Timing the Impact of Sanctions on Trade*

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Abstract

We capitalize on the latest estimation methods in the empirical gravity literature and the development of a new dataset (the Global Sanctions Data Base, GSDB) to study the evolution, over time, of the effects of sanctions on international trade. Our analysis reveals that the contemporaneous effects of sanctions on trade are large, negative and statistically significant. Additionally, we obtain negative and significant anticipatory effects prior to the official imposition of sanctions, as well as negative and significant post-sanction effects, which disappear gradually approximately eight years after the lifting of sanctions. Our work generates several insights related to the estimation of the impact of sanctions on trade and unveils new avenues for future work. For example, we find the strength of the negative impact of sanctions to rise with the duration of the time that sanctions are in force. Moreover, our analysis of unilateral vs. multilateral and US vs. UN vs. EU sanctions suggests that unilateral sanctions and sanctions imposed by the US stand out as being most effective. A battery of sensitivity experiments confirms the robustness of our main findings and conclusions.

JEL Classification Codes: F1, F13, F14, F5, F51, H5, N4.
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1 Introduction

For decades decision makers, political scientists and scholars of international relations have displayed a keen interest in sanctions and their effects on target (i.e., sanctioned) and sender (i.e., sanctioning) states. While interest in this controversial instrument of foreign policy is on the rise, the extent to which economists have contributed to the related scholarship has been modest. At center stage in the sanctions debate stands one multifaceted problem that invariably all researchers and policy practitioners must grapple with: Are economic sanctions effective? Do they work? We view these as important questions because, as has been documented in the existing literature (see, for example, Felbermayr et al., 2020b) and as will be discussed shortly, the frequency of use of economic sanctions (especially financial and travel sanctions) has been increasing over time.

But how should one go about determining the "effectiveness" of sanctions? Surely, the motivation, specific objectives and intentions of the interacting parties should matter. The existing scholarship emphasizes that the initiation of sanctions and the responses to them aim to: compel governments to change their behavior internationally and/or domestically (Galtung, 1967; Renwick, 1981; Drury, 2001; Hufbauer et al., 2007); project power; reassure domestic constituencies and/or interest groups of their leaders' commitment to national and/or special interests (Kaempfer and Lowenberg, 2007; Krustev and Morgan, 2011); and achieve policy objectives peacefully rather than by means of force.[1]

Naturally, the ability to exert influence and the affected leaders' response to coercive measures are also important as they, too, may alter behavior (Kirshner, 2007; Drezner, 2011; Lektzian and Souva, 2003; 2007). Similarly, the outcomes of sanctions depend on: the strategic environment within which senders and targets operate (e.g., political regime, level of economic development, domestic institutions, international cooperation, exposure to foreign trade and investment); the availability of policy instruments (e.g., diplomacy, types of economic sanctions, military intervention) in interacting states; and the various policy constraints the primary actors face. Ultimately, though, the success or failure of

[1] In the words of (Hufbauer et al., 2007, p. 7), "[T]he imposition of sanctions conveys a triple signal: To the target country it says the sender does not condone the target's actions; to allies it says that words will be supported with deeds; and to domestic audiences it says the sender government will act to safeguard the nation's vital interests."

sanctions hinges on the benefits they generate to sender governments and the costs they inflict on leaders in targeted states (Tsebelis, 1990; Morgan and Schwebach, 1997; Eaton and Engers, 1992).

It is widely believed that the magnitude of the economic hardship imposed on the ruling elite and/or the general citizenry in sanctioned states is a key predictor of the efficacy of sanctions (Drury, 2000; Hufbauer et al., 2007). However, this view has been criticized on measurement, implementation and moral grounds (Pape, 1997; Morgan and Schwebach, 1997; and Cortright and Rogers, 2002, among numerous others). While we do not dispute the importance of the objections raised in such contributions, we find the idea that the costs of economic coercion matter in this context to be logically sound. For this reason, we think there is value in careful studies (e.g., Ahn and Ludema, 2018); Besedes et al., 2018; Crozet and Hinz, 2016, and Felbermayr et al., 2020a;b, among others) that strive to quantify these costs.

We, too, aim to contribute to this literature. Our primary objective is to characterize the evolution of the impact of sanctions on trade flows. We accomplish this objective by utilizing the newly developed Global Sanctions Data Base (GSDB) and by capitalizing on the latest developments in the international trade literature related to the gravity equation.[2]

The descriptive analysis of the GSDB, which we present in Section 2, illustrates that sanctions exhibit extensive heterogeneity with regards to the duration of imposed sanctions. On average, a complete trade sanction lasts about 6 years and the median duration is 4 years, pointing to a significant variance. Around 14% of complete trade sanctions last more than 5 years, and the longest episode of a complete trade sanction in the GSDB is 66 years. These figures suggest that the timing of sanctions may play an important role in the determination of their efficacy.

With these new stylized facts about sanctions, in this chapter, we build on and extend

[2]We refer the reader to Felbermayr et al. (2020a) for a detailed description of the GSDB and to Kirilakha et al. (2021) for a recent update of the data. The GSDB is freely available at GSDB@drexel.edu.

the recent work of Felbermayr et al. (2020a;b) and Egger et al. (2020).[3] Motivated by the findings of Felbermayr et al. (2020a;b), who quantify the heterogeneous effects of sanctions on trade, we focus on complete trade sanctions and complement the analysis of these works by characterizing the evolution of their impact on trade over time. We do this by extending Egger et al. (2020), who quantify the evolution of the impact of free trade agreements (FTAs) on international trade, to include *pre-sanction* and *post-sanction* effects. Thus, we depart from the existing literature in that we consider the *pre-sanction* and *post-sanction* period effects, in addition to allowing for heterogeneous phasing-in effects during the period that sanctions are in place.[4] Our estimation methods are presented in Section 3.1.

We draw a number of conclusions on the impact of sanctions on trade flows and its evolution over time in Section 3.2. First, our contemporaneous estimate when pre- and post-sanction effects are considered is relatively larger (about 17 percent in our sample) than the corresponding estimate when pre- and post-sanction effects are not considered. As a consequence, estimates of the effects of sanctions that do not allow for pre-sanction and post-sanction effects underestimate the true contemporaneous sanction effects. The econometric explanation of this finding is that the introduction of pre-sanction and post-sanction effects changes the reference group used to identify the contemporaneous effects.

Second, our pre-sanction period estimates reveal that sanctions affect trade flows even before they are formally/officially imposed. We find that these effects, which we label "anticipatory effects", are strongest (in terms of economic magnitude and statistical significance) between one and three years prior to the imposition of sanctions. We view the theoretical and empirical disentangling of the underlying dynamic channels and causes as interesting and important tasks that future work ought to address. For now, the key implication of our findings is that, when assessing the impact of sanctions on trade,

[3]Our work is also related to several other contributions that use the gravity model to estimate the effects of sanctions on trade (e.g., Hufbauer and Oegg (2003), Caruso (2003), Yang et al. (2004), and Afesorgbor (2018)). The main differences between these papers and ours can be summarized as follows: (i) we rely on a newer database; (ii) our analysis is based on the latest developments in the empirical gravity literature; and (iii) we develop new insights on the evolution of sanctions.

[4]An important difference between the effects of sanctions and FTAs, that differentiates our work from Egger et al. (2020), is this: Sanctions are often lifted/terminated within a certain number of periods while, typically, most FTAs remain present throughout the estimating samples.

researchers should examine the just noted anticipatory effects.

Third, consistent with the related literature (e.g., Morrow et al. (1998), Lektzian and Souva (2001)), North (1990), and Eichengreen and Irwin (2009)), we find (i) that the impact of sanctions on trade flows is present for a significant period of time (e.g., seven to eight years) after sanctions are lifted, and (ii) that the recovery of trade flows is gradual and steady. The important takeaway is that the recovery of trade flows during post-sanction periods is not instantaneous.

Fourth, a comparison of our pre-sanction and post-sanction estimates reveals an interesting and encouraging result. Specifically, we observe that the negative post-sanction estimates become statistically insignificant – in fact, they turn positive in some specifications – after the elapse of a certain period of time (i.e., seven to eight years after the lifting of sanctions). On the other hand, the pre-sanction estimates are all negative and at least marginally statistically significant sometimes ten years prior to the imposition of sanctions. Therefore, sanctions may lead to increased trade flows and improved trade relations in the post-sanction period as compared to the pre-sanction period.

We also study the evolution of the impact of complete trade sanctions during the period of their imposition. We find that, on average, the longer sanctions are in place the stronger their adverse effect on trade flows. Next, we distinguish between the phasing-in effects of long (5+ years) vs. short (<5 years) sanctions. The negative impact of complete trade sanctions on trade is mostly driven by sanctions with long duration. In combination with our finding that the impact of sanctions during the period of their imposition is stable, this result implies that the depth of the initial sanction effect can help predict whether its duration will be long or short.

To strengthen our analysis, we distinguish between unilateral and multilateral trade sanctions. The main finding is that the estimates of the effects of unilateral sanctions on trade are significantly larger. We also check for possible differences in sanctions imposed by the US, the UN, and the EU. Our estimates reveal strong anticipatory effects for all three groups of sanctions. The negative impact of US sanctions on trade appears to be the strongest. Our main results are robust to a number of sensitivity experiments.

Our work is related to contributions that deal with dynamic aspects of economic sanctions. For example, Bolks and Al-Sowayel (2000) report that the institutional structure and the political vulnerability of the sanctioned country's regime play a significant role in the determination of the duration of sanctions. Dorussen and Mo (2001) rely on audience costs and sanction rents to explain the occurrence and duration of sanctions episodes. Krustev and Morgan (2011) extend this contribution–by combining the redistributive and bargaining dimensions of sanctions–to argue that "...the influence of bargaining factors declines as a sanction episode continues while the relevance of domestic realignments increases over time" (p. 351). McGillivray and Stam (2004) show that change of leadership in nondemocratic sanctioning and sanctioned states affects significantly the duration of sanctions. Moreover, Kwon et al. (2020) quantify the short- and long-run effects of trade and "smart" (defined as financial and travel) sanctions on GDP per capita utilizing a novel instrumental variable (IV) strategy that addresses the issue of endogeneity. They show that, while trade sanctions undermine growth in sanctioned states, smart sanctions appear to promote growth there. Our work in the current paper differs in one important respect: it addresses the timing of the effects of sanctions on international trade.

We also contribute to a small literature that studies the effectiveness of sanctions by incorporating timing. This issue has been of interest to economists and political scientists alike, but has been under-explored due to the lack of appropriate data (Peksen, 2019). There are, however, notable exceptions. For example, Dizaji and van Bergeijk (2013) show that economic sanctions are effective for the first two years of their imposition but then their effectiveness diminishes because the target learns how to adjust to the imposed sanctions regime. These authors study the impact of sanctions on economic indicators such as real government consumption expenditures per capita, real imports per capita, real investment per capita and real GDP per capita. van Bergeijk and van Marrewijk (1995) also show that sanctions can be effective in the long run when the permanent damage caused by the sanctions is estimated to be higher than the yields of non-compliance. We complement these studies by focusing on the impact of sanctions on bilateral trade flows and implementing the latest developments in the empirical trade

literature to study possible links between sanctions duration and effectiveness.

The rest of the paper is organized as follows. Section 2 offers a brief overview of the GSDB and zooms in on the several types of trade sanctions covered by this dataset. Section 3.1 motivates and sets up our econometric model. Section 3.2 presents our main findings and offers a series of sensitivity experiments that demonstrate the robustness of our main results. Section 4 concludes.

2 Trade Sanctions and Their Duration

To perform the upcoming empirical analysis we rely on the Global Sanctions Data Base (GSDB) developed by Felbermayr et al. (2020a) and recently updated by Kirilakha et al. (2021).[5] This section zooms in on trade sanctions, which are a key dimension of the GSDB, and which are the focus of our analysis. Specifically, Section 2.1 offers details on various dimensions of trade sanctions in the GSDB, while Section 2.2 discusses the duration of trade sanctions.

2.1 Trade Sanctions in the GSDB

In the GSDB, trade sanctions are broadly defined as limitations of trade flows. The GSDB distinguishes between several types of trade sanctions depending on coverage, direction and participating countries. First, some trade sanctions specifically ban imports and/or exports while others could limit trade in both directions. Accordingly, depending on the direction of the restriction on trade flows, the GSDB distinguishes between sanctions on exports from the sender to the target (export sanctions), sanctions on imports from the target to the sender (import sanctions), and sanctions that simultaneously apply to both the exports and the imports between the two sides (unilateral trade sanctions). Second, trade sanctions may apply only to specific goods (partial trade sanctions) or to exports and/or imports as a whole (complete trade sanctions). Thus, the GSDB distinguishes between "partial" and "complete" sanctions within each of the three dimensions, depending

[5]The GSDB is freely available and we will be happy to share it with interested researchers, who can request it by e-mail at GSDB@drexel.edu. When writing to us with requests for the data, please indicate your name and affiliation.

on the direction of banned trade flows.[6] Finally, an important aspect of sanctions is the scope of participating countries that can vary from one country (a unilateral sanction) to, for example, a sanction imposed multilaterally by all members of the United Nations.[7] To perform the structural empirical analysis, we capitalize on the variation across each of the three dimensions of trade sanctions in the GSDB.

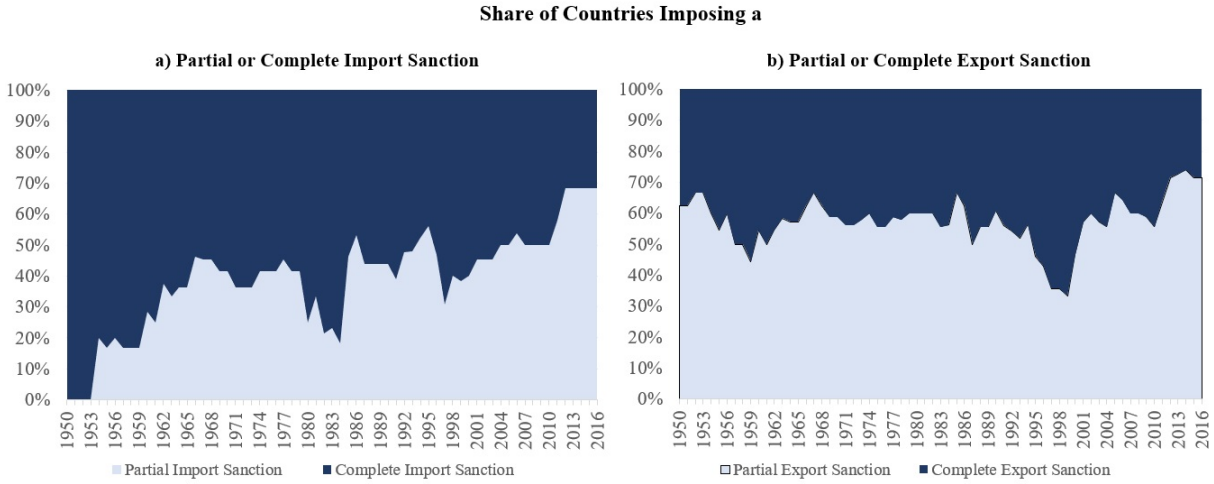
Figure 1 tracks partial and complete trade sanctions over time. Interestingly, in the early 1950s, all countries that imposed import sanctions restricted imports to the full extent. However, in the succeeding years, an increasing share of countries restricted imports only partly. In 2016, their share stood at around 70% of all countries applying import sanctions. In contrast, as illustrated in panel (b) of Figure 1, over the past 65 years, countries have been less eager to impose restrictions on all exports. Between 1950 and 1990, around 60% of countries sanctioning exports imposed partial restrictions. In the following 10 years, more than half of all export restricting countries applied complete export sanctions, whereas in recent years partial export sanctions have been on the rise again. These patterns illustrate the importance of identifying the differing extent of trade sanctions as partial vs. complete and export vs. import sanctions. In the econometric analysis below we demonstrate that the effectiveness of sanctions varies across these dimensions.

Motivated by the fact that the United States and the European Union members have been the most active senders, Figure 2 depicts the exposure share of world trade to US sanctions (panel (a)), and to EU sanctions (panel (b)). Panel (a) reveals that the US sanctions could potentially impact 2.5 percent of global trade in 2015. Interestingly, the share of global trade potentially affected by EU sanctions turns out to be substantially less volatile (but similarly sized). Moreover, in recent years EU sanctions have been threatening an increasingly larger share of global trade than US sanctions. The EU

[6]For a range of cases the GSDB additionally includes detailed trade ban information (e.g., export controls of small aviation, helicopter, aviation parts and electronics, or export restrictions of high-tech products). The partial character of this trade sanction type is very heterogeneous as the product ranges differ substantially.

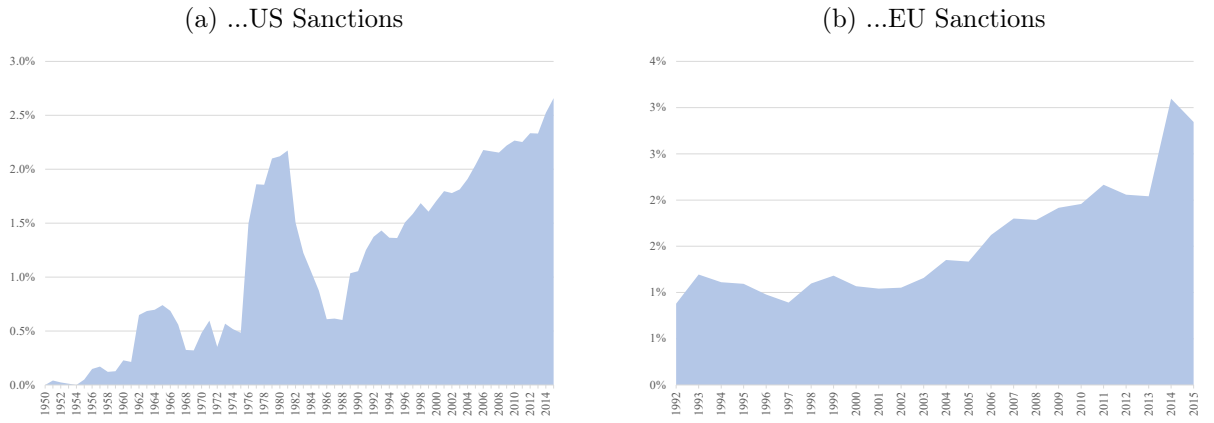
[7]A prominent example of a complete unilateral sanction is the full trade sanction policy imposed by the United States on Cuba, which was introduced by President John F. Kennedy in February 1962. The UN sanction on Iran based on resolution 1996 is an example of a partial sanction policy that is imposed by all UN member states. The different dimensions of trade sanctions in the GSDB are explained in detail in Felbermayr et al. (2020a)

Figure 1: Partial versus Complete Trade Sanctions



Share of countries that have imposed partial and complete import (panel (a)) and export (panel (b)) sanctions over time (1950 to 2016).

Figure 2: Share of World Trade Exposed to...



Note: The diagrams show the share of world exports exposed to US and EU sanctions. Trade data stem from the IMF Direction of Trade Statistics. EU statistics start in 1992 due to German unification.

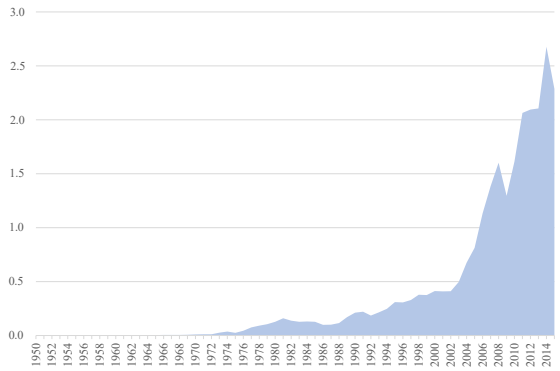
and US are jointly responsible for negatively affecting about two thirds of global trade with sanction policies. The main message from Figure 2 is that, individually and in combination, the U.S. and EU sanctions have the potential to affect a significant fraction of trade flows, and therefore economic activity, in the world.

Figure 3 complements the analysis of the impact of U.S. and EU sanctions by illustrating the total potential impact on trade that could be caused by all trade sanctions in the world for a given year.[8] The left panel of Figure 3 reports the sanction-affected trade volumes in levels, measured in trillions of current U.S. dollars.

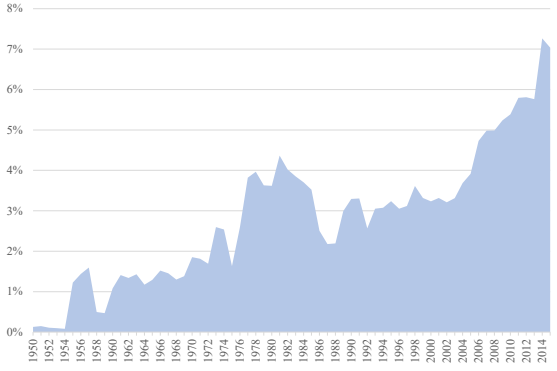
[8]In case of unilateral sanctions the graph accounts for imports and exports of sanctioning countries while for cases with reciprocal sanctions only both import volumes have been accounted for.

Figure 3: Trade Potentially Affected by All Sanctions

(a) in trn. USD



(b) in % of world trade



Note: These diagrams quantify the exposed value and the share of exposed trade in world trade to all observed sanctions for each year between 1950 and 2015. The presented trade volume is the amount of observed yearly trade between countries that introduce a sanctions policy in the same year. Trade data stem from the IMF Direction of Trade Statistics.

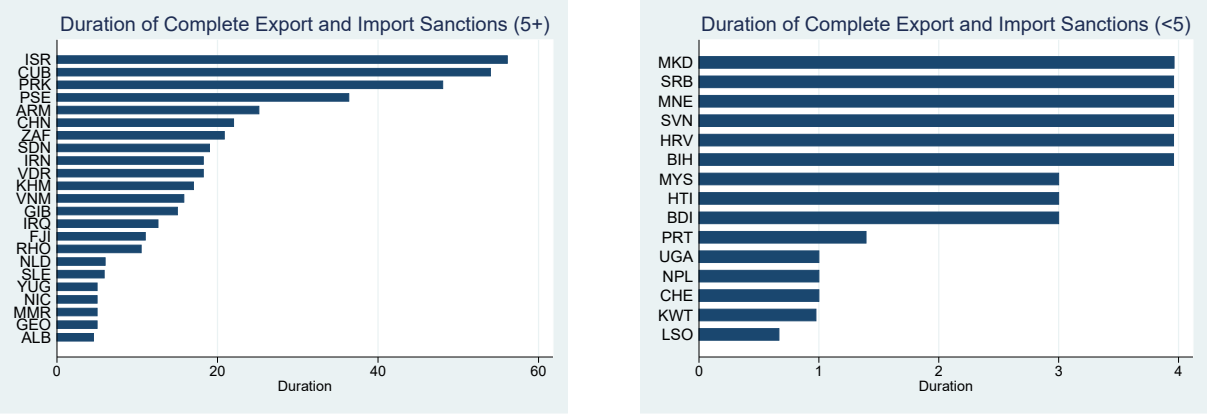
Three periods with a stepwise increase in potentially affected global trade volume can be identified. In the mid 1970s, sanctions started to have some bite, but the extent of their impact remained very minor. After the fall of the Iron Curtain in 1989, potentially affected trade volumes quickly rose to about 200 bn. U.S. dollars. The most dramatic increase occurred after 2002: the trade volume potentially affected by sanctions stood at over 2 trillion U.S. dollars in recent years. The increasing economic integration over the last decades could be one reason for the exponential pattern depicted in Figure 3.

In order to gauge the relative importance of sanctions for international trade, panel (b) of Figure 3 translates the levels in (a) into percentages. The share of world trade potentially impacted by sanctions has risen steadily since 1950, reaching 7 percent of world trade in recent years. In contrast to the exponential growth in nominal value, the increase in fraction of trade affected by sanction appears much more gradual. All these suggest that the potential size of economic damage from sanctions through the trade channel has reached quite a significant volume. This validates our focus on measuring the impact of sanctions on international trade as an important component of the overall effectiveness of sanctions. Our empirical analysis below complements and reinforces the stylized description presented in this section by demonstrating that the EU and US sanctions have been among the most effective in reducing trade flows. In addition, we show that the impact of sanctions is very heterogeneous even across the EU members.

Felbermayr et al. (2020b) find that the impact of trade sanctions is highly heteroge-

Figure 4: Duration of Sanctions by Target (Long vs. Short)

(a) (b)



Note: The graphs show the average duration of complete trade sanctions for a given target (ranked from longest to shortest duration). The targets' names are written as USITC ISO-3 codes (refer to Table A.1 in the Appendix).

neous and, among all trade sanction types, complete trade sanctions (complete ban on both exports to and imports from the sanctioned country) appear to have the strongest effect on trade flows. In light of this finding, we focus on complete trade sanctions.

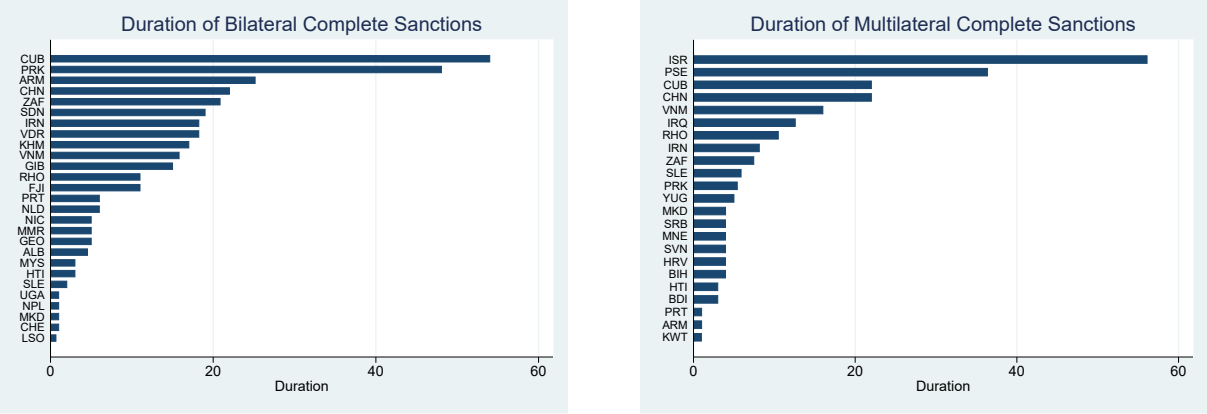
2.2 On the Duration of Trade Sanctions

This section offers descriptive analysis of the duration of trade sanctions. The distribution of the duration of complete trade sanctions is highly skewed. On average, a complete trade sanction lasts about 6 years and the median duration is 4 years. Around 14% of complete trade sanctions lasts more than 5 years, and the longest episode is 66 years. Figure 4 (a) and (b) illustrate the average duration of long (5+ years) complete trade sanctions and the average duration of short (<5 years) complete trade sanctions ranked by the targeted nation (from longest to shortest in duration). Long-lasting complete trade sanctions are usually associated with a territorial conflict, an inter-country or intra-country war, and/or ideological conflict (e.g., capitalism vs. communism). Many of those conflicts, such as the Arab-Israeli conflict, the Cuban Missile Crisis, North Korea nuclear tensions, or Armenia-Azerbaijan conflict over the Nagorny Karabakh region are still unresolved. In Section 3, we explore the impact of short vs. long complete trade sanctions.

Additionally, we investigate the difference between unilateral and multilateral complete trade sanctions. Figure 5 shows that the longest and ongoing unilateral complete

Figure 5: Duration of Sanctions by Target (Unilateral vs. Multilateral)

(a) (b)



Note: The graphs depict: (a) the average duration of unilateral complete trade sanctions ranked (from longest to shortest duration) by the target and (b) the average duration of multilateral complete trade sanctions ranked (from longest to shortest duration) by the target. The targets' names are written as USITC ISO-3 codes (refer to Table A.1 in the Appendix).

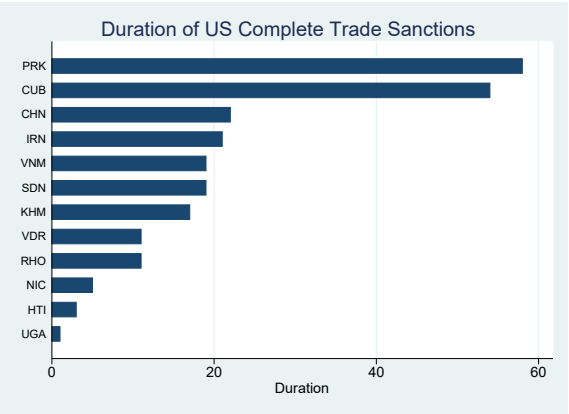
trade sanction has been imposed on Cuba by the US as a result of the Cuban Missile Crisis. Not surprisingly, the US sanctions on North Korea are the second longest and still in force due to nuclear tensions. As for the most severe (in terms of duration) multilateral sanctions, Israel and Palestine have been long sanctioned by the Arab League. Cuba got hit hard by the Coordinating Committee for Multilateral Export Controls (CoCom) sanctions, in addition to the US sanctions, that targeted primarily the Communist regime.

Next, we compare the complete trade sanctions imposed by the EU, the US, and the UN. The EU has been the most frequent sanctioner as a union, while the US has sanctioned the most as an individual country. Figure 6 lists the countries affected by the UN, the US, and EU sanctions ranked by the duration of the corresponding sanction episodes. Figure 6 (a) shows that North Korea and Cuba got sanctioned by the US with one of the longest complete trade sanctions. China, Vietnam and Cambodia have been also hit by the long US sanctions (primarily for ideological reasons). Iran has been targeted by the US sanctions for its nuclear program. The UN sanctions have been on a rapid rise for the past 30 years. However, their duration is much shorter given that the UN have started actively using sanctions as a tool to achieve certain political objectives. Iraq has been hit by the longest UN sanctions as the result of the Iraqi invasion and its attempted annexation of Kuwait. Zimbabwe (former Rhodesia) was sanctioned by

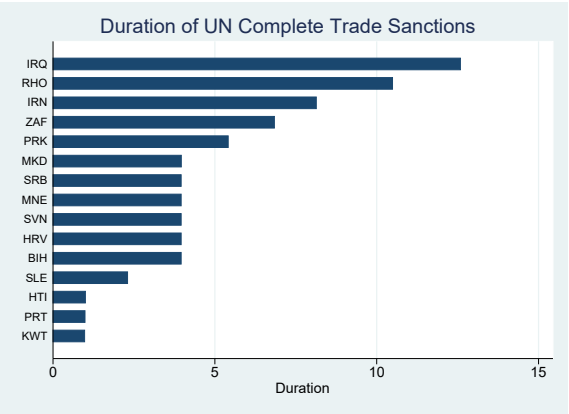
the UN due to breaking from the United Kingdom rule, and Iran was sanctioned due to their nuclear activities. South Africa was punished for its apartheid policies, and this is one vivid example of a sanction that has been imposed to advocate democracy and human rights. Finally, complete EU trade sanctions affected only Iraq and South Africa. Overall, the duration of the US sanctions are usually longer than that of the UN and EU sanctions. This suggests that the US has not only used sanctions frequently as a foreign policy tool to inflict economic pain to the target in order to achieve its underlying political objectives. In Section 3, we look closely at the impacts of the complete trade sanctions imposed by the US, the UN, and the EU on bilateral trade.

Figure 6: Duration of Sanctions by Target (US vs. UN vs. EU)

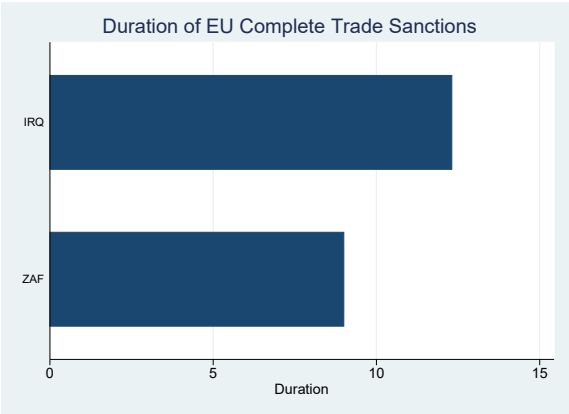
(a)



(b)



(c)



Note: The graphs depict the average duration (ranked from longest to shortest) of complete trade sanctions for a given target. Panel (a) shows the average duration of the US complete trade sanctions ranked (from longest to shortest duration) by the target. Panel (b) shows the average duration of the UN complete trade sanctions ranked (from longest to shortest duration) by the target. Finally, panel (c) shows the average duration of the EU complete trade sanctions ranked (from longest to shortest duration) by the target. The countries' names are written as USITC ISO-3 codes (refer to Table A.1 in the Appendix).

3 Empirical Analysis

To characterize the evolution of the impact of sanctions on trade flows we rely on the workhorse empirical trade model – the gravity equation. In Section 3.1, we set up and motivate our econometric model. Section 3.2 presents our main findings and offers a series of sensitivity experiments that demonstrate the robustness of our main findings.

3.1 Econometric Specification

To set up our estimating equation we capitalize on the latest developments in the empirical gravity literature.[9] Specifically, we combine and extend on the recent work of Felbermayr et al. (2020a;b) and Egger et al. (2020). Felbermayr et al. (2020a;b) are the basis for our analysis because they, too, use the GSDB and the latest gravity estimation techniques to study the heterogeneous impact of sanctions on international trade. We complement and extend on Felbermayr et al. (2020a;b) by characterizing the evolution of the impact of sanctions on trade over time. To this end we follow and extend on the methods of Egger et al. (2020) who quantify the evolution of the impact of free trade agreements (FTAs) on international trade. Based on the insights from these and other related studies, we specify the following econometric model:

$$X_{ij,t} = \exp[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \alpha CTS_{ij,t} + \sum_{s} \alpha_s CTS_{ij,t+s} + \sum_{k} \beta_k CTS_{ij,t-k} + GRAV_{ij,t}\gamma] \times \epsilon_{ij,t}. \quad (1)$$

Before we motivate and discuss each of the individual elements in our econometric model, we note that, as famously demonstrated by Arkolakis et al. (2012), equation (1) is representative of a very wide class of alternative theoretical microfoundations. Anderson (1979) is the first to derive a structural gravity model of trade under the assumptions that goods are differentiated by place of origin (Armington, 1969) and that consumer preferences are homothetic, identical across countries, and approximated by a CES utility function. Since then, the gravity equation has been derived from many alternative

[9] Below, we motivate each element of our estimating equation based on the existing literature. We refer the reader to Baldwin and Taglioni (2006), Head and Mayer (2014) and Yotov et al. (2016) for surveys of the empirical gravity literature.

microfoundatoins, including: a Monopolistic Competition setting, e.g., Krugman (1979); from Heckscher-Ohlin foundations, e.g., Bergstrand (1985); from a Ricardian setting, e.g., Eaton and Kortum (2002); at the sectoral level from a demand-side perspective, e.g., Anderson and van Wincoop (2004); with heterogeneous firms, e.g., Chaney (2008); at the sectoral level from a supply-side perspective, e.g., Costinot et al. (2012); with country-specific dynamics via asset accumulation, e.g., Olivero and Yotov (2012); with input-output linkages, e.g., Caliendo and Parro (2015); and with bilateral dynamics, e.g., Anderson and Yotov (2020).[10]

In what follows, we motivate each of the elements in our estimating specification as well as present and defend our identification strategy. The dependent variable in (1), $X_{ij,t}$, denotes nominal trade flows (in levels) from exporter i to importer j at time t. Given our main goals, it is natural to employ panel data. In addition to allowing us to characterize the evolution of the impact of sanctions on trade over time, the use of panel data has two econometric advantages. First, using panel data improves estimation efficiency because when we move from a cross-section to panel bilateral data the number of parameters in our specification grows slower than the number of observations. Second, using panel data allows us to include country-pair fixed effects, whose benefits we discuss below.

Cheng and Wall (2005) note that econometric specifications with fixed effects, such as the gravity model employed here, are *"sometimes criticized when applied to data pooled over consecutive years on the grounds that dependent and independent variables cannot fully adjust in a single year's time."* (Footnote 8, p. 52, Cheng and Wall, 2005). Therefore, they recommend the use of interval data instead of data over consecutive years for gravity estimations. Many papers follow this recommendation and, to avoid the Cheng-and-Wall critique, estimate gravity with interval data.[11] More recently, however, Egger et al. (2020) argue that in addition to improving estimation efficiency and avoiding arbitrary dropping

[10]We refer the reader to Anderson (2011), Costinot and Rodríguez-Clare (2014), Head and Mayer (2014) and Yotov et al. (2016) for surveys of the theoretical gravity literature, which is the foundation for our estimations as well as for the general equilibrium analysis.

[11]For example, Trefler (2004) also criticizes trade estimations with samples that are pooled over consecutive years and uses 3-year intervals. Cheng and Wall (2005) and Baier and Bergstrand (2007) use 5-year intervals, while Olivero and Yotov (2012) experiment with 3- and 5-year interval data.

of observations, the use of pooled/consecutive-year data in fact improves our ability to capture the adjustment of trade flows in response to trade policy changes. We follow Egger et al. (2020) in using consecutive-year data to obtain our main results. However, in the sensitivity analysis, we also experiment with interval data. Our main conclusions remain robust.

In combination with the fact that the dependent variable enters our estimating specification in levels, the exponential function on the right-hand side of equation (1) reflects the fact that, to obtain our main results, we rely on the Poisson Pseudo Maximum Likelihood (PPML) estimator. Following the recommendations of Santos Silva and Tenreyro (2006; 2011), the motivation for using PPML for our main analysis, and for gravity estimations in general, is twofold. First, the PPML estimator handles successfully the heteroskedasticity in trade data which would otherwise lead to inconsistent OLS estimates. Second, due to its multiplicative form, the PPML estimator enables us to take advantage of the information contained in the zero trade flows, which account for 43.1% of the observations in our sample. In the sensitivity analysis, we demonstrate that our main findings are robust to the use of the standard OLS estimator.

Equation (1) includes three sets of fixed effects. As is now standard in the gravity literature, we use exporter-time fixed effects ($\pi_{i,t}$) and importer-time fixed effects ($\chi_{j,t}$). Based on the seminal work of Anderson and van Wincoop (2003), the theoretical motivation for the use of exporter and importer fixed effects in gravity estimations is that these dummy variables control for the unobservable multilateral resistances terms, which account for the fact that trade between two countries depends not only on their sizes and the direct trade frictions between them but also on how remote these economies are from the other countries in the sample. Olivero and Yotov (2012) demonstrate that, due to the presence of country-specific dynamic forces (e.g., asset accumulation) the multilateral resistances should be accounted for by exporter-time and importer-time fixed effects in panel gravity specifications. Baldwin and Taglioni (2006) refer to the malpractice of not accounting for the multilateral resistances in gravity estimations as 'the gold medal mistake'. Finally, we note that the exporter-time and the importer-time fixed effects

also absorb/control for any other time-varying country-specific characteristics that may impact bilateral trade on the exporter side and on the importer side, respectively.[12]

We also employ a set of country-pair fixed effects, μ_{ij}. The motivation for the use of country-pair fixed effects in gravity estimations is twofold. First, as convincingly argued by Baier and Bergstrand (2007), the pair fixed effects absorb most of the linkages between the potentially endogenous trade policy variables and the error term $\epsilon_{ij,t}$, which mitigates potential endogeneity concerns. Thus, in our setting, the pair fixed effects would mitigate endogeneity concerns with respect to sanctions.[13] Second, on a related note, the country-pair fixed effects will absorb/control for all time-invariant bilateral trade costs. This is important because, as demonstrated by Egger and Nigai (2015) and Agnosteva et al. (2019), the proxies for trade costs that are standardly used in gravity models (e.g., the log of bilateral distance and indicators for contiguity, common language, colonial ties, etc.) may sometimes fail to capture all time-invariant bilateral trade costs. To obtain our main results we follow Baier et al. (2016) and employ *directional* bilateral fixed effects. The benefits are: (i) that the directional fixed effects allow and control for the presence of asymmetric trade costs; and (ii) this treatment is consistent with the fact that many of the sanctions in our database are directional. In the sensitivity analysis we also demonstrate that our findings are robust to using symmetric bilateral fixed effects.

The next three sets of covariates are most important for our purposes. Felbermayr et al. (2020b) find that the impact of sanctions on trade is widely heterogeneous. In particular, and as expected, they find that Complete Trade Sanctions (CTS) exert the strongest effect on trade, followed by sanctions on exports. This is the reason why the focus of our main analysis is exactly on the impact of complete trade sanctions. To capture the evolution of the impact of sanction on trade, we follow and extend the methods of Egger et al. (2020) who study the evolution of the effects of FTAs. An important difference between sanctions and FTAs, however, is that sanctions are often lifted/terminated while,

[12]For further analysis of the MRs and their importance in the structural gravity system, we refer the interested reader to Yotov et al. (2016).

[13]As noted by Felbermayr et al. (2020a), another factor that mitigates potential endogeneity concerns with respect to sanctions is that, by definition, sanctions are usually imposed in response to actions/inactions that are specific to the target country. Therefore, the use of exporter-time and importer-time fixed effects in our econometric specification completely controls for any such target-specific linkages.

in general, most of the FTAs continue to exist throughout the estimating samples. This allows and, in fact, requires us to introduce an additional, *post-sanction* period in our analysis.

Based on these insights, we use three sets of covariates to capture the desired time-varying sanction effects. $CTS_{ij,t}$ is a vector of variables that are designed to capture the contemporaneous effects of sanctions on trade (i.e., the effects during the period when the sanctions are actually in place). In the main analysis, we limit this vector to a single dummy variable, which takes the value of one if there is a complete trade sanction in place between exporter i and importer j at time t, and the value of zero otherwise. However, we also zoom further in by allowing for differential effects of sanctions during the period when they are imposed. Following Egger et al. (2020), $\sum_k \beta_k CTS_{ij,t-k}$ is a vector of sanction variables designed to capture any changes in the trade flows between the sanctioning and sanctioned countries prior to the imposition of sanctions (i.e., in the pre-sanction period). Mechanically, these variables are constructed as the k leads of $CTS_{ij,t}$. Finally, $\sum_s CTS_{ij,t+s}$ is a vector of sanction variables that are designed to capture the post-sanction evolution of trade flows. The idea is to examine whether, when, and how fast trade flows return to their pre-sanction levels. Again, mechanically, these variables are constructed as the lags of $CTS_{ij,t}$.[14]

Finally, vector $GRAV_{ij,t}$ in equation (1) includes a series of additional time-varying control variables. In particular, here we add all other types of sanctions that are covered by the GSDB. We experiment by combining the rest of the sanctions into a single variable and by including them separately. In addition, we control for the presence of economic integration agreements (EIAs) with an indicator variable that takes the value of one if there is an EIA between countries i and j at time t, and the value of zero otherwise. We also include indicator variables for membership in the European Union ($EU_{ij,t}$) and for

[14]In the empirical analysis we obtain and present results when we include 10-year leads and lags. We also experiment with a fully saturated set of lags and leads in our alternative specifications. Results are very similar to our main findings. In principle, it is possible to use VAR methods, such as the AIC and BIC, and lag selection criteria (such as the Akaike information criterion, the Schwarz information criterion and the Hannan–Quinn information criterion) to determine the optimal lag structure of the model. However, doing so in our current analysis is difficult due to the presence of three sets of high-dimension fixed effects: country pair (49208), importer time (11784), and exporter time (11997). These fixed effects play important roles in gravity models and have been applied extensively in the literature (e.g., Anderson and van Wincoop (2003), Baier and Bergstrand (2007), and Yotov et al. (2016)).

membership in the World Trade Organization ($WTO_{ij,t}$).[15] Given the rich structure of fixed effects in each of our specifications, we believe it is safe to assume that the error term $\epsilon_{ij,t}$ is just noise. Finally, we note that in all specifications we cluster the standard errors by country-pair.

3.2 Estimation Results and Analysis

This section presents the results from a series of specifications that are designed to characterize the evolution of the impact of sanctions on trade flows over time. We present our main findings in two subsections. Section 3.2.1 focuses on the pre- and post-sanction effects on trade, while Section 3.2.2 analyzes the evolution of the impact of sanctions during the period they are in place. As described in the previous section, to obtain our main results we focus on the effects of complete trade sanctions, and we use the PPML estimator, consecutive-year data, exporter-time and importer-time fixed effects, and directional country-pair fixed effects. All of our specifications allow for possible pre-sanction and post-sanction effects ten years before and ten years after the corresponding sanctions are in place. In addition to yearly estimates, we experiment with 2- and 3-year lags and leads. All standard errors are clustered by country-pair. For clarity, due to the large number of estimates we obtain in some specifications, we complement some of our main estimation results with visual graph presentations.

3.2.1 On the Pre- and Post-sanction Effects on Trade

We start the analysis in column (1) of Table 1, where we obtain a single estimate of the impact of complete trade sanctions on trade flows. These benchmark results are comparable to the estimates from Felbermayr et al. (2020a) and confirm one of their main findings that complete trade sanctions are very effective in impeding bilateral trade flows. Specifically, our estimate implies that, all else equal, complete trade sanctions have led to a 76.8% (std.err. 5.531) decrease in bilateral trade among the sanctioning and the sanctioned countries in our sample. The trade volume effect (in %) is calculated

[15]The additional time-varying control variables come from the Dynamic Gravity Database of the US International Trade Commission, c.f., Gurevich and Herman (2018).

as $(\exp(-1.46) - 1) * 100 = 76.774$, and the corresponding standard errors are obtained with the Delta method.

The estimates in column (2) of Table 1 include a series of sanction leads and lags. In particular, in order to capture the full lifespan of the impact of sanctions on trade, we allow for 10-year leads and for 10-year lags. Three main results stand out from the estimates in column (2). First, we note that the contemporaneous effect of sanctions in column (2) is relatively larger (about 17 percent larger) as compared to the corresponding estimate in column (1). The explanation for this result is that by introducing pre-sanction and post-sanction effects, we are changing the reference group that is used to obtain the corresponding contemporaneous effects. Specifically, when the contemporaneous effects of sanctions are estimated without allowing for pre- and post-sanction effects, the pre- and post-sanction effects are in the reference group. When we explicitly allow for pre- and post-sanction effects, these are no longer in the reference group. This, in combination with the fact that obtain negative estimates of the pre- and post-sanction effects explains the increase (in the absolute value) of our contemporaneous sanction estimate. The implication of this result is that estimates of the effects of sanctions that do not allow for pre-sanction and post-sanction effects may underestimate the contemporaneous sanction effects.

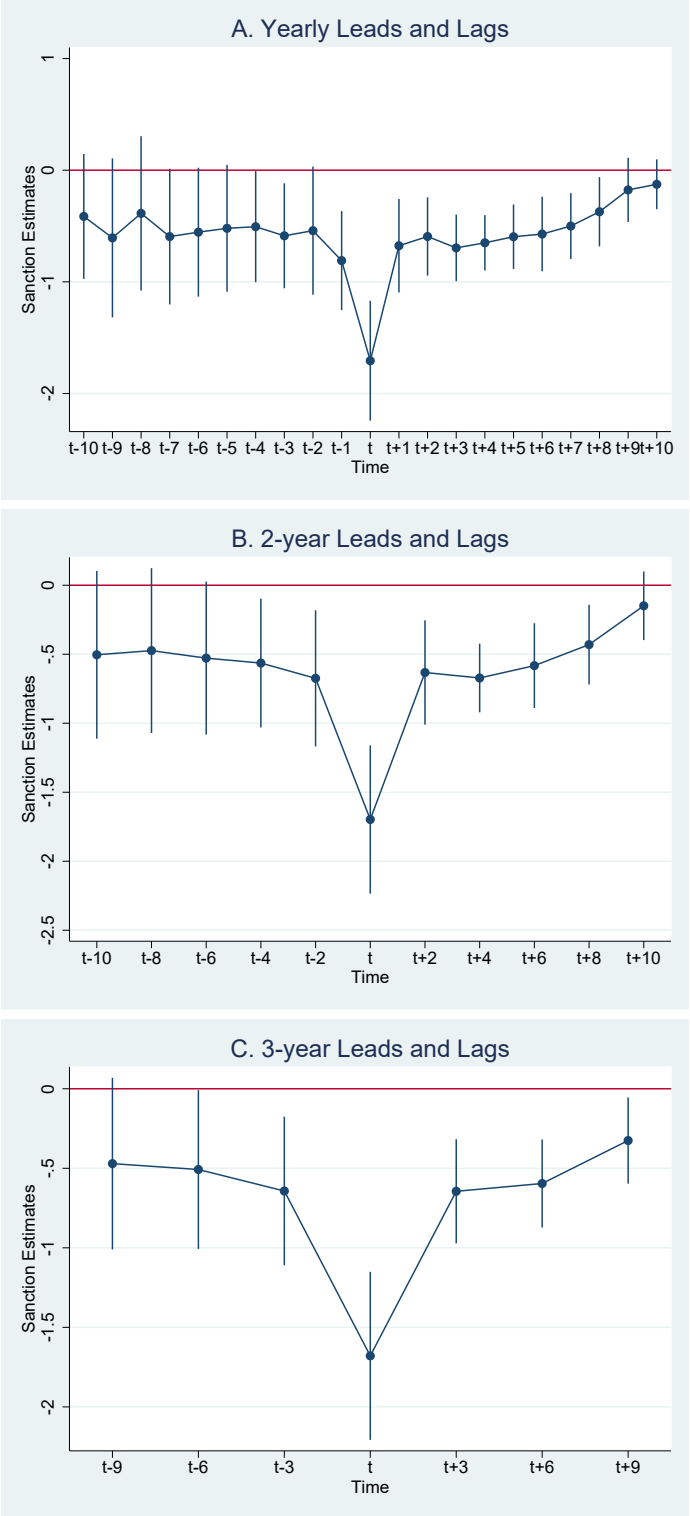
Next, we turn to the estimates of the impact of sanctions in the pre-sanction period (i.e., the estimates on the covariates $CTS_{ij,t-10}$ through $CTS_{ij,t-1}$). We observe two patterns in these results. First, we see that between ten and four years prior to the implementation of a sanction, trade between the sanctioned and the sanctioning countries is already lower. This is captured by the negative estimates on $CTS_{ij,t-10}$ through $CTS_{ij,t-4}$. (As a reminder, we note that all of our specifications include country-pair fixed effects. Thus, these negative estimates cannot/should not be reflective of higher time-invariant trade costs between the sanctioning and the sanctioned countries. They may, however, reflect long-term tensions between these countries. We also note that the estimates on $CTS_{ij,t-10}$ through $CTS_{ij,t-4}$ are often only marginally significant. Therefore, we hesitate placing a heavy weight on their importance and policy implications.

Table 1: Timing the Impact of Sanctions on Trade

	(1) SINGLE	(2) YEARLY	(3) 2-YEARS	(4) 3-YEARS
$CTS_{ij,t-10}$		-0.414	-0.504	
		(0.286)	(0.310)	
$CTS_{ij,t-9}$		-0.606		-0.471
		$(0.363)^{+}$		$(0.275)^{+}$
$CTS_{ij,t-8}$		-0.387	-0.474	
		(0.353)	(0.305)	
$CTS_{ij,t-7}$		-0.595		
		$(0.310)^{+}$		
$CTS_{ij,t-6}$		-0.555	-0.528	-0.508
		$(0.295)^{+}$	$(0.283)^{+}$	$(0.255)^{*}$
$CTS_{ij,t-5}$		-0.520		
		$(0.290)^{+}$		
$CTS_{ij,t-4}$		-0.506	-0.564	
		$(0.254)^{*}$	$(0.238)^{*}$	
$CTS_{ij,t-3}$		-0.588		-0.643
		$(0.240)^{*}$		$(0.238)^{**}$
$CTS_{ij,t-2}$		-0.542	-0.674	
		$(0.293)^{+}$	$(0.252)^{**}$	
$CTS_{ij,t-1}$		-0.810		
		$(0.226)^{**}$		
$CTS_{ij,t}$	-1.460	-1.707	-1.698	-1.679
	$(0.238)^{**}$	$(0.274)^{**}$	$(0.274)^{**}$	$(0.270)^{**}$
$CTS_{ij,t+1}$		-0.676		
		$(0.214)^{**}$		
$CTS_{ij,t+2}$		-0.594	-0.632	
		$(0.179)^{**}$	$(0.193)^{**}$	
$CTS_{ij,t+3}$		-0.696		-0.645
		$(0.152)^{**}$		$(0.167)^{**}$
$CTS_{ij,t+4}$		-0.650	-0.672	
		$(0.127)^{**}$	$(0.127)^{**}$	
$CTS_{ij,t+5}$		-0.596		
		$(0.147)^{**}$		
$CTS_{ij,t+6}$		-0.572	-0.583	-0.596
		$(0.170)^{**}$	$(0.157)^{**}$	$(0.141)^{**}$
$CTS_{ij,t+7}$		-0.500		
		$(0.150)^{**}$		
$CTS_{ij,t+8}$		-0.372	-0.430	
		$(0.158)^{*}$	$(0.147)^{**}$	
$CTS_{ij,t+9}$		-0.177		-0.326
		(0.147)		$(0.138)^{*}$
$CTS_{ij,t+10}$		-0.126	-0.149	
		(0.114)	(0.127)	
N	1936973	1935581	1935581	1935581

Notes: This table reports estimates of the evolution of the impact of sanctions on trade. All results are obtained with the PPML estimator, consecutive-year data, exporter-time and importer-time fixed effects, and directional country-pair fixed effects. The estimates of all fixed effects are omitted for brevity. The dependent variable is always nominal trade flows in levels. Column (1) obtains a single average estimate of the impact of complete trade sanctions on trade flows. Column (2) uses ten yearly sanction lags and ten yearly sanction leads. Columns (3) and (4) employ 2-year lags and leads and 3-year lags and leads, respectively. Standard errors are clustered by country pair. $^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$. See text for further details.

Figure 7: Evolution of the Impact of Sanctions on Trade



Note: This figure presents estimates of the evolution of the impact of sanctions on trade. The estimates used to construct the three panels of the figure are those from Table 1. Specifically, panel A depicts the estimates, and their corresponding confidence intervals, from column (2) of Table 1. Panels B and C, respectively, depict the results from columns (3) and (4) of Table 1. See text for further details.

More importantly, we see from column (2) that the impact of sanctions picks up about four years prior to their implementation. This is captured by the estimates on $CTS_{ij,t-4}$

through $CTS_{ij,t-1}$ in column (2) of Table 1, which are increasing (in absolute value) and also becoming more statistically significant the closer we move to the sanction period.[16]

Based on our pre-sanction estimates, we conclude that sanctions do have an impact on trade before they are implemented, which is the strongest, both in terms of economic magnitude and in terms of statistical significance between one and four years prior to the implementation of the sanction. This result is consistent with and complements the results of Egger et al. (2020) who obtain positive and significant estimates of the effects of FTAs prior to their implementation. Following Egger et al. (2020), we label the statistically significant effects we obtain in the pre-sanction period as anticipatory effects. Possible explanations for these effects include: (i) already increased trade frictions between the sanctioning and the sanctioned countries prior to the implementation of the sanction, including the ability of governments to influence firms, especially their state owned firms, even before the formal sanction restrictions are in place; and/or (ii) adjustments made by firms in expectation of the imposition of the sanction. We view the disentangling of these dynamic channels (both empirically and also theoretically) as very interesting and important tasks for future work. For now, the main implication of our findings is that researchers should allow for anticipatory effects when they estimate the impact of sanctions on trade.

The third main result from column (2) of Table 1 relates to our post-sanction estimates (i.e., the estimates on the covariates $CTS_{ij,t+1}$ through $CTS_{ij,t+10}$). We see two significant patterns in the evolution of these estimates. The main conclusion from them is that the recovery of trade flows is not instantaneous. Our estimates suggest that the impact of sanctions on trade flows is not completely eliminated until about seven to eight years after the sanctions are lifted. The second pattern we observe in our post-sanction estimates is that the recovery of trade flows is gradual and steady. The two patterns captured by our estimates are consistent with the discussion in the literature explaining the smooth dynamic adjustment after the lifting of sanctions. One possible explanation is that sanctions damage the trust in international trade relations which increases the risk associated

[16]The exception is the estimate on $CTS_{ij,t-2}$, which is still negative but not increasing in absolute value.

with trade and the transaction costs that accompany commercial relationships (Morrow et al. (1998), Lektzian and Souva (2001)) and which, in turn, may influence patterns of international specialization even after the sanctions have been lifted. Moreover, the speed with which trade recovers depends on the target's political system (North (1990), Eichengreen and Irwin (2009)). Other possible explanations for this smooth dynamic could be the gradual lifting of various trade barriers as well as post-sanction adjustment of firms, including gradual re-entry into the previously banned market.

Comparison between our pre-sanction and post-sanction estimates reveals an encouraging result. Specifically, we notice that the post-sanction estimates also become statistically insignificant after a given period of time and they become smaller in absolute value (i.e., less negative) as compared to the pre-sanction estimates. While the differences between the pre- and the post-sanction estimates may not be statistically significant, pushing inference to the limit, the implication is that sanctions may actually lead to increased/improved trade relationships in the post-sanction period as compared to the pre-sanction period. A natural explanation for this pattern is that the sanctions could have eliminated the source of tension between the countries and, therefore, they have led to improved economic/trade relationships.

The estimates in columns (3) and (4) of Table 1 are obtained with yearly data and all estimation features we have used to obtain the results in column (1). The only difference is that the results in columns (3) and (4) are obtained with 2-year and 3-year lags and leads, respectively. These estimates are visualized in panels B and C of Figure 7, respectively. Our results reveal that using longer lags and leads has some advantages and some disadvantages. On the positive side, the new estimates are 'smoother' due to the fact that they are averages over longer periods of time. They are also more 'efficient' from an econometric point of view. The 'smoothness' of the longer lead and lag estimates is clearly depicted in panels B and C of Figure 7. We also note that our argument about the difference between the pre-sanction and the post-sanction effects is most clearly seen in panel B of Figure 7. On the downside, using longer leads and lags may lead to inaccurate timing of some of the sanction effects. For example, the yearly

estimates in column (3) reveal that the post-sanction effects of sanctions are exhausted seven to eight years after their lifting, while the results in column (4) suggest that the sanction effects are still strong nine years after their implementation. Based on these results, our recommendation is that researchers should experiment with alternative lags and leads and use a combination of them to present and interpret their findings.

3.2.2 On the Phasing-in Sanction Effects

In this section we zoom in on the time period when complete trade sanctions are in place in order to investigate how the impact of such sanctions evolves while they are active. If the enforcement of complete trade sanctions is strict, trade should fall immediately and stay at the low level. In practice, trade flows may vary within the sanction period depending on, for instance, enforcement effort, specific goals sought, and/or the expectation of conflict resolution. To understand the time-varying impact of complete trade sanctions on trade, we first designate each sanction-year as early, mid or late phase, by dividing the spell of the sanctions into three quartiles, and separately estimate the phase-specific sanction effects. Two main findings emerge from column (2) of Table 2 and panel D of Figure 8. First, our estimates confirm that the impact of complete trade sanctions is deep and immediate. Second, they suggest that the negative impact of sanctions appears to be increasing over time. The estimated effect of sanctions is weaker in the early phase and stronger in the late phase. However, the differences across phases are quite small and statistically insignificant.

In order to understand the timing of the contemporaneous impact of sanctions, in the next step we allow for differential effects of long (5 or more years) vs. short (less than 5 years) complete trade sanctions.[17] Figure 8 (F) (corresponding column (4) of Table 2) suggests that sanctions with longer duration are very effective in restricting trade. Trade flows dip in the first year following the sanction and remain low (roughly a 79% reduction in trade flows) throughout its duration.[18] There is no obvious trend in trade

[17]Long and short sanctions represent 20% and 80% of sanction cases in the sample, respectively.

[18]It is worth mentioning here the "naive" theory of sanctions (Galtung (1967)), according to which extensive economic damage translates into the achievement of ambitious objectives, which long-term sanctions might pursue.

Table 2: On the Contemporaneous Impact of Sanctions on Trade

	(1) AVE_SANCT	(2) DURATION	(3) YEARLY	(4) LONG_SANCT	(5) SHORT_SANCT
$CTS_{ij,t-10}$	-0.414	-0.420	-0.467	-0.497	-0.542
	(0.286)	(0.284)	(0.280)$^{+}$	(0.278)$^{+}$	(0.279)$^{+}$
$CTS_{ij,t-9}$	-0.606	-0.611	-0.664	-0.698	-0.761
	(0.363)$^{+}$	(0.360)$^{+}$	(0.356)$^{+}$	(0.351)*	(0.355)*
$CTS_{ij,t-8}$	-0.387	-0.394	-0.447	-0.483	-0.549
	(0.353)	(0.349)	(0.345)	(0.339)	(0.349)
$CTS_{ij,t-7}$	-0.595	-0.601	-0.654	-0.688	-0.767
	(0.310)$^{+}$	(0.308)$^{+}$	(0.304)*	(0.303)*	(0.305)*
$CTS_{ij,t-6}$	-0.555	-0.563	-0.620	-0.655	-0.732
	(0.295)$^{+}$	(0.293)$^{+}$	(0.291)*	(0.291)*	(0.291)*
$CTS_{ij,t-5}$	-0.520	-0.528	-0.584	-0.621	-0.689
	(0.290)$^{+}$	(0.289)$^{+}$	(0.290)*	(0.293)*	(0.296)*
$CTS_{ij,t-4}$	-0.506	-0.513	-0.562	-0.599	-0.614
	(0.254)*	(0.253)*	(0.259)*	(0.262)*	(0.267)*
$CTS_{ij,t-3}$	-0.588	-0.590	-0.634	-0.671	-0.668
	(0.240)*	(0.240)*	(0.245)**	(0.249)**	(0.252)**
$CTS_{ij,t-2}$	-0.542	-0.519	-0.552	-0.582	-0.565
	(0.293)$^{+}$	(0.288)$^{+}$	(0.292)$^{+}$	(0.295)*	(0.296)$^{+}$
$CTS_{ij,t-1}$	-0.810	-0.683	-0.663	-0.663	-0.565
	(0.226)**	(0.238)**	(0.225)**	(0.247)**	(0.233)*
CTS_{ij}	-1.707		-0.871	-0.874	-0.742
	(0.274)**		(0.227)**	(0.353)*	(0.238)**
BEGIN		-1.629			
		(0.278)**			
DURING		-1.874			
		(0.304)**			
END		-1.888			
		(0.294)**			
$IN\_CTS_{ij,t+1}$			-1.287	-2.321	-0.794
			(0.180)**	(0.516)**	(0.142)**
$IN\_CTS_{ij,t+2}$			-1.273	-2.550	-0.551
			(0.197)**	(0.444)**	(0.131)**
$IN\_CTS_{ij,t+3}$			-1.200	-2.520	-0.537
			(0.182)**	(0.396)**	(0.117)**
$IN\_CTS_{ij,t+4}$			-1.304	-2.377	-0.592
			(0.199)**	(0.367)**	(0.135)**
$IN\_CTS_{ij,t+5}$			-2.041	-2.213	
			(0.278)**	(0.310)**	
$IN\_CTS_{ij,t+6}$			-2.320	-2.469	
			(0.346)**	(0.372)**	
$IN\_CTS_{ij,t+7}$			-2.153	-2.291	
			(0.323)**	(0.343)**	
$IN\_CTS_{ij,t+8}$			-2.249	-2.391	
			(0.340)**	(0.356)**	
$IN\_CTS_{ij,t+9}$			-2.340	-2.482	
			(0.331)**	(0.348)**	
$IN\_CTS_{ij,t+10}$			-2.650	-2.803	
			(0.343)**	(0.364)**	
$CTS_{ij,t+1}$	-0.676	-0.676	-0.650	-0.653	-0.612
	(0.214)**	(0.213)**	(0.210)**	(0.208)**	(0.206)**
$CTS_{ij,t+2}$	-0.594	-0.594	-0.571	-0.575	-0.541
	(0.179)**	(0.179)**	(0.176)**	(0.175)**	(0.172)**
$CTS_{ij,t+3}$	-0.696	-0.698	-0.674	-0.676	-0.642
	(0.152)**	(0.152)**	(0.150)**	(0.150)**	(0.147)**
$CTS_{ij,t+4}$	-0.650	-0.653	-0.632	-0.630	-0.594
	(0.127)**	(0.126)**	(0.125)**	(0.124)**	(0.125)**
$CTS_{ij,t+5}$	-0.596	-0.598	-0.582	-0.580	-0.547
	(0.147)**	(0.147)**	(0.146)**	(0.144)**	(0.146)**
$CTS_{ij,t+6}$	-0.572	-0.573	-0.563	-0.551	-0.539
	(0.170)**	(0.170)**	(0.169)**	(0.168)**	(0.167)**
$CTS_{ij,t+7}$	-0.500	-0.503	-0.491	-0.480	-0.465
	(0.150)**	(0.150)**	(0.149)**	(0.148)**	(0.147)**
$CTS_{ij,t+8}$	-0.372	-0.375	-0.364	-0.354	-0.339
	(0.158)*	(0.159)*	(0.158)*	(0.157)*	(0.156)*
$CTS_{ij,t+9}$	-0.177	-0.179	-0.170	-0.161	-0.151
	(0.147)	(0.147)	(0.145)	(0.144)	(0.144)
$CTS_{ij,t+10}$	-0.126	-0.128	-0.119	-0.111	-0.104
	(0.114)	(0.114)	(0.113)	(0.112)	(0.113)
N	1935581	1934732	1935585	1927177	1926032

Notes: This table reports results from the sanctions duration analyses. Column (1) shows the benchmark results from column (2) of Table 1. Column (2) reports estimates for the sanctions period divided into 3 phases. Column (3) shows the yearly phasing-in effects of complete trade sanctions. Columns (4) and (5) differentiate between the phasing-in effects of complete trade sanctions with long (5+ years) and short (<5 years) duration. Standard errors are clustered by country pair. $^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$. See text for further details.

volume prior to the onset or termination of long sanctions, which suggests the absence of anticipation. This is not very surprising since sanctions with long duration are often related to territorial conflict, war and ideology issues. Affected countries usually confront pervasive conflicts in areas beyond trade and resolutions may be negotiated in stealth.

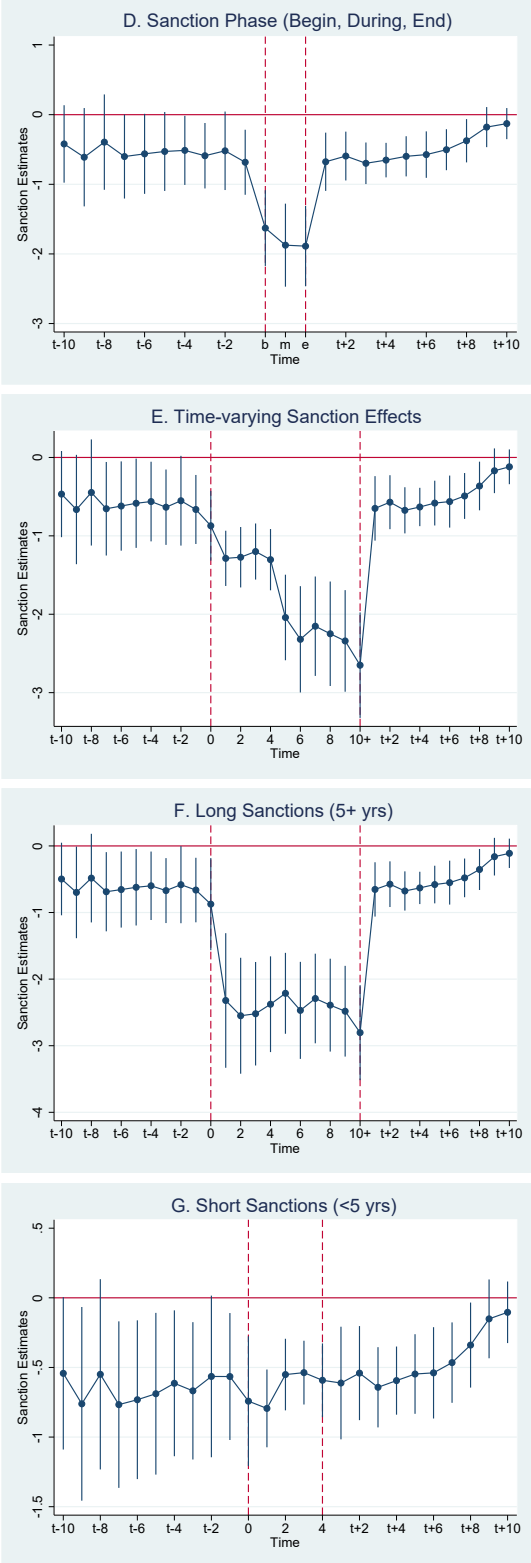
By contrast, Figure 8 (G) and column (5) of Table 2 show mixed results for sanctions with short durations. Trade initially decreases (around 42%) following the onset of sanctions. However, after two years, trade flows come back to almost the same level as those in pre-sanction periods, possibly in response to the expectation of swift conflict resolution. Trade then gradually increases in the post-sanction period, which again could be explained by the sanction-driven eased tensions between the sender(s) and the target(s).

Finally, column (3) of Table 2 and Figure 8 (E) demonstrate the full set of time-varying sanction effects. Consistent with the duration analysis, complete trade sanctions reduce trade on average and more so after being effective for over five years. The reduction is primarily driven by the sanctions with duration longer than five years while sanctions with short duration have limited impact on trade. It is also worth noting that trade flows recover once the sanctions are repealed. In fact, post-sanction trade flows rise on average compared to the pre-sanction level. The increase becomes apparent eight years after the sanction ends, and the estimates CTS_{t+8} and CTS_{t+10} are larger than those in pre-sanction periods. One possible explanation is that countries are able to achieve a certain degree of conflict resolution to have sanctions removed, and this could promote trade.

3.2.3 Further analysis and robustness specifications

We further investigate the differential effects of complete trade sanctions based on the scope and identity of sanctioning countries. First, in columns (1) and (2) of Table 3, we compare the unilateral and multilateral complete trade sanctions. We also control for the presence of non-trade sanctions, the EU membership, the WTO membership, and the presence of the EIAs. Our results reveal that the partial estimate of the impact of unilateral sanctions is larger than the corresponding impact of multilateral sanctions. A possible explanation for this result is that a country may participate in multilateral

Figure 8: Phasing-in Impact of Sanctions on Trade



Note: This figure presents estimates of the evolution of the impact of sanctions on trade. The estimates and their corresponding confidence intervals used to construct the figure are those from Table 2. Specifically, panel D of the figure depicts the estimates, and their corresponding confidence intervals, from column (2) of Table 2. Panels E, F and G visualize the results from columns (3), (4) and (5), respectively, of Table 2. See text for further details.

sanctions against another country as a member of international coalitions such as the UN or the EU. The incentive to enforce sanctions as a coalition member may be weaker than a country that initiates a unilateral sanction.[19] The estimates are presented graphically in Figure 9 (H) for unilateral sanctions and (I) for multilateral sanctions.

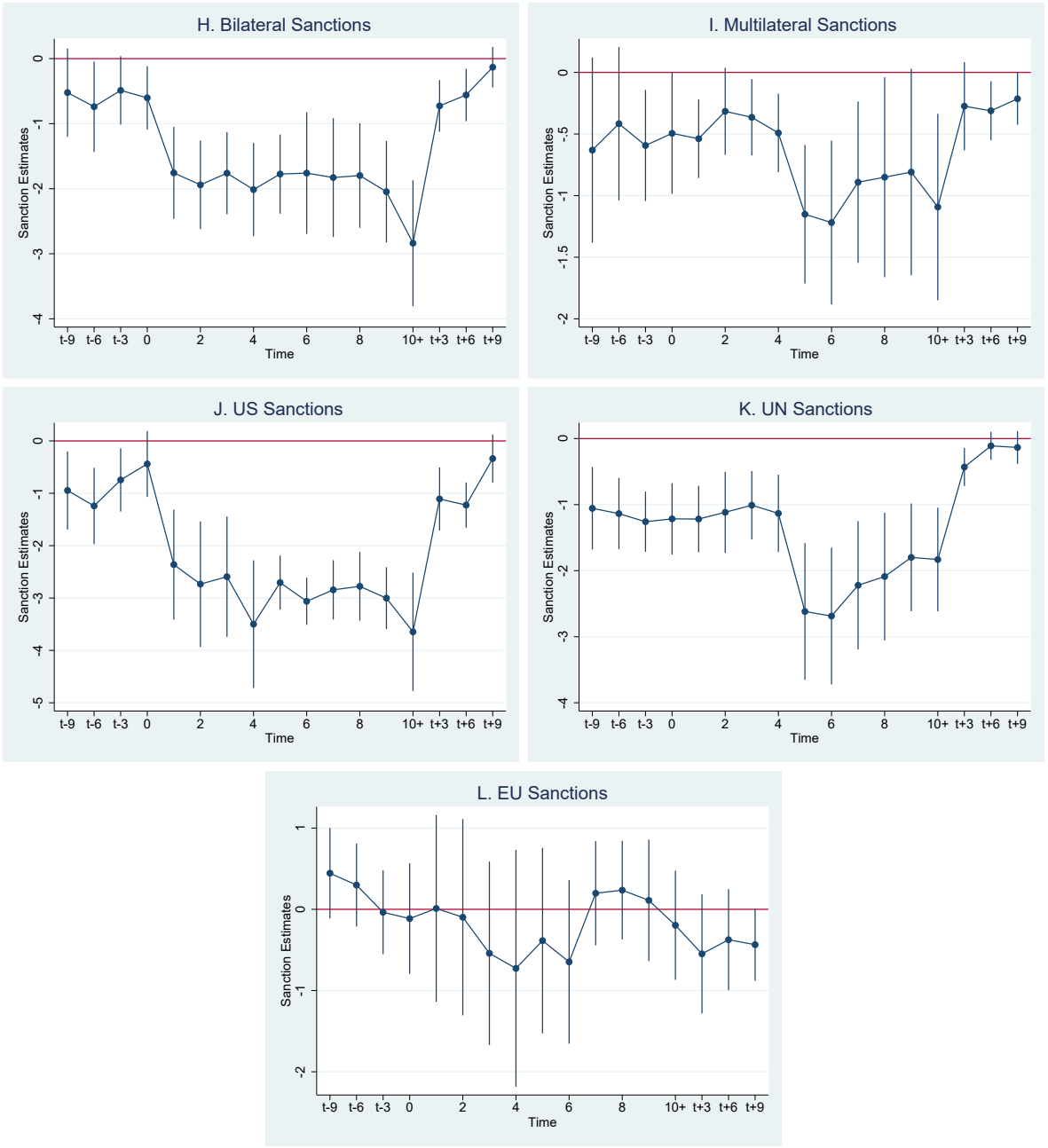
Next, we look at the differential effects of the US, the UN, and the EU sanctions (columns (3), (4), and (5), respectively, of Table 3). The estimates can also be visualized in Figure 9 (J) for the US sanctions, (K) the UN sanctions, and (L) the EU sanctions. Similar to the descriptive evidence, we find that the US complete trade sanctions emerge as the most powerful in restricting trade. This result is consistent with our earlier finding that the estimates of the effects of unilateral sanctions are larger as compared to those of multilateral sanctions. The US sanctions also have strong anticipation and post-sanction effects which disappear about six years after the sanctions are repealed.[20] The estimates of the UN sanctions also reveal strong anticipatory effects: The UN frequently and openly document their opinions in the form of official resolutions, in which sanctions are sometimes threatened and thus are anticipated. The UN sanctions appear to be less effective in terms of trade reduction. Our estimates reveal that, on average, it takes about four years to see the additional impact of UN sanctions on trade. The estimates of the effects of EU sanctions are not statistically significant. The explanation for this is that EU sanctions are defined as a deviation from the UN sanctions. Thus, our estimates imply that the effects of the EU sanctions are not different from those of the UN sanctions.

We conclude our empirical analysis with a series of sensitivity experiments that confirm the robustness of our main findings. The results from these experiments appear in Table 4 and Figure 10. For brevity and clarity of exposition, we use the estimates with the 3-year lags and leads (i.e., the estimates from column (4) of Table 1) as our benchmark results. We show that our results and conclusions remain valid when we use:

[19]This intuition is confirmed by the widely heterogeneous estimates of the impact of the EU sanctions on Iran from Felbermayr et al. (2020b). We note that our results are based on and reflect changes in bilateral trade flows. Thus, our larger estimates of the impact of unilateral sanctions do not contradict the finding from the related literature that multilateral sanctions are more effective because, when the impact on trade across all sanctioning countries is summed, the total "damage" on the sanctioned country from a multilateral sanction is larger than the "damage" due to a unilateral sanction.

[20]For an excellent analysis of the impact of US sanctions on trade, we refer the reader to Kohl (2021). In addition, for a review of the recent US sanctions under the Trump administration we point to Kirilakha et al. (2021). Both Kohl (2021) and Kirilakha et al. (2021) appear as chapters in this Handbook.

Figure 9: Additional Analyses



Note: This figure presents estimates of the evolution of the impact of unilateral vs. multilateral, as well as the US vs. UN vs. EU sanctions on trade. The estimates and their corresponding confidence intervals used to construct the figures are those from Table 3. Specifically, panels H and I of the figure depict the estimates, and their corresponding confidence intervals, from columns (1) and (2), respectively, of Table 3. Panels J, K and L visualize the results from columns (3), (4) and (5), respectively, of Table 3. See text for further details.

Table 3: Additional Analyses. Unilateral vs. Multilateral. US vs. UN vs. EU

	(1) BILAT	(2) MULT	(3) US	(4) UN	(5) EU
$CTS_{ij,t-9}$	-0.522	-0.631	-0.947	-1.056	0.444
	(0.346)	(0.383)	(0.380)*	(0.318)**	(0.284)
$CTS_{ij,t-6}$	-0.739	-0.416	-1.242	-1.135	0.299
	(0.354)*	(0.317)	(0.371)**	(0.275)**	(0.261)
$CTS_{ij,t-3}$	-0.488	-0.593	-0.746	-1.258	-0.037
	(0.269)+	(0.230)*	(0.308)*	(0.232)**	(0.263)
CTS_{ij}	-0.603	-0.495	-0.440	-1.215	-0.114
	(0.249)*	(0.250)*	-0.321	(0.275)**	(0.347)
$IN\_CTS_{ij,t+1}$	-1.756	-0.538	-2.361	-1.218	-0.01
	(0.360)**	(0.162)**	(0.536)**	(0.257)**	(0.587)
$IN\_CTS_{ij,t+2}$	-1.940	-0.316	-2.734	-1.116	-0.097
	(0.347)**	(0.180)+	(0.611)**	(0.313)**	(0.616)
$IN\_CTS_{ij,t+3}$	-1.761	-0.365	-2.593	-1.008	-0.542
	(0.322)**	(0.158)*	(0.586)**	(0.264)**	(0.576)
$IN\_CTS_{ij,t+4}$	-2.014	-0.492	-3.500	-1.132	-0.727
	(0.366)**	(0.162)**	(0.622)**	(0.299)**	(0.744)
$IN\_CTS_{ij,t+5}$	-1.774	-1.151	-2.704	-2.618	-0.386
	(0.310)**	(0.287)**	(0.263)**	(0.528)**	(0.582)
$IN\_CTS_{ij,t+6}$	-1.760	-1.219	-3.062	-2.687	-0.647
	(0.477)**	(0.339)**	(0.229)**	(0.528)**	(0.514)
$IN\_CTS_{ij,t+7}$	-1.828	-0.891	-2.844	-2.221	0.198
	(0.466)**	(0.334)**	(0.289)**	(0.496)**	(0.327)
$IN\_CTS_{ij,t+8}$	-1.797	-0.851	-2.776	-2.089	0.236
	(0.410)**	(0.414)*	(0.335)**	(0.493)**	(0.310)
$IN\_CTS_{ij,t+9}$	-2.046	-0.809	-3.002	-1.799	0.11
	(0.397)**	(0.428)+	(0.301)**	(0.416)**	(0.381)
$IN\_CTS_{ij,t+10}$	-2.837	-1.093	-3.646	-1.831	-0.196
	(0.494)**	(0.386)**	(0.576)**	(0.401)**	(0.343)
$CTS_{ij,t+3}$	-0.727	-0.274	-1.109	-0.431	-0.548
	(0.203)**	(0.182)	(0.307)**	(0.146)**	(0.374)
$CTS_{ij,t+6}$	-0.559	-0.312	-1.225	-0.110	-0.375
	(0.206)**	(0.122)*	(0.221)**	(0.108)	(0.318)
$CTS_{ij,t+9}$	-0.132	-0.214	-0.337	-0.134	-0.436
	(0.158)	(0.108)*	(0.234)	(0.127)	(0.226)+
N	1935530	1935530	1935539	1935532	1935530

Notes: This table reports results from a series of additional analyses. Columns (1) and (2) differentiate between unilateral and multilateral complete trade sanctions. Columns (3), (4), and (5) report estimates for the US. vs. UN. vs. EU sanctions, respectively. Additional variables such as other types of trade and non-trade sanctions, the EU membership, WTO membership, and the presence of the EIAs have been controlled for. Standard errors are clustered by country pair. $^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$. See text for further details.

(i) the PPML with positive observations only; (ii) the OLS estimator; (iii) symmetric country-pair fixed effects; (iv) additional time-varying control variables including non-trade sanctions, the EU membership, the WTO membership, and the presence of the EIAs, and (iv) the 3- and 5-year interval data.

Column (1) of Table 4 reports PPML estimates of the effects of complete trade sanc-

Table 4: On the Impact of Sanctions on Trade. Robustness.

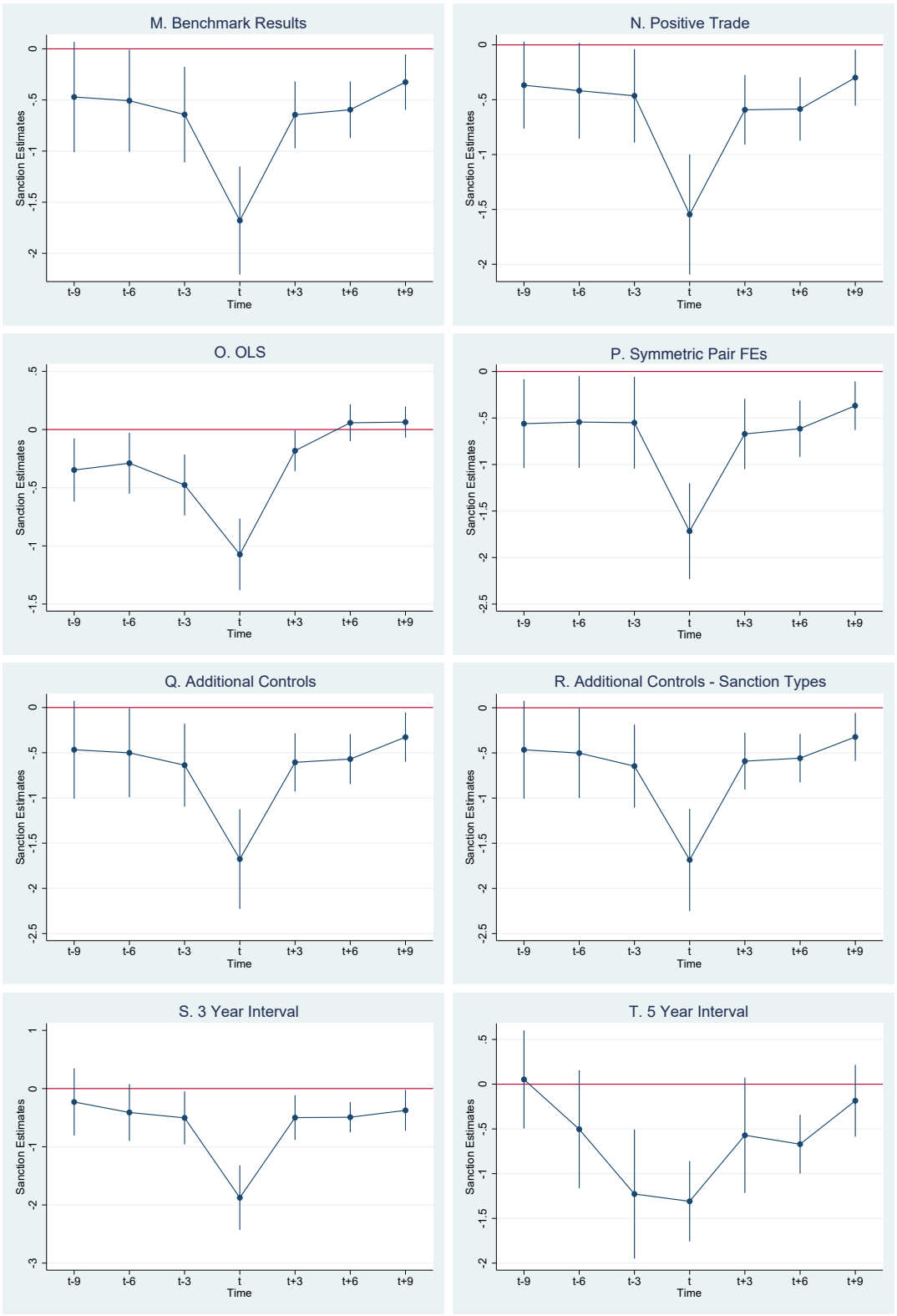
	(1) Main	(2) PSTV	(3) OLS	(4) SYMM	(5) CONTRLS	(6) TYPES	(7) 3YRS	(8) 5YRS
$CTS_{ij,t-9}$	-0.471	-0.368	-0.348	-0.494	-0.467	-0.465	-0.231	0.053
	$(0.275)^{+}$	$(0.202)^{+}$	$(0.138)^{*}$	$(0.261)^{+}$	$(0.276)^{+}$	$(0.276)^{+}$	(0.295)	(0.280)
$CTS_{ij,t-6}$	-0.508	-0.418	-0.289	-0.518	-0.501	-0.501	-0.410	-0.503
	$(0.255)^{*}$	$(0.223)^{+}$	$(0.134)^{*}$	$(0.247)^{*}$	$(0.251)^{*}$	$(0.254)^{*}$	$(0.249)^{+}$	(0.336)
$CTS_{ij,t-3}$	-0.643	-0.464	-0.477	-0.641	-0.638	-0.646	-0.504	-1.228
	$(0.238)^{**}$	$(0.217)^{*}$	$(0.133)^{**}$	$(0.238)^{**}$	$(0.234)^{**}$	$(0.235)^{**}$	$(0.232)^{*}$	$(0.368)^{**}$
$CTS_{ij,t}$	-1.679	-1.546	-1.074	-1.699	-1.676	-1.684	-1.875	-1.309
	$(0.270)^{**}$	$(0.279)^{**}$	$(0.157)^{**}$	$(0.269)^{**}$	$(0.281)^{**}$	$(0.289)^{**}$	$(0.284)^{**}$	$(0.229)^{**}$
$CTS_{ij,t+3}$	-0.645	-0.592	-0.182	-0.682	-0.606	-0.591	-0.499	-0.571
	$(0.167)^{**}$	$(0.162)^{**}$	$(0.089)^{*}$	$(0.170)^{**}$	$(0.164)^{**}$	$(0.161)^{**}$	$(0.195)^{*}$	$(0.329)^{+}$
$CTS_{ij,t+6}$	-0.596	-0.585	0.058	-0.625	-0.570	-0.558	-0.493	-0.671
	$(0.141)^{**}$	$(0.147)^{**}$	(0.081)	$(0.142)^{**}$	$(0.141)^{**}$	$(0.137)^{**}$	$(0.132)^{**}$	$(0.168)^{**}$
$CTS_{ij,t+9}$	-0.326	-0.298	0.064	-0.355	-0.328	-0.323	-0.374	-0.185
	$(0.138)^{*}$	$(0.131)^{*}$	(0.068)	$(0.122)^{**}$	$(0.139)^{*}$	$(0.136)^{*}$	$(0.178)^{*}$	(0.205)
OTHER_TRADE_SANCT					-0.095	-0.073	-0.136	0.048
					$(0.043)^{*}$	(0.055)	$(0.061)^{*}$	(0.076)
ANY_OTHER_SANCT					0.019			
					(0.023)			
EU					0.447	0.449	0.463	0.489
					$(0.037)^{**}$	$(0.037)^{**}$	$(0.038)^{**}$	$(0.039)^{**}$
WTO					0.147	0.147	0.175	0.082
					$(0.055)^{**}$	$(0.055)^{**}$	$(0.054)^{**}$	(0.065)
EIA					0.053	0.053	0.052	0.071
					$(0.030)^{+}$	$(0.030)^{+}$	$(0.030)^{+}$	$(0.032)^{*}$
ARMS_SANCT						0.003	-0.005	0.000
						(0.047)	(0.050)	(0.060)
MLTRY_SANCT						0.032	0.033	0.050
						(0.025)	(0.025)	$(0.030)^{+}$
FINCE_SANCT						-0.072	-0.072	-0.200
						(0.046)	(0.052)	$(0.071)^{**}$
TRAVL_SANCT						0.105	0.102	0.125
						$(0.047)^{*}$	$(0.046)^{*}$	$(0.071)^{+}$
OTHER_SANCT						0.019	0.047	0.047
						(0.051)	(0.051)	(0.068)
N	1935581	1098644	1098644	1935906	1935528	1935529	624397	362262

Notes: This table reports results from a series of robustness experiments. The benchmark results are based on our estimates from column (4) of Table 1 and panel C of Figure 7. For convenience, these results are reproduced in column (1) of this table. Column (2) presents results that are obtained with the PPML estimator but only based on the positive trade flow observations in our sample. Column (3) reports estimates that are obtained with the OLS estimator. Column (4) uses symmetric instead of directional country-pair fixed effects. Column (5) controls for additional non-trade sanctions as well as the EU membership, WTO membership, and the presence of the EIAs. Column (6) uses the same controls as in (5) but also differentiates among other types of sanctions. Columns (7) and (8) use the three-year and five-year interval data, respectively. Standard errors are clustered by country pair. $^{+}$ $p < 0.10$, * $p < .05$, ** $p < .01$. See text for further details.

tions on trade flows, and Figure 10 (M) presents them graphically. Column (2) of Table 4 presents PPML results using only the observations with positive trade flows. Column (3) reports OLS estimates using the logarithm of trade flows as our dependent variable; Overall, the OLS estimates are smaller in absolute value as compared to the corresponding PPML results. Following Santos Silva and Tenreyro (2006; 2011), we attribute the (sometimes significant) bias in the OLS estimates to the failure of OLS to properly account for the heteroskedasticity in trade data. In column (4), we report PPML estimates using the symmetric country-pair fixed effects, and the main results hold. In specification (5), we control for the presence of other types of trade sanctions (i.e., export partial, import partial), the presence of non-trade sanctions (i.e., arms sanctions, military assistance restrictions, asset freezes, travel bans), as well as the EU membership, the WTO membership and the presence of Economic Integration Agreements (EIAs). We also distinguish between the alternative types of sanctions in specification (6). Our findings confirm that complete trade sanctions are more effective in restricting trade than partial trade sanctions. The effects of partial import or export sanctions are very close to zero and statistically insignificant. Moreover, non-trade sanctions have very limited effects on trade – most of them are small and insignificant.[21] In columns (7) and (8), we use a 3-year and 5-year interval data, respectively, to allow for phasing-in effects of sanctions; The main results hold.

[21]We note that the impact of travel sanctions in column (6) is small, but actually positive and statistically significant, suggesting that travel sanctions may promote trade. We find this result interesting and possibly worthy of further investigation. We also believe that, if any, the effects of travel sanctions on international trade are indirect and possibly captured by the fixed effects in our econometric model.

Figure 10: Timing the Impact of Sanctions on Trade. Robustness.



Note: This figure presents estimates from the robustness analyses. Panel M depicts the benchmark results discussed in panel C of Figure 7. Panel N presents the PPML estimates computed using non-zero trade sample, and panel O shows the OLS estimates. Panel P presents the sanctions estimates from the PPML regression that uses symmetri country pair fixed effects. Panels Q and R shows estimates from the PPML regressions with additional controls, and panel R also distinguishes among types of non-trade sanctions. Panels S and T use the 3 year and 5 year interval data, respectively.

4 Conclusion

The popularity of economic sanctions has risen in recent years. Moreover, due to intensifying geopolitical rivalries – for example, between Russia and Ukraine or Greece and Turkey in the Eastern-Mediterranean and other conflicts – sanctions are expected to persist in the years ahead. Surprisingly, despite countries' increasing reliance on economic sanctions as foreign policy instruments, the academic literature is struggling to grapple with the question of whether sanctions represent an efficient policy tool.

We contribute to this literature by characterizing the evolution of the impact of sanctions on trade flows. To this end, we utilize the newly developed Global Sanctions Data Base (GSDB) and capitalize on the latest developments in the international trade literature related to the gravity equation. Descriptive statistics based on the GSDB suggest that the effectiveness of sanctions hinges on three key features: their type, scope, and duration. We are able to illustrate that, in addition to the sanction types and scope, the duration of sanctions is an important component of the effectiveness of this policy instrument. Moreover, our empirical analysis establishes several important results related to dynamic impact of sanctions.

We find that the estimate of the impact of complete trade sanctions on international trade is larger (by 17%) with the inclusion of pre- and post-sanction indicators. As a consequence, estimates of the effects of sanctions that do not allow for pre-sanction and post-sanction effects underestimate the true contemporaneous sanction effects. Our results also establish the presence of significant anticipatory effects of sanctions. In addition, our analysis reveals that economic recovery from sanctions is not instantaneous. The negative impact of sanctions on trade is on average present for about seven to eight years down the road after sanctions are lifted. Importantly, we find that the effect of sanctions that last for more than five years is much stronger than that of shorter ones. Thus, the negative impact of complete trade sanctions on trade in our analysis is mostly driven by sanctions with long duration. Lastly, we perform a series of robustness analysis, which generate additional isights on the impact and effectiveness of sanctions.

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A Appendix: Additional Tables

This Appendix includes two additional tables. Table A.1 lists the ISO-3 Codes according to USITC, and Table A.2 lists the country pairs that have been involved in 20+ years sanctions.

Table A.1: List of Country ISO-3 Codes (Source: USITC)

Country Name	**ISO-Code**	**start**	**end**
Afghanistan	AFG	1948	2016
Aland Islands	ALA	1948	2016
Albania	ALB	1948	2016
Algeria	DZA	1962	2016
American Samoa	ASM	1948	2016
Andorra	AND	1948	2016
Angola	AGO	1975	2016
Anguilla	AIA	1983	2016
Antarctica	ATA	1948	2016
Antigua and Barbuda	ATG	1981	2016
Argentina	ARG	1948	2016
Armenia	ARM	1991	2016
Aruba	ABW	1986	2016
Australia	AUS	1948	2016
Austria	AUT	1948	2016
Azerbaijan	AZE	1991	2016
Bahamas, The	BHS	1973	2016
Bahrain	BHR	1971	2016
Bangladesh	BGD	1971	2016
Barbados	BRB	1966	2016
Belgium	BEL	1948	2016
Belize	BLZ	1981	2016
Bermuda	BMU	1948	2016
Bhutan	BTN	1949	2016
Bonaire, Sint Eustatius and Saba	BES	2010	2016
Byelorussian SSR	BYS	1950	1990
Belarus	BLR	1991	2016
Bolivia	BOL	1948	2016
Bosnia and Herzegovina	BIH	1992	2016
Botswana	BWA	1966	2016
Bouvet Island	BVT	1948	2016
Br. Antr. Terr	BAT	1962	1979
Brazil	BRA	1948	2016
British Indian Ocean Ter.	IOT	1965	2016
British Virgin Islands	VGB	1948	2016
Brunei	BRN	1984	2016
Bulgaria	BGR	1948	2016
Upper Volta	HVO	1960	1983
Burkina Faso	BFA	1984	2016
Burma	BUR	1948	1988
Myanmar	MMR	1989	2016
Burundi	BDI	1962	2016
Cambodia	KHM	1953	2016
Cameroon	CMR	1960	2016
Canada	CAN	1948	2016
Cape Verde	CPV	1975	2016

Cayman Islands	CYM	1962	2016
Central African Republic	CAF	1960	2016
Ceylon	LKA	1948	2016
Chad	TCD	1960	2016
Chile	CHL	1948	2016
China	CHN	1948	2016
Christmas Island	CXR	1948	2016
Cocos (Keeling) Islands	CCK	1948	2016
Colombia	COL	1948	2016
Comoros	COM	1975	2016
Congo, Republic of the	COG	1960	2016
Congo, Democratic Republic of the	COD	1960	2016
Zaire	ZAR	1971	1997
Cook Islands	COK	1965	2016
Costa Rica	CRI	1948	2016
Cote d'Ivoire	CIV	1960	2016
Croatia	HRV	1991	2016
Cyprus	CYP	1960	2016
Cuba	CUB	1948	2016
Curacao	CUW	2010	2016
Czechoslovakia	CSK	1948	1992
Czech Republic	CZE	1993	2016
Dahomey	DHY	1960	1974
Benin	BEN	1975	2016
Denmark	DNK	1948	2016
Djibouti	DJI	1977	2016
Dominica	DMA	1967	2016
Dominican Republic	DOM	1948	2016
East Timor	TMP	2002	2016
Ecuador	ECU	1948	2016
Egypt, Arab Rep.	EGY	1948	2016
El Salvador	SLV	1948	2016
Equatorial Guinea	GNQ	1968	2016
Eritrea	ERI	1993	2016
Estonia	EST	1991	2016
Ethiopia (excludes Eritrea)	ETH	1948	2016
Ethiopia (includes Eritrea)	ETF	1950	1992
Faeroe Islands	FRO	1948	2016
Falkland Islands	FLK	1948	2016
Fiji	FJI	1970	2016
Finland	FIN	1948	2016
Federation of Rhodesia and Nyasaland	ZW1	1953	1963
France	FRA	1948	2016
French Guiana	GUF	1948	2016
French Polynesia	PYF	1948	2016
French Southern Territories	ATF	1955	2016
Gabon	GAB	1960	2016
Gambia, The	GMB	1965	2016

Gaza Strip	GAZ	1948	2016
Georgia	GEO	1991	2016
German Democratic Republic	DDR	1949	1990
Germany	DEU	1948	2016
Ghana	GHA	1957	2016
Gibraltar	GIB	1967	2016
Greece	GRC	1948	2016
Greenland	GRL	1948	2016
Grenada	GRD	1967	2016
Guadeloupe	GLP	1948	2016
Guam	GUM	1948	2016
Guatemala	GTM	1948	2016
Guernsey	GGY	1948	2016
Guinea	GIN	1958	2016
Guinea-Bissau	GNB	1974	2016
Guyana	GUY	1966	2016
Haiti	HTI	1948	2016
Heard Island and McDonald Islands	HMD	1948	2016
Honduras	HND	1948	2016
Hong Kong	HKG	1997	2016
Hungary	HUN	1948	2016
Iceland	ISL	1948	2016
India	IND	1948	2016
Indonesia	IDN	1948	2016
Iran	IRN	1948	2016
Iraq	IRQ	1948	2016
Ireland	IRL	1948	2016
Isle of Man	IMN	1948	2016
Israel	ISR	1948	2016
Italy	ITA	1948	2016
Jamaica	JAM	1962	2016
Japan	JPN	1948	2016
Jersey	JEY	1948	2016
Johnston Island	JTN	1948	1986
Kazakhstan	KAZ	1992	2016
Kenya	KEN	1963	2016
Gilbert and Ellice Islands	GEL	1971	1978
Kiribati	KIR	1979	2016
Korea, North	PRK	1948	2016
Korea, South	KOR	1948	2016
Kosovo	KSV	2008	2016
Kuwait	KWT	1961	2016
Kyrgyzstan	KGZ	1992	2016
Latvia	LVA	1991	2016
Laos	LAO	1949	2016
Lebanon	LBN	1948	2016
Lesotho	LSO	1966	2016
Liberia	LBR	1948	2016

Libya	LBY	1951	2016
Liechtenstein	LIE	1948	2016
Lithuania	LTU	1992	2016
Luxembourg	LUX	1948	2016
Macao	MAC	1987	2016
Macedonia	MKD	1991	2016
Malagasy Republic	MDG	1960	2016
Malawi	MWI	1964	2016
Malaya	MYS	1957	2016
Maldives	MDV	1965	2016
Mali	MLI	1960	2016
Malta	MLT	1964	2016
Marshall Islands	MHL	1986	2016
Martinique	MTQ	1948	2016
Mauritania	MRT	1960	2016
Mauritius	MUS	1968	2016
Mayotte	MYT	1948	2016
Mexico	MEX	1948	2016
Micronesia, Federated States of	FSM	1986	2016
Midway Islands	MID	1974	1986
Moldova	MDA	1992	2016
Monaco	MCO	1948	2016
Mongolia	MNG	1948	2016
Montserrat	MSR	1948	2016
Montenegro	MNE	2006	2016
Morocco	MAR	1956	2016
Mozambique	MOZ	1975	2016
Muscat and Oman	OMN	1948	2016
Namibia	NAM	1990	2016
Nauru	NRU	1968	2016
Nepal	NPL	1948	2016
Netherlands	NLD	1948	2016
Netherlands Antilles	ANT	1948	2010
Neutral Zone	NTZ	1974	1993
New Caledonia	NCL	1998	2016
New Zealand	NZL	1948	2016
Nicaragua	NIC	1948	2016
Niger	NER	1960	2016
Nigeria	NGA	1960	2016
Niue	NIU	1974	2016
Norfolk Island	NFK	1979	2016
Northern Marianas	MNP	1986	2016
Norway	NOR	1948	2016
Pacific Islands Trust Territory	PCI	1974	1985
Pakistan	PAK	1948	2016
Palau	PLW	1994	2016
Palestine	PSE	1994	2016
Panama	PAN	1948	2016

Former Panama Canal Zone	PCZ	1948	1980
Papua New Guinea	PNG	1975	2016
Paraguay	PRY	1948	2016
Peru	PER	1948	2016
Philippines	PHL	1948	2016
Pitcairn	PCN	1948	2016
Poland	POL	1948	2016
Portugal	PRT	1948	2016
Puerto Rico	PRI	1948	2016
Qatar	QAT	1971	2016
Rhodesia	RHO	1965	1979
Zimbabwe	ZWE	1980	2016
Reunion	REU	1948	2016
Romania	ROM	1948	2001
Romania	ROU	2002	2016
Russia	RUS	1992	2016
Rwanda	RWA	1962	2016
Saint Barthelemy	BLM	1948	2016
Saint Helena, Ascension, and Tristan da Cunha	SHN	1948	2016
Saint Christopher-Nevis-Anguilla	KN1	1967	1982
Saint Kitts and Nevis	KNA	1983	2016
Saint Lucia	LCA	1967	2016
Saint-Martin	MAF	1948	2016
Saint Pierre and Miquelon	SPM	1948	2016
Saint Vincent	VCT	1969	2016
San Marino	SMR	1948	2016
Sao Tome and Principe	STP	1975	2016
Saudi Arabia	SAU	1948	2016
Senegal	SEN	1960	2016
Seychelles	SYC	1976	2016
Sierra Leone	SLE	1961	2016
Sikkim	SKM	1948	1977
Singapore	SGP	1965	2016
Sint Maarten	SXM	2011	2016
Slovakia	SVK	1993	2016
Slovenia	SVN	1991	2016
Solomon Islands	SLB	1978	2016
Somalia	SOM	1960	2016
South Africa	ZAF	1948	2016
South Georgia and South Sandwich Islands	SGS	1993	2016
South Sudan	SSD	2011	2016
Soviet Union	SVU	1948	1991
Spain	ESP	1948	2016
Sudan	SDN	1956	2016
Suriname	SUR	1975	2016
Svalbard and Jan Mayen Islands	SJM	1948	2016
Swaziland	SWZ	1968	2016
Sweden	SWE	1948	2016

Switzerland	CHE	1948	2016
Syria	SYR	1948	2016
Taiwan	TWN	1948	2016
Tanganyika	TAN	1961	1963
Tajikistan	TJK	1992	2016
Tanzania	TZA	1964	2016
Thailand	THA	1948	2016
Togo	TGO	1960	2016
Tokelau	TKL	1948	2016
Tonga	TON	1970	2016
Trinidad and Tobago	TTO	1962	2016
Transjordan	JOR	1948	2016
Tunisia	TUN	1956	2016
Turkey	TUR	1948	2016
Turkmenistan	TKM	1992	2016
Turks and Caicos Islands	TCA	1962	2016
Tuvalu	TUV	1978	2016
Uganda	UGA	1962	2016
Ukraine	UKR	1992	2016
United Arab Emirates	ARE	1971	2016
United Kingdom	GBR	1948	2016
United States	USA	1948	2016
U.S. Minor Outlying Islands	UMI	1987	2016
U.S. Miscellaneous Pacific Islands	PUS	1974	1986
U.S. Virgin Islands	VIR	1948	2016
Uruguay	URY	1948	2016
Uzbekistan	UZB	1992	2016
New Hebrides	NHB	1974	1979
Vanuatu	VUT	1980	2016
Vatican City	VAT	1948	2016
Venezuela	VEN	1948	2016
North Vietnam	VDR	1954	1976
South Vietnam	VNM	1952	2016
Wake Island	WAK	1974	1986
Wallis and Futuna Islands	WLF	1948	2016
Western Samoa	WSM	1962	2016
Spanish Sahara	ESH	1976	2016
Yemen, North	YEM	1948	2016
Yemen, South	YMD	1967	1989
Yugoslavia	YUG	1948	2002
Serbia and Montenegro	SCG	2003	2005
Serbia	SRB	2006	2016
Zambia	ZMB	1964	2016
Zanzibar	ZPM	1963	1963

Table A.2: List of Country Pairs with Sanctions Duration 20+ years

Sanctioning Country ISO-Code	**Sanctioned Country ISO-Code**	**Duration**
AZE	ARM	27
ISR	KWT	28
IND	ZAF	29
DZA	PSE	32
KWT	PSE	33
MAR	PSE	36
TUN	PSE	36
SDN	PSE	38
DJI	ISR	39
ISR	IRQ	39.5
PSE	ISR	40
LBY	PSE	41
SOM	ISR	42
MRT	ISR	43
EGY	PSE	44
IRQ	PSE	44
JOR	PSE	44
LBN	PSE	44
SAU	PSE	44
SYR	PSE	44
YEM	PSE	44
ARE	ISR	45
BHR	ISR	45
OMN	ISR	45
QAT	ISR	45
USA	CUB	54
DZA	ISR	54
MAR	ISR	58
TUN	ISR	58
USA	PRK	58
SDN	ISR	60
LBY	ISR	63
EGY	ISR	66
JOR	ISR	66
LBN	ISR	66
SAU	ISR	66
SYR	ISR	66
YEM	ISR	66