Russia, as listed in Annex XII; or (b) a legal person, entity or body established outside the Union whose proprietary rights are directly or indirectly owned for more than 50 % by an entity listed in Annex XII; or (c) a legal person, entity or body acting on behalf or at the direction of an entity referred to in point (a) or (b) of this paragraph.”</p>
Exclusion from SWIFT	<p>According to Article 5h of Council Regulation (EU) 2022/345:</p> <p>“1. It shall be prohibited to provide specialised financial messaging services, which are used to exchange financial data, to the legal persons, entities or bodies listed in Annex XIV or to any legal person, entity or body established in Russia whose proprietary rights are directly or indirectly owned for more than 50 % by an entity listed in Annex XIV.</p> <p>2. For each legal person, entity or body listed in Annex XIV, the prohibition set out in paragraph 1 shall apply as of the date mentioned for it in that Annex. The prohibition shall apply as of the same date to any legal person, entity or body established in Russia whose proprietary rights are directly or indirectly owned for more than 50 % by an entity listed in Annex XIV.”</p>
Prohibitions on Dispositions	<p>In Article 2 of Council Regulation (EU) 269/2014 it is specified:</p> <p>“1. All funds and economic resources belonging to, owned, held or controlled by any natural persons or natural or legal persons, entities or bodies associated with them as listed in Annex I shall be frozen.</p> <p>2. No funds or economic resources shall be made available, directly or indirectly, to or for the benefit of natural persons or natural or legal persons, entities or bodies associated with them listed in Annex I.”</p>

Appendix 2: Financial Sanctions Against Belarus Banks (as of March 17, 2023)

Capital Market Sanctions	Exclusion from SWIFT
Council Regulation (EU) 2021/1030 of 24 June 2021; Council Regulation (EU) 2022/398 of 9 March 2022	Council Regulation (EU) 2022/398 of 9 March 2022; Council Regulation (EU) 2022/877 of 3 June 2022
Belarusbank (6/24/2021)	
Belinvestbank (6/24/2021)	Belinvestbank (6/14/2022)
Belagroprombank (6/24/2021)	Belagroprombank (3/20/2022)
Bank Dabrabyt (3/9/2022)	Bank Dabrabyt (3/20/2022)
Development Bank of the Republic of Belarus (3/9/2022)	Development Bank of the Republic of Belarus (3/20/2022)

Source: European Union.

Appendix 3: The Effect of Sanctions on Financial Flows (Belarus only)

	2022					
	Inflows	Outflows	Inflows	Outflows	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)	(6)
Sanctions_{bt} × Post	0.058 (0.571)	-0.110 (0.594)				
Capital Market Sanctions_{bt} × Post			0.142 (0.520)	-0.011 (0.539)	0.152 (0.511)	-0.001 (0.531)
Exclusion from SWIFT_{bt} × Post			-6.293*** (0.937)	-3.849*** (0.412)	-2.062* (1.248)	-0.667 (0.434)
Anticipation of Exclusion from SWIFT					-4.254*** (0.767)	-3.207*** (0.712)
# BIC	48	27	48	27	48	27
# Business Days	570	570	570	570	570	570
Observations	27,360	15,390	27,360	15,390	27,360	15,390
Adj. R²	0.796	0.732	0.802	0.739	0.802	0.740

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a Belarusian banking account (BIC11) at daily frequency. Data cover the period from January 2021-March 2023, respectively. Banking account and daily fixed effects are included but not reported. Robust standard errors (clustered by banking account) in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

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