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Smart or smash?
The effect of financial sanctions on trade in goods and services

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Non-technical summary

Research Question

The recent empirical literature shows that financial sanctions reduce German cross-border financial flows with sanctioned countries. Against this background, this research project deals with the question of whether financial sanctions also affect trade in goods and services. We compare the effect of financial sanctions on cross-border financial flows with their effect on flows of goods and services. The latter can be interpreted as a spillover effect.

Contribution

In our study, we use four data sets. The main data set is based on information from the Deutsche Bundesbank's service centre “Financial Sanctions" and contains data on financial sanctions that Germany implemented between January 2001 and September 2020. This data was collected by the authors themselves and enriched by own investigations. The list includes 29 episodes of sanctions that freeze financial assets and resources of individuals and/or companies/organizations. About half of the financial sanctions also include export restrictions on specific goods that might be used for military purposes. This applies to nuclear technology, chemicals or military equipment, among other things. We match this information with three other data set: data on trade in goods from Eurostat (Comext), data on trade in services (“International Trade in Services Statistics”) and data on cross-border capital flows (“Statistics on International Financial and Capital Transactions”) from Deutsche Bundesbank.

Results

Financial sanctions reduce cross-border capital flows by around 50%. In addition, the effects of financial sanctions seem to spill over to trade in goods and services: trade in goods falls by 25% and in services by 33%. Additional analyses take into account the information on export restrictions. Financial sanctions affect trade in goods only negatively if countries also imposed export restrictions during the sanction episodes. The decline in trade in services, on the other hand, cannot be explained by the additional export restrictions and is therefore linked to the financial sanctions. A possible explanation for this observation is that financial sanctions tend to affect financial services negatively, in contrast to services such as the cross-border transport of goods.

In the current geopolitical environment, countries have imposed much stronger sanctions against Russia since the end of February 2022. These restrictions exceed the measures in the period under review in this research project. In addition, several large multinationals from Western countries have withdrawn business from the Russian market. This is likely to have an

additional negative effect on cross-border activities with Russia. Against this background, the results of this study serve as a likely lower limit for the effect of financial sanctions.

Nichttechnische Zusammenfassung

Fragestellung

Frühere Studien zeigen, dass Finanzsanktionen die grenzüberschreitenden Kapitalströme Deutschlands mit den sanktionierten Ländern reduzieren. Vor diesem Hintergrund beschäftigt sich die vorliegende Studie mit der Frage, ob Finanzsanktionen ebenfalls den Handel mit Waren und Dienstleistungen beeinflussen. Wir vergleichen den Effekt von Finanzsanktionen auf grenzüberschreitende Kapitalströme mit deren Effekt auf Waren- und Dienstleistungsströme. Letzterer Effekt kann als Übertragungseffekt interpretiert werden.

Beitrag

In unserer Studie verwenden wir insgesamt vier Datensätze. Der zentrale Datensatz basiert auf Informationen vom Servicezentrum „Finanzsanktionen" der Deutschen Bundesbank und beinhaltet Daten zu Finanzsanktionen, welche Deutschland zwischen Januar 2001 und September 2020 implementiert hat. Diese Daten wurden von den Autoren selbst zusammengestellt und mit Hilfe zusätzlicher Recherchen erweitert. Die Liste umfasst 29 Sanktionsepisoden, bei denen finanzielle Vermögenswerte und Ressourcen von Privatpersonen und/oder Unternehmen/Organisationen eingefroren werden. Ungefähr die Hälfte der Finanzsanktionen umfasst ebenfalls Exportrestriktionen von bestimmten Gütern, welche militärisch genutzt werden können. Dies betrifft unter anderem Nukleartechnologie, Chemikalien oder militärische Ausrüstung. Diese Informationen werden mit drei weiteren Datenätzen verknüpft: Daten zum Güterhandel von Eurostat (Comext), Daten zum Dienstleistungshandel („International Trade in Services Statistics") sowie Daten über grenzüberschreitende Kapitalströme („Statistics on International Financial and Capital Transactions") der Deutschen Bundesbank.

Ergebnisse

Finanzsanktionen reduzieren grenzüberschreitende Kapitalströme um ungefähr 50%. Außerdem scheinen sich die Effekte von Finanzsanktionen vermeintlich auf den Handel von Waren und Dienstleistungen zu übertragen: die Geschäfte verringern sich bei Waren um 25% und bei Dienstleistungen um 33%. Zusätzliche Analysen berücksichtigen die Informationen zu den Exportrestriktionen. Der Warenhandel ist nur negativ signifikant von Finanzsanktionen betroffen, wenn bei den Sanktionsepisoden auch explizit Exportrestriktionen auferlegt wurden. Der Rückgang im Handel von Dienstleistungen hingegen kann nicht durch die zusätzlichen Exportrestriktionen erklärt werden und steht somit in Verbindung mit den Finanzsanktionen. Eine mögliche Erklärung für diese Beobachtung ist, dass eher Finanzdienstleistungen von den

Finanzsanktionen negativ betroffen sind als beispielsweise Dienstleistungen in Verbindung mit grenzüberschreitendem Warentransport.

Im aktuellen geopolitischen Umfeld wurden seit Ende Februar 2022 gegen Russland sehr viel stärkere Sanktionen verhängt. Diese gehen über die Maßnahmen hinaus, die im Betrachtungszeitraum des Forschungspapiers gültig waren. Außerdem haben sich einige große multinationale Unternehmen der westlichen Länder aus dem russischen Markt zurückgezogen. Dies dürfte einen zusätzlichen negativen Effekt auf die grenzüberschreitende Geschäftstätigkeit mit Russland haben. Die vorliegenden Ergebnisse selbst sollten daher eher als mögliche Untergrenze des Effektes von Finanzsanktionen betrachtet werden.

DEUTSCHE BUNDESBANK DISCUSSION PAPER NO 28/2022

Smart or Smash? The Effect of Financial Sanctions on Trade in Goods and Services [1]

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Abstract

We examine the extent to which financial sanctions imposed by Germany through its European Union and United Nations commitments cause collateral damage on Germany's trade in goods and services. Financial sanctions reduce Germany's inflows and outflows of financial assets, as well as imports and exports of goods and services. The relative effects on trade in goods and services are weaker than on financial assets, about half as large in the case of goods and two-thirds as large in the case of services. The effect on trade in goods is entirely due to episodes where financial sanctions are accompanied by export restrictions of specific goods. In the case of services trade, only exports are affected by financial sanctions once export restrictions are considered. The primary channel through which sanctions affect the three types of cross-border flows is the extensive margin. Anticipation effects are quite strong for financial assets and weak for services and goods.

Keywords: sanction; restriction; cross-border transaction, trade in goods, trade in services financial flows

JEL Classification Codes: F20; F36; F38

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1. Introduction

Sanctions have long been used as a foreign policy tool to achieve a variety of objectives. Dating back at least to the ancient Greeks and the Megarian decree of Athenians in 435 BC, sanctions have been in place throughout history, with various degrees of frequency and intensity, from U.S. sanctions of France and Great Britain during the Napoleonic wars to sanctions imposed on South Africa's apartheid regime in the 1980s and, most recently, sanctions against Russia and Iran (Drezner, 1999). While sanctions often vary in their mechanics and specific targets, their goal is usually similar – to inflict economic pain to force a change in policy. As documented by Felbermayr et al. (2020b) sanctions are either complete, trying to fully cutoff the target, or partial, aiming at a subset of activities or specific actors and their access to the global economy. The more recent cases of sanctions tend to be of the partial kind and policy makers have started referring to them as smart: targeting only specific activities and specific individuals, firms and organizations, thereby minimizing their spillover effects or collateral damage.

Apart from classifying sanctions as partial or complete, Felbermayr et al. (2020b) distinguish between six types of sanctions: trade, financial, travel restrictions, arms, military assistance, and other (which primarily entail diplomatic measures). The primary objective of each type of sanctions is obvious. Trade sanctions are designed to reduce trade between the sender country, the country imposing sanctions, and the target country, the country being sanctioned. As shown by Felbermayr et al. (2020b) in a large cross-country sample, trade sanctions do indeed reduce trade between sender and target. Similarly, financial sanctions reduce cross-border financial flows as shown by Besedeš et al. (2017). Travel restrictions limit travel between the two countries and are usually imposed by prohibiting specific individuals from entering the sender country. In addition to the direct consequences of sanctions, however, there is the possibility and open question of secondary effects, that the effect of one type of sanctions may spill over into another sphere of cross-border interactions and, therefore, cause collateral damage. Perhaps the most obvious connection is the possibility of financial sanctions to reduce trade flows between the target and sender country. After all, to conduct trade, money or finance must flow between countries.[2] If the flow of money is curtailed, it only stands to reason that there will be an accompanying reduction in trade. Indeed, Felbermayr et al. (2020b) find some evidence, albeit weak, of these spillover effects in their cross-country study where

[2] Apart from rare exception cases such as barter trade.

they show that trade between sender and target countries is reduced not only by trade sanctions, but also by financial sanctions.

This paper extends our efforts to understand the effects of financial sanctions imposed by Germany based on it being both a member of the European Union (EU) and the United Nations (UN).[3] In the first analysis we showed that financial sanctions reduce German cross-border financial flows by about 50% (Besedeš et al. 2017). In another exercise (Besedeš et al. 2021) we examined how precise, or how smart, these sanctions are in terms of which types of firms they affect. We focused on the performance of non-financial firms and showed that while financial sanctions reduce financial flows, they have no adverse effect on broader measures of firm performance such as employment or total sales. This may be because German non-financial firms affected by these sanctions tend to be disproportionately large and are able to expand their activities with non-sanctioned countries. Finally, Efing et al. (2018) reveal that banks located in Germany decrease external positions in sanctioned countries while branches and subsidiaries abroad do not respond. For affiliated banks located in countries with low financial standards, they even observe a relative increase in credit supply.

In this paper we turn our attention to the question of whether financial sanctions affect international trade. We investigate the effect of financial sanctions on trade in goods and services, respectively. To properly gauge this secondary effect of financial sanctions, the spillover into other activities or collateral damage, we also re-examine the effect on German cross-border financial flows, allowing us to compare the magnitudes of the primary or direct effect and the secondary or the spillover effect. We do so by using four different data sets. One reflects financial sanctions imposed by Germany between 2001 and 2020; it is an update of data used by Besedeš et al. (2017) which reflected only the period between 2005 and 2014. This information is combined with three different data sets: data on merchandise trade sourced from Eurostat and data on trade in services as well as cross-border financial flows sourced from the Deutsche Bundesbank. Our data span the period between January 2001 and September 2020. We also take advantage of one feature of financial sanctions imposed by Germany. While all 29 episodes of sanctions in our data are sanctions that freeze financial assets and economic resources, slightly less than half of them also come with export restrictions on a set of specific products, largely tied to military use such as nuclear technology, chemicals, or military equipment. This feature allows us to explore whether any collateral damage is due to financial

[3] Since European Union member countries are committed to the Common Foreign and Security Policy, any sanctions imposed by Germany have been imposed by the EU in the first place.

sanctions themselves, or the differential effect of these additional features. As we show, this additional dimension of some sanction measures is indeed relevant.

We uncover three main results. First, while we find some evidence of collateral damage, its extent is typically limited to a subset of goods and does not uniformly affect all trade. As an example, financial sanctions reduce German merchandise exports and imports by about one half as much as they reduce financial flows. However, this reduction is entirely due to those financial sanctions that were accompanied by restrictions on German exports. As a result, such a reduction in trade should not be considered as collateral damage. Rather, it is consistent with the idea of sanctions being smart: reducing precisely the activity that it targets. Second, the primary channel through which financial sanctions affect cross-border flows is the extensive margin, reducing the number of firms and products engaged in cross-border activities. Third, there are weak anticipation effects in the case of trade in goods and services, but much stronger anticipation effects in cross-border flows of financial assets. Results are almost diametrically opposite in the case of post-sanctions effects.

We contribute to the fast-growing literature on the economic impact of sanctions. Economists' interest in sanctions and their effects waxes and wanes with their use in practice and, perhaps more importantly, with the importance of their target. The most recent uptake in research pertaining to sanctions is due to sanctions imposed on Russia, both in response to its invasion of Crimea in 2014 and the entire Ukraine in 2022, and Iran, in response to its nuclear arms program and support of terrorism. Crozet and Hinz (2020), Miromanova (2019), and Gullstrand (2020) examine the effects of various sanctions on Russia, while Haidar (2017), Draca et al. (2017), and Felbermayr et al. (2020a) examine the consequences of recent sanctions on Iran. Unlike the literature focusing on a single targeted country, our effort examines the effect of several episodes of EU sanctions for a single sender country, Germany, which is more in line with Hufbauer and Oegg (2003), Caruso (2003), Yang et al. (2004), and Afesorgbor (2018). In a much broader effort Felbermayr et al. (2020b) build a new database of 729 sanctions episodes between 1950 and 2016 and demonstrate the extent to which sanctions reduce trade between countries. Dai et al. (2021) use the same data source to examine the timing of the effect of sanctions showing there are significant negative anticipatory effects preceding sanctions as well as negative lagging effects which take eight years to dissipate. Ahn and Ludema (2019, 2020) provide an analysis of the flipside of sanctions imposed on Russia in 2014. Using data on Russian firms they show that firms targeted by sanctions experience losses in operating revenue, asset value, and employees. Similar to our conclusion, though from a

different point of view, they conclude that sanctions on Russia were smart as they had a smaller effect on Russia's macroeconomy than oil prices, indicating that sanctions were affecting intended targets without causing widespread collateral damage.

2. Financial Sanctions in the European Union

Besedeš et al. (2021) describe the implementation of financial sanctions in practice. Member states of the European Union have committed themselves to a Common Foreign and Security Policy. As a result foreign policy instruments are imposed by the Council of the EU. Financial sanctions became an available instrument for external action to EU authorities in 1994 when the Treaty of Maastricht entered into force. Among other aspects, the treaty introduced the free movement of capital as a Treaty freedom. Article 63 of the Treaty of the Functioning of the European Union (TFEU) prohibits all restrictions on payments and movement of capital between member states and between member states and third countries, while Article 215 of TFEU allows for the interruption or reduction, in part or completely, of economic and financial relations with one or more third countries.

For our purposes, two features of sanction policies in the European Union are particularly noteworthy. First, while the Council acts by unanimity, regulations are directly applicable in all EU member states and binding in their entirety. As a result, there is only limited scope for potential concerns of endogeneity, where the decision to impose restrictive measures is affected by their expected domestic costs.

Second, the EU adopts, in practice, a wide range of restrictive measures. These measures often target specific activities and also include restrictions on non-financial activities such as trade embargoes and travel bans. The overwhelming majority of such measures, however, directly and/or indirectly affects cross-border financial relations and are, officially recorded as a financial sanction, the policy instrument of our interest. Embargoes on exports of specific types of goods, for instance, typically involve restrictions on technical assistance, training and financing. Embargoes on exports often pertain to military goods and technology related to potential use in weapons of mass destruction, such as nuclear technology and chemicals. Specific individuals are targeted with travel and are often accompanied by other restrictive measures, such as the freezing of funds and financial assets. Since slightly less than half of sanctions episodes in our sample include export restrictions measures, in addition to the freezing of assets and economic resources, we use that feature to explore the differential effect of export

restrictions being attached to financial sanctions. The measures are also regularly reviewed and frequently adjusted. Besedeš et al. (2017) show that strengthening of sanctions further reduces German cross-border flows, while weakening results in the opposite effect. In this paper, to save space, we generally limit our attention to the distinction of whether a country is sanctioned or not and ignore the intensity of adopted sanction measures.

3. Data

3.1 Data on sanctions and German cross-border activities

Our analysis is based on four datasets, sourced from the Deutsche Bundesbank and Eurostat. The first source of data consists of information on financial sanctions imposed and enforced by Germany and is obtained from the service center 'Financial Sanctions' of the Deutsche Bundesbank as in Besedeš et al. (2017).[4] This unit, which is responsible for the implementation of European Union regulations on financial sanctions in Germany, provides a compilation of executive orders and disseminates relevant information to interested parties and the wider public. We augment this data with additional information from official European Union sources.[5] During our sample period, financial sanctions have been newly imposed on 29 countries. Table 1 provides a list of countries along with a brief description of the measures taken. This table has been updated and extended from Besedeš et al. (2017). Interestingly, while all 29 episodes take the form of financial sanctions by freezing assets and economic resources, 13 of these episodes also provide for some restrictions on exporting to target countries, usually related to goods that could be used for military purposes, such as nuclear technology, chemicals, or military equipment. In our analysis we will take advantage of this difference across sanctions, a difference that will prove to be important.

Sanctions are applied instantaneously, such that there is no time lag between the date of announcement of a sanction and its enforcement. In our empirical analysis, with data at monthly frequency, we code sanctions imposed after the middle of the month as being effective from the beginning of the following month. For six target countries, Liberia, Côte d'Ivoire, Uzbekistan, the Comoros, Eritrea, and the Maldives, sanctions have also been lifted again completely during our sample period and are appropriately coded to reflect the removal of sanctions.

[4] See http://www.bundesbank.de/Navigation/EN/Service/financial_sanctions/.
[5] Common Foreign and Security Policy Decisions and European Union Regulations are published in the Official Journal of the EU; see http://eur-lex.europa.eu/homepage.html.

We use monthly data on German imports and exports at the product level taken from Eurostat. To be fully consistent across all our data sets, we use data on imports and exports between January 2001 and September 2020. Eurostat's Comext database provides data on detailed product-level imports and exports for all EU member countries. Products are classified according to EU's 8-digit Combined Nomenclature (CN) classification reflecting some 9,500 products. The data reporting thresholds are established by EU legislation and provide for different reporting thresholds depending on whether data reflect extra- or intra-EU trade in goods. Any extra-EU transaction involving more than €1,000 in value or 1,000 kilograms in net mass must be reported. For intra-EU trade, given the volume of transactions and trade between EU member countries, reporting thresholds are higher and member-specific and are designed to minimize the reporting burden imposed on businesses, especially smaller ones. Four different thresholds are used to determine whether businesses must report their intra-EU trade, with the first three based on the annual value of trade and the last one based on a per-transaction basis. The annual trade thresholds are the exemption, simplification, and statistical value thresholds. Under the exemption threshold member countries can exempt businesses from reporting their trade provided that at least 97% of their intra-EU exports by value and 93% of their intra-EU imports (95% until 2013) are covered and reported according to Eurostat (2020). The simplification threshold allows businesses with annual trade above the exemption threshold but below the simplification threshold to report a limited set of data or use a simplified commodity code. Trade reported by these reporting units may cover at most 6% of a member's total trade. The statistical value threshold, which was discontinued in 2014, allowed member states to collect the statistical value from their largest reporting units whose overall share of total trade may not exceed 70%. In terms of individual transactions, member states are allowed not to report any transaction that is less than €200. For each product, data report the value of trade, the partner country involved, and a measure of quantity (either units or weight, which we do not use).

We source data on trade in services and cross-border capital flows from two confidential micro data sets from the Deutsche Bundesbank. Given the sensitivity of the business information involved, these data are only accessible, often in anonymized form, at the headquarters of the Bundesbank in Frankfurt, Germany. To compile the balance of payments statistics, the Deutsche Bundesbank collects data on trade in services at the firm level at the monthly frequency. Data are made available through the 'International Trade in Services Statistics' (SITS) database which records service transactions using the residence principle, between residents and non-residents, which exceed €12,500 or its equivalent in another

currency. The database covers almost the entire population of German service exporters and importers[6]; it comprises data in three of the four modes of the General Agreement of Trade in Services, though in an aggregate fashion precluding the ability of conducting a mode-specific analysis.[7] Services are categorized according to the sixth edition of IMF's Balance of Payments and International Investment Position Manual (BPM6).

The SITS database provides information on the reporting unit, the value of each transaction, the type of service involved according to the balance of payments classification, country of destination or origin, and sector of the party required to report. A total of twelve different types of services are reflected in the data: product-related, enterprise-related, personal, intellectual property, telecommunications, construction, transport, insurance, travel, private transfers, transactions by the federation, and other. Taxes are included in reported transaction values. While the original data are reported at the firm level, in order to avoid granularity problems, we perform much of our analysis at the country-month level.

Data on cross-border capital flows are similarly sourced from the Deutsche Bundesbank's balance of payments statistics and are obtained from the Deutsche Bundesbank's 'Statistics on International Financial and Capital Transactions' (SIFCT) database which contains detailed information on financial transactions between Germany and the rest of the world. Data are collected at monthly frequency for the purpose of compiling the balance of payments statistics. The data set is complete with all individuals, firms, and financial institutions in Germany required to report international payments over €12,500. The data reflect the reporting unit, the partner country of each transaction as well as the value and the type of asset involved. To better compare our results to trade in goods and services, we only focus on financial transactions involving German investors, since trade in goods and services reflects the behavior of German firms and consumers. Thus, we focus on capital exports, claims of German investors against foreigners, and capital imports, liabilities of German investors against foreigners.

[6] The Bundesbank supplements the data with estimates for transactions that are below the reporting threshold and for some service categories for which the demanded methodology cannot be reported, such as transportation.
[7] The three modes are cross-border trade (mode 1), consumption abroad (mode 2), and presence of natural persons (mode 4). The missing mode is commercial presence (mode 3).

3.2 Descriptive statistics

The basic reporting unit differs across the three data sets on Germany's cross-border flows. Consequently, in view of this difference, we will largely refer to them as declarants or reporting units, rather than firms or products throughout the paper. Data sourced from Eurostat provide information on Germany's merchandise trade with the basic reporting unit reflecting a product classified under EU's 8-digit CN product classification and are reported on a monthly basis for each of Germany's trade partner country. There are 15,008 8-digit CN product codes in our data set which we aggregate into the 10 1-digit SITC codes. The discrepancy between the number of CN codes in our data and the 9,500 cited above is because CN codes are regularly revised with some codes merged to form new codes, some codes eliminated, and new codes added. Our benchmark results are based on all codes and we explore this issue in the appendix. Data obtained from the Deutsche Bundesbank provide information reported by German businesses or declarants on a monthly basis with information on the type of service or financial transaction involved. There are twelve different categories of services which are further divided into 181 different subcategories. In total, there are 130,702 German declarants reporting data on their trade in services. Financial transactions are classified into six different asset categories with 48 specific types of asset transactions and are reported by 35,407 German declarants.

Given the differences in the number of reporting units, be they products in the case of merchandise trade or German firms and enterprises in the case of trade in services and financial transactions, we base much of our analysis on data aggregated to the country-month level. This approach equalizes the analyzed reporting unit to be a country, while keeping the monthly frequency allows us to precisely time the effect of each sanction imposed. As discussed below, when analyzing the effect of sanctions on third country relationships, we will use more granular data available to us, either the firm-country-month level in the case of services trade and financial transactions or the product-country-month level in the case of merchandise trade.

The basic descriptive information on the three data sets we use is presented in the three-part Table 2. For each of the data sets we present information on the full sample as well as two sub-samples of observations, one consisting of observations affected by sanctions and the other consisting of observations that were not affected by sanctions. The last column shows the p-value for a t-test of equality of means between the under-sanctions and not-under-sanctions subsamples.

Table 2a presents summary information on trade in goods which is based on 49,787 country-month observations. Unsurprisingly, flows involving goods are larger than those

involving services, with average monthly flow in the full sample of 667 million euros with 297 million euros due to imports and 371 million euros due to exports. The under-sanction sample consists of 3,593 observations or 7.2% of the full sample. Flows under sanctions have an average size of 152 million euros with 64 million euros falling on imports and 89 million euros on exports. Flows not affected by sanctions are larger, averaging 707 million euros, with 315 million falling on imports and 393 on exports. In terms of cross-sample comparisons, the average flow per entry is significantly larger in the not-under-sanctions sample in the under-sanctions sample at 180,000€ versus 100,000€.

Table 2b shows that there are 50,249 country-month observations on trade in services with an average value of 205 million euros, of which 101 million euros are due to imports and 104 million euros are accounted for by exports. For each country-month pair, there are on average 454 entries and 321 declarants declaring their trade in services. Flows affected by sanctions account for some 7.2% of observations, 3,593 to be precise. As such they account for a small share of total trade, on average 34 million euros with 15 million euros imported and 18 million euros exported. Services trade not affected by sanctions averages 218 million euros with 107 million due to imports and 111 due to exports. Given the relatively small share of flows affected by sanctions, the only dimension in which the equality-of-means test provides useful information are those comparing either per-entry or per-declarant values. We have three such measures, average flow per entry, average number of entries per declarant, and average flow per category per declarant. The average flow per entry is virtually identical in two subsamples at a quarter of million euros. The average number of entries per declarant is also almost identical at 1.24 in the not-under-sanctions subsample and 1.29 for the under-sanction subsample. Lastly, the average flow per declarant is identical in the two subsamples at 40,000€.

Finally, Table 2c presents descriptive information on the financial transactions sample which consists of 32,989 country-month observations with 1,927 observations in the under-sanctions subsample comprising a somewhat smaller fraction (5.8%) of the full sample than was the case for trade in goods and services. Financial flows dwarf both goods and services trade flows with a total of 4,015 million euros in the full sample of which 1,956 million euros are due to inflows and 2,059 million euros due to exports. Whereas the average flow per entry on the trade side was well below a million euros, the average financial flow in the full sample is 12 million euros and 5 million euros in the under the sanctions subsample. The average number of entries per declarant is 1.27 in the not-under-sanctions subsample and 1.06 in the under-sanctions subsample. The average flow per category per declarant is larger in the not-

under-sanctions subsample at 4.7 million euros compared to 3.5 million euros in the under-sanctions sample.

4. Trade with Sanctioned Countries

4.1 Benchmark Estimation Specification

We begin our empirical analysis by examining the effect of financial sanctions on trade in services and goods with sanctioned targets. We follow Besedeš et al. (2021) and estimate the following gravity equation using the Poisson pseudo-maximum likelihood estimator (PPML):

$$\text{Flow}_{ct} = exp[\beta \text{Sanctions}_{ct} + \eta_c + \phi_t] + \epsilon_{ct}, \quad (1)$$

where Flow_{ct} is a measure of the flow of interest, German imports or exports of merchandise goods or services, and inflows or outflows of financial assets, with country *c* at time *t*. The exponential function on the right-hand side of equation (1) is due to our use of the PPML estimator. The gravity equation has long been used to empirically examine trade in goods and services. It has also been used to examine cross-border financial flows by Okawa and van Wincoop (2012) and in direct application to the effects of financial sanctions on financial flows by Besedeš et al. (2021).

Sanctions_{ct} is an indicator variable that takes the value of one when financial sanctions are imposed (and is zero otherwise) against country *c* at time *t*, and we include country-specific (η_c) and time-specific (ϕ_t) fixed effects. The coefficient of interest is β, which measures the effect of sanctions on cross-border flows; a negative and significant coefficient indicates that the adoption of sanctions is associated with fewer transactions between German declarants and their foreign counterparts, ceteris paribus. We analyze the data at the country-month level to reduce the amount of noise and to compare the three types of flows in goods, services, and financial assets, on as similar a basis as possible; as noted before, the data we use are not based on the same reporting unit with services and financial asset data reported at the firm level and goods trade data reported at the product level. To help with the interpretation of results, in every table we report the estimated coefficient, the standard error, and for significantly estimated coefficients the implied relative effect.

4.2 A first take on the effect of financial sanctions

Table 3 reports our benchmark results in Panel A. As in Besedeš et al. (2017) and Besedeš et al. (2021), all time-invariant influences on German flows with a country (such as, for instance, the partner's geographic distance from Germany) are accounted for by country fixed effects, while a comprehensive set of time fixed effects captures monthly variations in capital flows common to all partners. As shown, the point estimates of β are consistently negative and statistically significant. Financial sanctions reduce German imports from targeted countries by 26 percent[8] and exports to targeted countries by 24 percent. The effect on services trade is somewhat stronger with German services imports from target countries reduced by 31 percent and exports to target countries reduced by 33 percent. Thus, it seems this first investigation of the effect of financial sanctions on trade does indicate collateral damage. Before taking a more detailed approach to this question, the last two columns offer a comparison to the effect of financial sanctions on German financial flows. Consistent with the notion of collateral damage being a secondary effect, financial sanctions have a stronger effect on financial flows, reducing inflows of financial assets from targeted countries decrease by 50 percent and outflows by 48 percent.[9] Thus, comparing the estimated relative effects, financial sanctions have half as large an effect on trade in goods and two-thirds as large an effect on trade in services as they have on flows of financial assets.

Panels B and C of Table 3 provide some robustness to our results. As is common in the gravity equation literature we use country- and time-specific fixed effects to control for multilateral resistance terms. However, the nature of both our data and our question makes this difficult. Since our data varies at the country-month level, ideally we should be employing fixed effects at the country-month level to deal with multilateral resistances. However, doing so would preclude us from estimating any effect of sanctions since they are identified at the country-month level. While an imperfect approach, in Panel B of Table 3 we include in our specification the atheoretical remoteness index calculated as the GDP-weighted average distance of every partner country. Our estimates of the effect of sanctions change little. Our estimating sample decreases in size due to missing GDP data for a number of countries.

In Panel C we examine whether our results suffer from some omitted variable bias. While our country-level fixed effects control for most standard time-invariant gravity variables,

[8] The estimated effect is given by $(e^{-0.306} - 1) \cdot 100 = -26.4\%$.

[9] Both of these estimates are in line with results in Besedeš et al. (2017) who focus on the effect financial sanctions on financial flows over a short time period.

there may be some time-varying variables that could be included. An example would be tariffs in the case of trade in goods and services or similar policy variables. While tariff data are relatively easily available for trade in goods, they are less readily available for trade in services and there are no capital controls imposed on German financial flows (other than sanctions). One alternative we can use available across the three types of cross-border flows we investigate are data on various agreements Germany has entered into with other countries. We use the Baier and Bergstrand (2007) Database on Economic Integration Agreements[10] to identify agreements affecting Germany's trade in goods. While the database identifies six different agreements, we use a single dummy to identify the existence of any trade agreement between Germany and a trading partner. For trade in services we use information on services commitments in regional trade agreements made available by the WTO.[11] Finally, to identify similar agreements affecting financial flows we use UNCTAD's International Investment Agreements Navigator data[12] to identify bilateral investment treaties (BIT) and treaties with investment provisions (TIP) Germany has entered into. As seen from our results in Panel C of Table 3 the inclusion of these bilateral time-varying macroeconomic variables affects our estimates of the effect of sanctions very little, usually marginally increasing their magnitude.

In Table 4 we expand our analysis to cover other quantitative features of Germany's bilateral cross-border relationships. We decompose aggregate flows with a partner country into different margins that we summarized in Table 2. Understanding how sanctions affect the various margins can help us identify the channels through which sanctions reduce cross-border flows. We estimate variants of equation (1), but with each different margin serving as the dependent variable. The two regressions involving the value of trade and reflecting the intensive margin, in rows one and three, are estimated using PPML. The remaining three results, in rows two, four, and five, provide different measures of the extensive margin contain various counts. As Santos Silva et al. (2014) point out, such measures have both a lower and an upper bound with resulting partial effects of explanatory variables on the conditional mean of the dependent variable not being constant. We use the Flex estimator suggested by Santos Silva et al. (2014) to deal with this issue.

To save space, we only report estimates for the coefficient of interest, β. The dependent variable is tabulated in the first column on the left of the table. The first row reproduces, for comparison, estimates from Table 3 showing the effect of sanctions on total cross-border flows

[10] https://sites.nd.edu/jeffrey-bergstrand/database-on-economic-integration-agreements/
[11] https://www.wto.org/english/tratop_e/serv_e/dataset_e/dataset_e.htm
[12] https://investmentpolicy.unctad.org/international-investment-agreements

at the country-month level. The remaining rows show the estimated effect of financial sanctions on various margins. To be precise, the second row presents the estimated effect of sanctions on the number of entries underlying every country-month observation. In the case of merchandise trade this is the number of product observations for each country-month pair. In the case of trade in services this is the number of firm-service observations for each country-month pair and in the case of financial assets it is the number of firm-asset observations for each country-month pair.

Among the various margins, financial sanctions have the most consistent (negative) effect on the number of entries and the number of declarants or products. This holds for all types of cross-border flows we examine. Exports of goods experience a 30 percent decline in the number of entries (products), while the effect on imports is not statistically distinguishable from zero. The effect on services trade is somewhat weaker, with the number of entries for imports decreasing by 22% and exports by about 24 percent. The number of entries for financial-asset inflows and outflows decreases by about 30 percent. The relative effects of sanctions on the number of declarants, products in the case of merchandise trade and firms in the case of services and financial asset transactions, are almost identical in terms of magnitude and significance to the effects on the number of entries.[13] Sanctions reduce the number of asset classes by more than 60%. They also reduce the number of imported service categories by 42%, while having no significant impact on exports of service categories, or industries in the case of trade in goods. On the intensive margin sanctions only have an effect on exports of goods reducing average exports by about 27 percent. Thus, the main channel through which financial sanctions affect German cross-border flows is through the extensive margin, reducing the number of declarants that engage in cross-border flows while sanctions are in place. Only exports of goods seem to be affected on the intensive margin.

[13] In the case of trade in goods, the results for the number of entries and the number of declarants are identical as the two datasets are identical. The declarant in the goods trade dataset is the product.

4.3 Collateral damage or smart sanctions?

Our main question of interest is whether financial sanctions produce spillover effects (or collateral damage) on trade in goods and services. If there are no effects, one could make a strong case that financial sanctions are indeed smart in the sense that their economic effect and damage is narrowly focused on reducing financial cross-border flows. Our results so far imply that financial sanctions do create collateral damage. They reduce both imports and exports of goods and services, having half as large as effect on merchandise trade and two-thirds as large an effect on services trade as they do on financial flows.

However, this may not be a complete picture. The reason is that, as noted above, 13 of the 29 sanctions episodes in our data set also have provisions that restrict trade in certain types of goods, usually related to their military use. It is entirely possible that the negative effect of financial sanctions we have identified on trade in goods and services is due to these episodes that have non-finance related stipulations. In order to investigate this possibility in more detail, we estimate the following specification:

$$\text{Flow}_{ct} = exp[\beta \text{Sanctions}_{ct} + \gamma \text{SanctionsExports}_{ct} + \eta_c + \phi_t] + \epsilon_{ct}, \quad (2)$$

where we add a separate dummy variable, $\text{SanctionsExports}_{ct}$, which identifies the 13 sanctions episodes with export restrictions. The estimate of the coefficient γ is then the differential effect those additional restrictions have on trade in goods and services.

Results shown in Table 5 indicate that allowing for this differential effect bolsters the argument that financial sanctions affecting Germany's cross-border flows in trade and finance are smart and cause only moderate collateral damage. The strongest results are obtained for merchandise trade. Financial sanctions do not affect either imports or exports of goods unless they are accompanied by specific export restrictions. In such cases, these additional restrictions reduce imports by 32% and exports by 26%. As far as trade in services is concerned, imports of services are no longer affected in a statistically meaningful way. Financial sanctions do reduce Germany's exports of services with no differential effect of sanctions that entail additional export restrictions. The effect of financial sanctions on financial flows increases in this expanded specification to 56% and 54% for inflows and outflows, with no significant differential effect of sanctions with export restrictions.

We make several observations about the potential for collateral damage caused by financial sanctions. The strongest evidence we have for them is in the case of service exports which are reduced by a third by any kind of financial sanctions. Given that some services are needed for the conduct of cross-border financial flows, such as financial services, this effect is perhaps not surprising. Note that in the case of merchandise trade, the only collateral damage we can identify is in the case of sanctions that also have export restrictions attached to them. Given that these additional restrictions are restrictions on exports, it seems difficult to argue that financial sanctions create collateral damage. The only remaining case of collateral damage is then due to the result that export restrictions reduce imports of goods. Our conclusion is that the extent of collateral damage caused by financial sanctions is limited and that these sanctions are likely smart: their main and strongest effects are to reduce their primary target – financial flows.[14]

4.4 Pre- and post-sanction effects

While the bulk of the effect of sanctions is contemporaneous, it is possible that they may be preceded by anticipation effects and followed by lingering effects affecting cross-border flows after they are removed. In fact, Dai et al. (2021) find significant pre- and post-sanctions effects in the case of trade sanctions, with the post-sanctions effects lingering for 8 years. They argue that including pre- and post-effects increases the estimates of the contemporaneous effect. In our earlier work on the effects of German financial sanctions we found evidence of anticipatory effects reducing cross-border financial flows, but also large positive effects of increases in cross-border flows after sanctions were removed (Besedeš et al. 2017).

We now investigate the possibility of pre- and post-sanctions effects on cross-border flows of goods, services, and capital. We do so by adding two new variables to equation (1): a pre-sanctions dummy and a dummy the removal of sanctions and report our results in Table 6. The pre-sanctions period dummy variable identifies the period between the event that was identified as the trigger event that led to the imposition of sanctions, such as the annexation of Crimea in the case of sanctions imposed on Russia, and the imposition of sanctions. This dummy identifies the period from the point when the specter of sanctions first arose and their eventual imposition. For 13 of the 29 sanctions episodes in our dataset there is a period between

[14] Goods and services trade is at least to some extent connected as some firms likely engage in both, especially those firm trading products that require maintenance. Unfortunately, our data prevent us from being able to examine the effect of sanctions on such firms as the two datasets, on trade in goods and trade in services, are separate and with different reporting units.

the two events varying from virtually instantaneous imposition in the case of Russia and the Comoros to 12 months in the case of Lebanon and Eritrea, with an average of 3.6 months and a median of 2 months. For the other 16 episodes, there are no possible anticipation effects since there is no specific event that is cited in the announcement of sanctions. Of the 29 episodes of sanctions imposed by Germany during the period we examine, only six were removed, on the Comoros, Côte d'Ivoire, Eritrea, Liberia, the Maldives, and Uzbekistan. For these six episodes we add a dummy identifying the post-sanctions period, when they were no longer in place.

Our results indicate almost no change in the contemporaneous effect of sanctions when we include the anticipation dummy and a sanctions removal dummy. There are significant anticipation effects for exports of goods (reduction of 22 percent) and services (reduction of 26 percent), and financial inflows (reduction of 52 percent). Note that these anticipation effects are similar to contemporaneous effects for exports of goods and financial inflows, and somewhat weaker in the case of exports of services. Curiously, we find evidence of additional negative post-sanctions effects in the case of imports of goods and services. Goods imports decrease by an additional 50 percent and service imports decrease by an additional 74 percent *after* the removal of sanctions. Both lingering effects of sanctions are much larger than the contemporaneous effects. In the case of financial flows, we find no evidence of post-sanctions effects of any kind. In no case have we found a significant positive effect of the removal of sanctions. A possible explanation could be that it is easier to restart financial relationships after sanctions are over, while those on involving goods or services are more difficult as they may involve higher fixed costs. The asymmetry between imports and exports for goods and services may be due to the fact that it may be easier for German firms to pay such costs to restart those relationships than is the case for firms from these six countries, all of which are low-income developing countries.

We can draw two conclusions from our investigations of pre- and post-sanctions effects. First, the anticipation effects of financial sanctions on trade in goods and services only affect exports, while the post-sanctions effects are stronger for imports of both goods and services. In this dimension, our results indicate weaker effects than those found by Dai et al. (2021), though they are identifying first order effects of trade sanctions on trade, while we are identifying second order effects of financial sanctions on trade, or as we put it earlier, collateral damage of financial sanctions. Second, anticipation effects are much stronger for the effect of financial sanctions on inflows of capital, the primary target of financial sanctions, while there are no post-sanction effects on either financial inflows or outflows.

5. Conclusions

A recent increase in the use of sanctions as a foreign policy tool has increased researchers' attention to their effects. While much effort has gone into uncovering the direct effects of sanctions on the activity primarily targeted by them, less attention has been paid to the extent the effects of sanctions spill over into other activities. We examine the extent of collateral damage in trade in goods and services resulting from German financial sanctions. The aim of financial sanctions is to restrict the cross-border flow of financial activities. Such sanctions could create collateral damage by reducing trade in goods and services. A simple link could be that the presence of financial sanctions increases the risk of doing business, any business, with the sanctioned country resulting in a broad reduction in economic interaction between the sender of sanctions and its target. We find limited evidence of such collateral damage effects.

Financial sanctions reduce the cross-border capital flows by some 50 percent and seemingly cause collateral damage by having half the effect on trade in goods and two-thirds as large a negative effect on trade in services. But the collateral damage is almost entirely due to sanctions episodes where financial sanctions are accompanied by export restrictions. Since export restrictions are designed to limit trade, one can hardly think of these effects as being evidence of collateral damage.

The primary channel through which financial sanctions affect cross-border flows is the extensive margin reducing the number of firms or products engaged in cross-border flows when sanctions are in effect. We find weak anticipation effects and stronger lagging negative effects for imports of both goods and services. Anticipation effects are much stronger when it comes to financial assets, but there are no lagging post-sanctions effects on financial assets.

Our aim in this paper was to investigate whether financial sanctions cause collateral damage or can be thought of as smart sanctions if there is no collateral damage. We conclude that there is limited evidence of collateral damage, but it is not widespread and is contained to certain specific services and goods. As such, on the whole, financial sanctions imposed by Germany do seem to be smart with their effects mostly concentrated on the targeted activity.

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Appendix

Our data on merchandize trade contains information on German imports and exports of some 15,000 different Combined Nomenclature (CN) product codes. This is a much larger number than some 9,500 CN product codes that Eurostat's documentation of the Comext database states are covered in the database. The discrepancy between the two numbers is due to CN codes being periodically revised with some codes discontinued and new codes introduced. Such revision will inflate the number of codes over time. There are typically two ways of dealing with such code revision issues. One is to concord all the changes to CN codes over time and create a synthetic code that captures all the codes that were affected by revisions using an algorithm similar to the one Pierce and Schott (2012) created for U.S. Harmonized System (HS) product classification. The other is to conduct the analysis only on the sample of product codes that were never revised during the sample period and can be thought of having been consistent during the sample period. We now examine our result following the latter approach.

Table A1 compares the results of estimating specification (1) using the full, benchmark sample and the consistent codes sample which drops all CN product codes that changed or were introduced during the sample period. As is readily seen, results for the consistent codes sample are statistically significant and somewhat larger with sanctions reducing imports by 34 percent and exports by 28 percent. In Table A2 we compare the result from estimating specification (2) on both samples with very similar results. We can again conclude that only sanctions with export restrictions reduce imports and exports of goods, but with a larger effect, reducing imports by 39 percent and exports by 30 percent. Note that the number of observations in both samples in Tables A1 and A2 is the same. This is because both samples are created by aggregating the CN-level data to the country level with aggregation obscuring the number of product codes.

While we do not reproduce all tables using the consistent codes sample to conserve space, the general pattern in results is similar to these two tables. In the consistent codes sample estimated coefficients are of the same direction and significance and are somewhat larger. The remaining tables are available on request.

Table 1: List of Financial Sanctions, 2001-2020

Country	First announcement (Lifted)	Measures taken	Cause cited in declaration	Date of event	Sanctions initially imposed by
Somalia	27 January 2003	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Situation in Somalia		UN
Liberia	4 September 2003 (20 June 2016)	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Situation in Liberia		UN
Congo, Dem. Rep.	29 September 2003	Freezing of assets and economic resources of natural persons and establishments	Violation arms embargo		UN
Sudan	26 January 2004	Freezing of assets and economic resources of natural persons	Situation in Sudan		UN
Zimbabwe	19 February 2004	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Situation in Zimbabwe		EU
Côte d'Ivoire	31 January 2005 (9 June 2016)	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Ceasefire violation	15 November 2004	UN
Uzbekistan	14 November 2005 (15 December 2009)	Freezing of assets and economic resources; export restriction on goods related to nuclear technology	Massacre in Andijan	13 May 2005	EU
Lebanon	21 February 2006	Freezing of assets and economic resources	Assassination of former Lebanese Prime Minister	14 February 2005	UN
Belarus	18 May 2006	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Presidential elections	19 March 2006	EU
Iran	2 February 2007	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment, chemicals and other resources (gold, silver, …)	Deterioration of human rights situation in Iran		UN
Korea, Dem. Rep.	27 March 2007	Freezing of assets and economic resources of natural persons and establishments; export restriction on luxury goods and goods related to nuclear technology	Nuclear test	9 October 2006	UN

Comoros	17 March 2008 (24 July 2008)	Freezing of assets and economic resources of natural persons	Invasion of Anjouan	17 March 2008	EU
Guinea	22 December 2009	Freezing of assets and economic resources of natural persons; export restriction on military equipment	Violent repression	28 September 2009	EU
Eritrea	26 July 2010 (10 December 2018)	Freezing of assets and economic resources; export restriction on military equipment	Border dispute with Djibouti and support of Somalia; AU summit declaration calling for sanctions	3 July 2009	UN
Tunisia	4 February 2011	Freezing of assets and economic resources of natural persons	Situation in Tunisia	18 December 2010	EU
Libya	2 March 2011	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment	Situation in Libya	17 February 2011	UN
Egypt	21 March 2011	Freezing of assets and economic resources of natural persons	Situation in Egypt	25 January 2011	EU
Syria	9 May 2011	Freezing of assets and economic resources of natural persons and establishments; export restriction on military equipment, chemicals and other resources (gold, silver, …)	Repression of the civilian population		EU
Afghanistan	1 August 2011	Freezing of assets and economic resources of natural persons and establishments	Situation in Afghanistan	17 June 2011	UN
Guinea-Bissau	3 May 2012	Freezing of assets and economic resources of natural persons	Coup d'etat	12 April 2012	EU
Russia	5 March 2014	Freezing of assets and economic resources of natural persons and establishments; export restriction on oil drilling machinery, chemicals and other natural resources	Annexation Crimea	3 March 2014	EU
Central African Republic	10 March 2014	Freezing of assets and economic resources of natural persons and establishments	Situation in the Central African Republic	5 December 2013	UN
Yemen	18 December 2014	Freezing of assets and economic resources of natural persons	Political situation in Yemen		UN
Burundi	1 October 2015	Freezing of assets and economic resources of natural persons	Violent repression		EU
Mali	28 September 2017	Freezing of assets and economic resources of natural persons	Violent repression		UN
Venezuela	13 November 2017	Freezing of assets and economic resources of natural persons	Violation of democracy, justice and human rights		EU

Maldives	16 July 2018 (17 June 2019)	Freezing of assets and economic resources of natural persons	Violation of human rights		EU
Nicaragua	14 October 2019	Freezing of assets and economic resources of natural persons	Violent repression		EU
Turkey	11 November 2019	Freezing of assets and economic resources of natural persons	Oil drilling in open water		EU

Source: Deutsche Bundesbank, Service center ‘Financial Sanctions’.

Table 2a: Descriptive Statistics Trade in Goods

	Full Sample			Not Sanctioned			Under Sanction			
	Obs.	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test (p-value)**
Total Flows (Mn. €)	49,787	667.35	2019.5	46,194	707.40	2085.5	3,593	152.42	559.15	0.00
Avg. Flow per Entry (Mn. €)	49,787	0.18	1.00	46,194	0.19	1.04	3,593	0.10	0.22	0.00
Products (Number)	49,787	1492.7	1964.3	46,194	1545.9	2007.8	3,593	809.55	1064.6	0.00
Industries (Number)	49,787	7.89	2.38	46,194	7.87	2.42	3,593	8.06	1.80	0.00
Imports (Mn. €)	49,787	296.49	954.03	46,194	314.58	985.58	3,593	63.90	255.24	0.00
Exports (Mn. €)	49,787	370.86	1116.5	46,194	392.82	1152.9	3,593	88.52	310.92	0.00
Categories (Mn. €)										
– Food and live animals	44,019	41.04	151.28	40,744	43.79	156.85	3,275	6.83	160.57	0.00
– Beverages and tobacco	37,890	7.18	22.37	35,150	7.65	23.15	2,740	1.16	2.86	0.00
– Crude materials, inedible, except fuels	39,875	21.93	70.86	36,642	23.55	73.65	3,233	3.63	9.01	0.00
– Mineral fuels, lubricants and related materials	31,722	47.61	191.06	29,495	46.03	185.25	2,227	68.57	254.97	0.00
– Animal and vegetable oils, fats and waxes	26,229	3.48	13.02	24,561	3.69	13.42	1,668	0.38	1.27	0.00
– Chemicals and related products, n.e.s.	46,072	104.70	366.39	42,543	111.92	379.89	3,529	17.74	67.82	0.00
– Manufactured goods	46,860	97.80	292.80	43,362	104.36	302.88	3,498	16.48	64.42	0.00
– Machinery and transport equipment	48,487	312.84	950.28	44,941	333.29	982.83	3,546	53.60	182.14	0.00
– Miscellaneous manufactured articles	47,811	82.73	253.62	44,241	88.37	262.56	3,570	12.83	42.74	0.00
– Commodities and transactions, n.e.s.	23,662	5.91	36.63	21,990	6.32	37.93	1,672	0.56	6.32	0.00

Notes: The unit of observation is a country-month pair. If not noted otherwise, values refer to the sum of exports and imports.

Table 2b: Descriptive Statistics Trade in Services

	Full Sample			Not Sanctioned			Under Sanction			
	Obs.	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test (p-value)**
Total Flows (Mn. €)	50,249	204.58	843.67	46,656	217.79	873.56	3,593	33.76	117.29	0.00
Entries (Number)	50,249	453.47	1142.6	46,656	479.14	1179.38	3,593	120.05	277.82	0.00
Avg. Flow per Entry (Mn. €)	50,249	0.24	0.78	46,656	0.23	0.64	3,593	0.25	1.77	0.33
Declarants (Number)	50,249	320.96	752.81	46,656	338.74	776.40	3,593	90.10	202.24	0.00
Avg. Number of Entries per Declarant	50,249	1.24	0.18	46,656	1.24	0.18	3,593	1.29	0.21	0.00
Categories (Number)	50,249	8.97	3.41	46,656	8.98	3.45	3,593	8.84	2.88	0.02
Avg. Flow per Category per Declarant (Mn. €)	50,249	0.04	0.17	46,656	0.04	0.15	3,593	0.04	0.28	0.13
Imports (Mn. €)	50,249	100.48	431.00	46,656	107.07	446.11	3,593	14.87	76.07	0.00
Exports (Mn. €)	50,249	104.10	436.53	46,656	110.71	452.02	3,593	18.20	62.44	0.00
Categories (Mn. €)										
– Product-related	39,346	27.53	121.67	36,571	29.16	124.90	2,775	5.96	61.97	0.00
– Enterprise-related	42,456	38.82	185.24	39,292	41.65	192.24	3,164	3.64	13.33	0.00
– Personal	29,447	4.06	18.46	27,319	4.31	18.76	2,128	0.91	1.37	0.00
– Intellectual property	33,121	22.93	120.55	30,804	24.48	124.83	2,317	2.32	10.26	0.00
– Telecommunications	36,798	18.33	69.15	34,417	19.46	71.34	2,381	1.98	7.98	0.00
– Construction	34,897	11.15	97.45	32,184	11.65	101.18	2,713	5.16	26.90	0.00
– Transport	44,808	45.37	144.68	41,641	48.21	149.54	3,167	8.08	25.26	0.00
– Insurance	35,505	55.53	355.03	33,553	58.49	364.91	1,952	4.75	32.11	0.00
– Travel	38,231	4.74	18.55	35,867	4.91	19.03	2,364	2.22	8.05	0.00
– Private transfers	38,533	3.84	16.97	35,108	4.00	16.25	3,425	2.15	22.97	0.00
– Transactions by the federation	47,227	18.21	82.01	43,669	19.34	84.62	3,558	4.43	34.36	0.00
– Other	30,268	13.62	48.84	28,462	14.43	50.26	1,806	0.84	2.37	0.00

Notes: The unit of observation is a country-month pair. If not noted otherwise, values refer to the sum of exports and imports.

Table 2c: Descriptive Statistics Financial Flows

	Full Sample			Not Sanctioned			Under Sanction			
	Obs.	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**t-test (p-value)**
Total Flows (Mn. €)	32,989	4014.9	14,900	31,062	4258.3	15,400	1,927	91.32	352.39	0.00
Entries (Number)	32,989	95.14	190.35	31,062	100.06	194.93	1,927	15.71	32.62	0.00
Avg. Flow per Entry (Mn. €)	32,989	11.87	38.69	31,062	12.33	37.99	1,927	4.58	48.09	0.00
Declarants (Number)	32,989	59.37	108.92	31,062	62.24	111.44	1,927	13.11	25.16	0.00
Avg. Number of Entries per Declarant	32,989	1.26	0.30	31,062	1.27	0.31	1,927	1.06	0.14	0.00
Asset Classes (Number)	32,989	3.21	1.75	31,062	3.28	1.75	1,927	2.13	1.17	0.00
Avg. Flow per Category per Declarant (Mn. €)	32,989	4.64	27.27	31,062	4.71	25.48	1,927	3.53	4.63	0.07
Inflows (Mn. €)	32,989	1956.2	7325.8	31,062	2074.8	7533.5	1,927	45.16	185.48	0.00
Outflows (Mn. €)	32,989	2058.7	7651.3	31,062	2184.6	7868.0	1,927	46.16	175.95	0.00
Asset Classes (Mn. €)										
– Bonds	24,859	2620.9	9071.9	23,730	2742.2	9267.7	1,129	71.01	197.05	0.00
– Money market instruments	8,075	1938.0	4257.8	8,000	1956.0	4273.7	75	16.30	29.01	0.00
– Equity	18,806	1552.3	6167.8	18,229	1598.2	6261.0	577	100.92	273.45	0.00
– Collective investment	7,391	1941.5	7443.1	7,378	1945.0	7449.2	13	0.49	1.15	0.35
– Foreign direct investment	22,548	284.11	1457.2	21,540	296.30	1489.7	1,008	23.64	108.11	0.00
– Other	24,314	69.90	488.55	23,012	73.31	501.72	1,302	9.61	64.78	0.00

Notes: The unit of observation is a country-month pair. If not noted otherwise, values refer to the sum of inflows and outflows.

Table 3: The Effect of (Financial) Sanctions on Trade in Goods/Services/Financial Flows

	Goods		Services		Financial Flows	
	Imports	**Exports**	**Imports**	**Exports**	**Inflows**	**Outflows**
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Benchmark						
(Financial) Sanctions	-0.306*** (0.077) -26.4%	-0.269*** (0.072) -23.6%	-0.374* (0.192) -31.2%	-0.401*** (0.084) -33.0%	-0.694*** (0.157) -50.0%	-0.645*** (0.163) -47.5%
Observations	51,192	51,192	52,140	52,140	48,822	48,822
Pseudo R^2	0.987	0.989	0.967	0.963	0.972	0.972
Panel B: Remoteness						
(Financial) Sanctions	-0.300*** (0.075) -25.9%	-0.345*** (0.062) -29.2%	-0.397** (0.192) -32.8%	-0.401*** (0.084) -33.0%	-0.634*** (0.157) -47.0%	-0.591*** (0.163) -44.6%
Remoteness	-0.014* (0.008)	-0.037*** (0.010)	-0.017 (0.011)	-0.013 (0.009)	-0.027 (0.027)	-0.031 (0.025)
Observations	40,743	40,743	40,600	40,600	29,015	29,014
Pseudo R^2	0.987	0.991	0.965	0.961	0.970	0.967
Panel C: Agreements						
(Financial) Sanctions	-0.308*** (0.078) -26.5%	-0.253*** (0.069) -22.4%	-0.375* (0.192) -31.3%	-0.401*** (0.084) -33.0%	-0.742*** (0.157) -52.4%	-0.704*** (0.163) -50.5%
Economic Integration Agreements	-0.032 (0.065)	0.164** (0.074)				
Services Trade Commitments			-0.089 (0.066)	-0.003 (0.095)		
Bilateral Investment Treaties					0.587** (0.292)	0.619** (0.239)
Treaties with Investment Provisions					0.026 (0.135)	0.074 (0.569)
Observations	51,192	51,192	52,140	52,140	48,822	48,822
Pseudo R^2	0.987	0.989	0.967	0.963	0.972	0.972

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Time fixed effects and country-specific fixed effects are included but not reported. Robust standard errors (clustered by country) in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.

Table 4: The Effect of (Financial) Sanctions on Trade in Goods/Services/Financial Flows

	Goods		Services		Financial Flows	
	Imports	**Exports**	**Imports**	**Exports**	**Inflows**	**Outflows**
	(1)	(2)	(3)	(4)	(5)	(6)
Total Value (PPML)	-0.306*** (0.077) -26.4%	-0.269*** (0.072) -23.6%	-0.374* (0.192) -31.2%	-0.401*** (0.084) -33.0%	-0.694*** (0.157) -50.0%	-0.645*** (0.163) -47.5%
Number of Entries (FLEX)	-0.067 (0.049)	-0.362*** (0.091) -30.4%	-0.249*** (0.087) -22.0%	-0.273*** (0.051) -23.9%	-0.351*** (0.114) -29.6%	-0.349*** (0.114) -29.5%
Average Value per Entry (PPML)	-0.097 (0.179)	-0.315*** (0.067) -27.0%	-0.273 (0.271)	-0.056 (0.164)	-0.722 (0.546)	-0.613 (0.450)
Number of Declarants/Products (FLEX)	-0.067 (0.049)	-0.362*** (0.091) -30.4%	-0.233*** (0.087) -20.8%	-0.262*** (0.053) -23.0%	-0.340*** (0.094) -28.8%	-0.351*** (0.099) -29.6%
Number of Categories/ Industries/Asset Classes (FLEX)	-2.656 (4.157)	-0.004 (0.022)	-0.543*** (0.211) -41.9%	-0.183 (0.139)	-1.067*** (0.408) -65.6%	-0.997** (0.429) -63.1%

Notes: Results in rows on and three were obtained using PPML. Results in rows two, four, and five were obtained using the Santos Silva et al. (2014) Flex estimator. Each cell contains the coefficient from a separate regression; the regression specification is similar to the corresponding column in Table 3. The dependent variable is listed in the first column; the sample is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Robust standard errors (clustered by country) in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.

Table 5: Differential Effect of Export Restrictions

	Goods		Services		Financial Flows	
	Imports	**Exports**	**Imports**	**Exports**	**Inflows**	**Outflows**
	(1)	(2)	(3)	(4)	(5)	(6)
(Financial) Sanctions	0.017 (0.087)	-0.039 (0.097)	-0.657 (0.421)	-0.393*** (0.140) -32.5%	-0.822*** (0.311) -56.0%	-0.782** (0.321) -54.3%
(Financial) Sanctions combined with export restrictions	-0.385*** (0.113) -32.0%	-0.298*** (0.095) -25.8%	0.421 (0.435)	-0.016 (0.158)	0.172 (0.337)	0.189 (0.347)
Observations	51,192	51,192	52,140	52,140	48,822	48,822
Pseudo R^2	0.987	0.989	0.967	0.963	0.972	0.972

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Time fixed effects and country-specific fixed effects are included but not reported. Robust standard errors (clustered by country) in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.

Table 6: The Effect of (Financial) Sanctions and Possible Anticipation and Removal Effects

	Goods		Services		Financial Flows	
	Imports	**Exports**	**Imports**	**Exports**	**Inflows**	**Outflows**
	(1)	(2)	(3)	(4)	(5)	(6)
(Financial) Sanctions	-0.319*** (0.079) -27.3%	-0.270*** (0.072) -23.7%	-0.403** (0.199) -33.2%	-0.389*** (0.085) -32.2%	-0.688*** (0.157) -49.7%	-0.640*** (0.163) -47.3%
Pre-(Financial) Sanctions Period	-0.191 (0.208)	-0.246*** (0.055) -21.8%	-0.215 (0.178)	-0.304** (0.137) -26.2%	-0.736*** (0.281) -52.1%	-0.355 (0.268)
(Financial) Sanctions Removed	-0.698*** (0.227) -50.2%	0.017 (0.226)	-1.334*** (0.474) -73.7%	0.299 (0.335)	0.481 (0.447)	0.358 (0.534)
Observations	51,192	51,192	52,140	52,140	48,822	48,822
Pseudo R^2	0.987	0.989	0.967	0.963	0.972	0.972

Notes: PPML estimation. The regression specification is similar to the corresponding column in Table 3. The dependent variable is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Robust standard errors (clustered by country) recorded in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.

Table A1: The Effect of (Financial) Sanctions on Trade in Goods/Services/Financial Flows

	Benchmark Sample		Consistent Codes Sample	
	Imports	**Exports**	**Imports**	**Exports**
	(1)	(2)	(3)	(4)
(Financial) Sanctions	-0.306*** (0.077) -26.4%	-0.269*** (0.072) -23.6%	-0.414*** (0.085) -33.9%	-0.327*** (0.078) -27.9%
Observations	51,192	51,192	51,192	51,192
Pseudo R^2	0.987	0.989	0.985	0.989

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Time fixed effects and country-specific fixed effects are included but not reported. Robust standard errors (clustered by country) in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.

Table A2: Differential Effect of Export Restrictions

	Benchmark Sample		Consistent Codes Sample	
	Imports	**Exports**	**Imports**	**Exports**
	(1)	(2)	(3)	(4)
(Financial) Sanctions	0.017	-0.039	0.014	-0.053
	(0.087)	(0.097)	(0.143)	(0.095)
(Financial) Sanctions with export restrictions	-0.385***	-0.298***	-0.496***	-0.356***
	(0.113)	(0.095)	(0.159)	(0.096)
	-32.0%	-25.8%	-39.1%	-30.0%
Observations	51,192	51,192	51,192	51,192
Pseudo R^2	0.987	0.989	0.985	0.989

Notes: PPML estimation. The dependent variable is specified at the top of each column. The unit of observation is a country-month pair. Data cover the period from January 2001 through September 2020 in monthly frequency. Time fixed effects and country-specific fixed effects are included but not reported. Robust standard errors (clustered by country) in parentheses. ***, ** and * denote significant at the 1%, 5% and 10% level, respectively.