Pain then Gain:
On the Impact of Economic Sanctions on Growth *

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This Version: July, 2020

Preliminary and Not for Circulation
Latest Version

Abstract

We propose a novel IV (instrument variable) strategy to study the impact of economic sanctions on target countries. Direct measures of economic impact of sanctions are complicated by the inherent endogeneity issue that arises from factors in target countries that incur international sanctions (e.g. civil or interstate conflicts). Our IV strategy takes advantage of sender countries' strategic correlation in the use of sanctions against *other* countries to construct exogenous variation in the number of sanctions faced by target countries. Our empirical findings can be summarized as follows. First, we find that OLS results overstate the negative impact of economic sanctions. Second, we find that trade sanctions have the largest negative impact on target countries among all types of sanctions, and that smart sanctions (that are designed to avoid collateral damage to the mass public by targeting key individuals) have positive long run impact on growth. Our paper provides a clear policy guidance in terms of reducing humanitarian cost of international sanctions.

JEL classification: F43, F51, F63

Keywords: Economic sanctions, Economic growth

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1 Introduction

What is the impact of international sanctions on target countries' economic growth? Empirical findings have shown mixed results. Previous works find that UN and US economic sanctions have negative impact on target countries' GDP growth (Neuenkirch and Neumeier, 2015) and US economic sanctions lead to wider poverty gap in target countries (Neuenkirch and Neumeier, 2016). Shin et al. (2016), however, find no change in the economic conditions of target countries.

We contribute to the literature in following dimensions. First, we use the recently available GSDB (Global Sanctions Database) dataset that has the largest coverage of economic sanctions (Felbermayr et al., 2020). Second, we tackle the inherent endogeneity problem associated target country's unobserved variables (that confound the outcomes of interest) with an IV strategy. Specifically, our instrument variable is constructed from the sender country's time-varying sanctions aggressiveness interacted with the predetermined sender-target country ties. Third, we differentiate smart sanctions from comprehensive trade sanctions (Drezner, 2011). Smart sanctions, allegedly derived its name from precision guided munition known as "smart" bombs, have the merit of achieving designated sanctions objectives while minimizing the collateral damage to the mass public (Ahn and Ludema, 2019).

Our empirical findings show that OLS estimation overstates the short run negative impact of sanctions on economic growth. Our IV estimation results show that an extra economic sanctions lead to 0.09% reduction in the contemporaneous level of GDP per capita. However, we find that economic sanctions do not have a significant impact on 10-year average GDP per capita.

We further investigate the impact of sanctions that can potentially differ across types. We find that trade sanctions have the most severe negative impact on target countries, whereas smart (a.k.a. targeted) sanctions have a positive impact on GDP per capita.

As for the mechanism, we find that trade sanctions lead to a long run reduction in trade-to-GDP ratios, level of democracy and TFP measures. In contrast, smart sanctions, have opposite impact on these channels. Neither type of sanctions appear to have a significant impact on the incidence of terrorist activities, wars or investment in target countries.

Ahn and Ludema (2017) use the firm-level data from Orbis database (Bureau Van Dijk) and study the effect of US and EU's targeted sanctions in response to Russia's annexation of Crimea and its alleged use of force in eastern Ukraine. They find that, on average, sanctioned companies lose about one-third of their operating revenue and employees and over one-half of their asset value. Ahn and Ludema (2017) also show that targeted

sanctions appear to generate minimal collateral damage to the overall Russia's GDP and import demand. In a related study, Ahn and Ludema (2019) show that targeted sanctions are especially more effective if firms rely on imported services from the West and not publicly designated as "strategic" by the Russian government.

2 Evolution of Sanctions Since 1950s

In this section, we formally define a few terminologies widely used in the sanctions literature. Following Cortright and Lopez (2002), we introduce the concept of "smart sanctions" (a.k.a. targeted sanctions), a concept in contrast with trade sanctions. We describe the evolution of international sanctions by their types and key senders. We document that systematic changes took place in terms of prioritized types of sanctions and frequencies of sanctions from key senders since 1950s. This paradigm shift can be traced to regulatory and geopolitical changes over time, a key point that motivates our IV strategy.

2.1 Smart Sanctions

Depending on their specific measures, sanctions can be broadly classified into 6 categories. They are trade sanctions, financial sanctions, travel restrictions on individuals, restrictions on arms sales, cease in military assistance (other than direct arms sales) and others. We formally give the definition of each type of sanctions in Table **??** in the Appendix.

A central thesis of our paper is that "smart sanctions" are beneficial to the target countries' long-run economic growth since they can lead to positive institutional changes without severe collateral damage to the mass public. Smart sanctions refer to types of sanctions that target the most politically sensitive individuals and entities in order to achieve the goal of sanctions. The most prominent examples of smart sanctions include financial sanctions, travel bans and arms embargoes (Drezner, 2011).

In contrast, trade sanctions are known to create overly high economic and humanitarian costs to the target country. A prominent case of (use against) trade sanctions is UN's strict trade embargo imposed on Iraq in 1990 followed by its invasion of Kuwait. The 1990 UN embargo against Iraq was unprecedented in its comprehensive coverage and almost all UN countries participated without exceptions. Studies estimate that pre-Gulf War trade sanctions cost Iraq around half of its GDP; post-Gulf war sanctions cost Iraq between 175 bn and 250 bn USD in oil revenues (O'Sullivan, 2004; Rosenberg et al., 2016).

Under the GSDB classification of sanctions, we broadly define smart sanctions to include financial sanctions, travel restrictions, arms embargo and military assistance restrictions. Smart sanctions are distinguished from trade sanctions in that they generate minimal collateral damage to the mass public.

We document that there has been a significant change in the popular types of sanctions. In Table 1, we show the total number of different types of sanctions in every decade since 1950. It is apparent that trade sanctions were the most commonly used type of sanctions in 50s and 60s. In 70s and 80s, trade and financial sanctions were almost equal in their frequencies. Since 90s, however, we observe that financial sanctions, a major type of targeted sanctions, become by far the predominant type of sanctions.

Previous works on sanctions show that there are a few contributing factors to the rise of financial sanctions. Prior to 1990s, popular among top senders of sanctions was the "brute force" theory of sanctions, according to which sanctions become more effective if greater economic costs are imposed on the target. Since early 1990s, governments have realized that there are great humanitarian costs associated with trade sanctions (Drezner, 2011) and that trade sanctions impose great monitoring costs to the sender countries (Andreas, 2005).[1] In comparison, international financial sanctions are facilitated by the Interlaken Process sponsored by the Swiss government in 1998 (Gordon, 2011) and a dominant role played by the US in the international financial system since 1990s (Gottemoeller, 2007).

Table 1 also shows that three other types of smart sanctions – travel restrictions, arms embargo and military assistance restrictions – also gain popularity since 1990s. This is in part due to senders' abstinence from trade sanctions and is facilitated by the "Bonn-Berlin Process" proposed jointly by the German foreign office, the UN Secretariat and the Bonn International Centre for Conversion in 2000 (Brzoska, 2001). Bonn-Berlin Process lays out the basic framework to design and implement arms embargo and travel bans. In 2004, the council of the European Union issued "Basic Principles on the Use of Restrictive Measures (Sanctions)", which strongly favored targeted sanctions. The *Basic Principles* called for the use of targeted sanctions to minimize the unintended consequences of comprehensive measures on civilians and maximize the impact on those responsible for misconduct (Giumelli, 2010).

[1] A case in point is UN sanctions on Iraq in 1990.

Table 1: Popularity of Different Types of Sanctions

		smart sanctions			
period	**trade**	**financial**	**travel**	**arms**	**mil. assit.**
1950-59	**18**	8	6	3	1
1960-69	**23**	15	4	16	6
1970-79	35	**38**	2	7	18
1980-89	**48**	47	19	14	12
1990-99	53	**133**	24	61	54
2000-09	46	**77**	58	54	49
2010-16	55	**89**	54	39	35

Notes: This table shows the total number of different types of sanctions initiated in every decade. The most popular type of sanctions in a decade is bold-faced. Source: Global Sanctions Data Base (GSDB).

Table 2: Top Senders of Sanctions

Top 5 Senders	**Sanctions**	**Percentage**
United States	214	29%
EU	103	14%
UN	76	10%
Norway	41	6%
Canada	40	6%

Notes: This table shows the top 5 senders of sanctions in GSDB. As of 2020, there are a total number of 1158 senders involved in 726 cases of sanctions in GSDB. Source: Global Sanctions Data Base (GSDB).

2.2 A Brief History of Sanctions

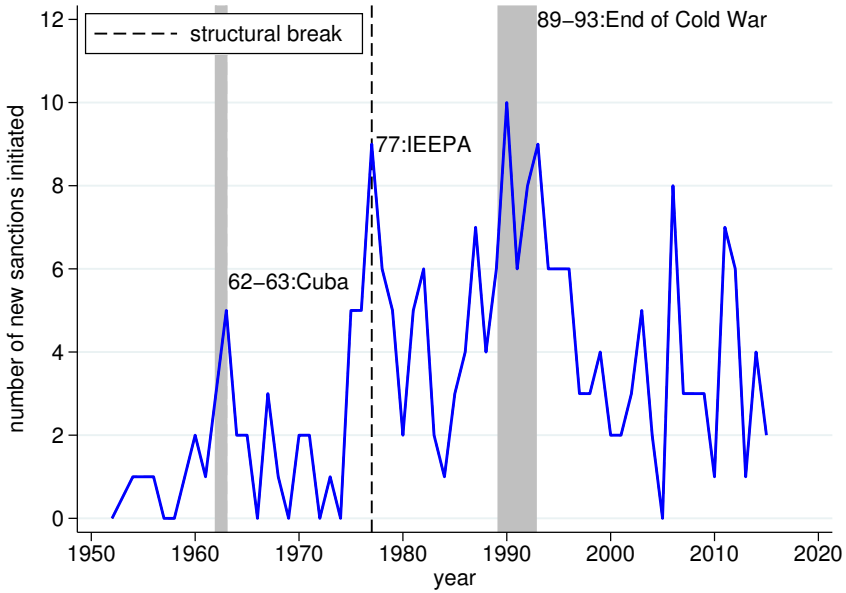
In this section, we review a brief history of sanctions since 1950s. We build our discussion around the top users of sanctions shown in Table 2. The key takeaway from this section can be summarized as follows. We find that top senders' time variation in frequency of sanctions can be traced to promulgation of key regulations or the evolution of geopolitics.

2.2.1 United States

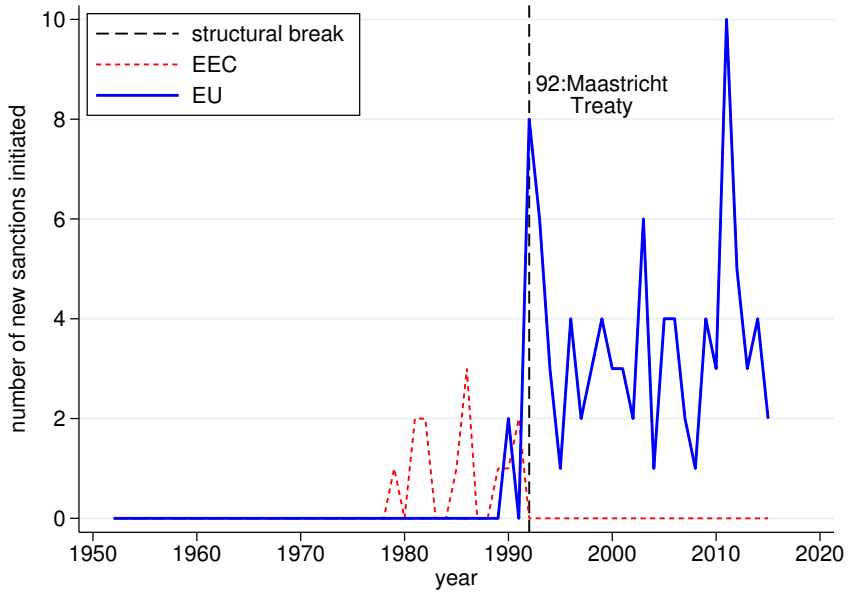
As shown in Table 2, US has been the predominant user of sanctions in the world since 1950s. The number of sanctions unilaterally initiated by the US accounts for 29% of all sanctions between 1950 and 2016. Additionally, US can be a part of multilateral or plurilateral sanctions through UN, NATO and G8.

Figure 1: Trend in Sanctions by Top Senders

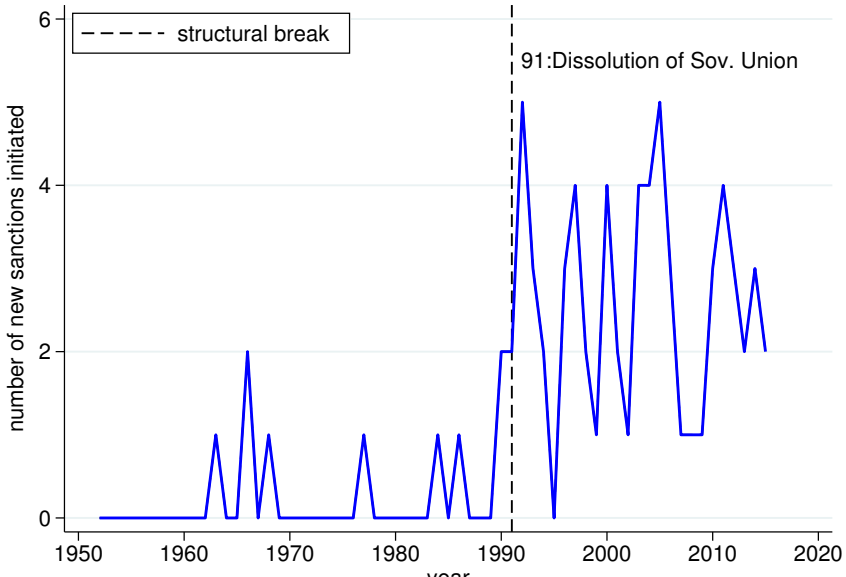
(a) US Unilateral Sanctions (not through UN)



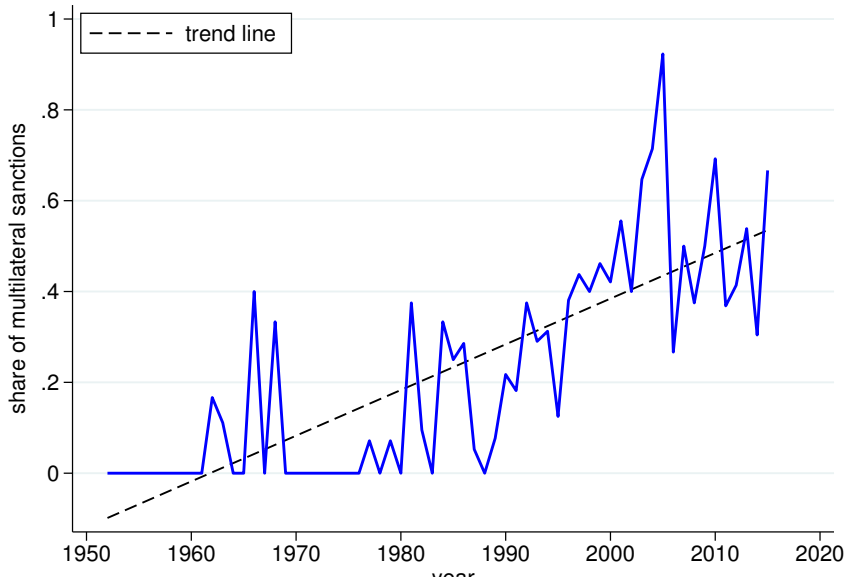
(b) EU Unilateral Sanctions (not through UN)



(c) UN Sanctions



(d) Multilateral Sanctions



In panel (a) of Figure 1, we show the number of sanctions unilaterally initiated by the US varies significantly across the years. We note that a structural break occurs in 1977, the year when IEEPA (International Emergency Economic Powers Act) came into effect. Political science literature on sanctions find that promulgation of IEEPA has been the watershed event for US sanctions (Hufbauer et al., 2008). IEEPA provides the US president broad authority to regulate a variety of economic transactions following a declaration of national emergency (Casey et al., 2019). Hufbauer (1998) notes that IEEPA became the "all-purpose" statute for US sanctions and that, when IEEPA was enacted, the frequent use of economic sanctions by US became at odds with customary international law at the time.[2]

Before IEEPA came into effect, there was a small peak around 1962-63 driven by the crisis in Cuba. During that period, US initiated three cases of sanctions against Cuba. Apart from this, US did not use sanctions aggressively against other countries until 1975-76, when US initiated three case of sanctions against Vietnam. We observe a significant increase in the number of US sanctions after 1977. In the post-IEEPA era, there are still some year-to-year variations driven by geopolitical changes. For instance, in the final years of cold wars, we find a significant increase in the number of US sanctions. Not surprisingly, target countries from 1989 to 1993 include Azerbaijan, Soviet Union and Yugoslavia. This is accompanied by two separate cases for China (1989 and 1993) following the Tiananmen Square incident.

Around the turn of 21st century, we see a decline in the number of US sanctions. This is consistent with the view that, toward the end of 1990s, scholars and policy makers were frustrated by the (lack of) effectiveness of past sanctions.[3] An influential paper titled as "Why economic sanctions do not work" reflects the suspicions at the time (Pape, 1997). Some even argue that "(a) power motivation behind the 2003 (US) invasion of Iraq was he widespread, albeit mistaken, belief that the UN sanctions regime had failed" (Rosenberg et al., 2016). Perhaps due to this reason, we do not see an immediate spike in the number

[2]The key role played by IEEPA in US sanctions is also evidenced by the US executive order documents for economic sanctions, where we find that documents in recent period share the following paragraph:

> By the authority vested in me as President by the Constitution and the laws of the United States of America, including the International Emergency Economic Powers Act (50 U.S.C. 1701 et seq.) (IEEPA), the National Emergencies Act (50 U.S.C. 1601 et seq.), section 212(f) of the Immigration and Nationality Act of 1952, as amended (8 U.S.C. 1182(f)), and section 301 of title 3, United States Code,
>
> I, BARACK OBAMA, President of the United States of America, hereby find that... (Executive Order 13608)

[3]A widely cited examples include failed attempt to force Iraq out of Kuwait, to topple the Haitian military and to punish China for human rights abuses among others.

of sanctions after the 9-11 attack in 2001. We notice that huge year-to-year variations still exist after 2001. There was a peak in 2006 that is not well explained by institutional reasons.[4] There was another peak in 2011-12 against Libya, Mali and Yemen associated with the Arab Spring movement. We notice, however, that there was contemporaneous increase in sanctions in 2011-12 against countries not associated with Arab Spring, such as Belize, Indonesia, Guinea-Bissau, Guatamala and Moldova, perhaps reflecting a political climate at the time with high propensity to use economics sanctions.

2.2.2 European Union and United Nations Security Council

The EU and the UN Security Council have been the second and third active users of economic sanctions, respectively accounting for 14% and 10% of all sanctions observed. In describing their respective trends in sanctions, we combine EU and UN sanctions in a single section as we find that their structural changes are far more apparent and easily explained than the US.

In panel (b) of Figure 1, we show the number of sanctions initiated by EU in each year since 1950s. We see that before 1992, EU issued only a limited number of sanctions through EEC (European Economic Community), including two sanctions against South Africa (1985 and 1986, for Apartheid) and one sanctions against China (1989, Tiananmen). Apart from these particular cases, EU did not appear to be a regular user of sanctions. In 1992, Maastricht Treaty (a.k.a. Treaty on European Union) was signed and led to creation of EU's CFSP (Common Foreign and Security Policy). According to Article J.1 of title V of the Maastricht Treaty, the goal of CFSP, broadly speaking, is to safeguard the common values and fundamental interests under the principles of the UN Charter, preserve peace and strengthen international security and consolidate democracy, rule of law and respect for human rights. Since the creation of CFSP, imposition of EU sanctions fell under the domain of CFSP and sanctions have been a part of regular EU foreign policy (Giumelli and Ivan, 2013). Confirming these institutional changes, in panel (b) of Figure 1, there appears to be a structural break around the time when Maastricht Treaty was signed. Since then, there is a significant increase in the number of EU sanctions.

The evolution of the sanctions by UN Security Council (UNSC) is shown in panel (c) of 1. Although the trend appears to be similar to that of EU sanctions, we posit that the the fundamental reason behind the sudden rise in the number of sanctions since 1991 is due to the dissolution of Soviet Union. Soviet Union was a permanent member of UNSC until its succession by Russian Federation in 1991. Under Article 27 of the UN Charter,

[4] In 2006, US sanctions were against Fiji for military coup (twice), Belarus for undermining democratic institutions, Venezuela for terrorism among others.

a permanent member has the veto power to obstruct any proposals. During the Cold War, UNSC was not able to intervene aggressively in international affairs due to lack of consensus among the permanent members. After the fall of Soviet Union, sanctions have become a common policy tool for the UNSC (Hufbauer et al., 2008). Confirming this, we find a significant increase in the number of UN sanctions since 1991.

2.3 Other Factors

In the preceding discussions, we identified key institutional and geopolitics changes that governed the frequencies of sanctions by their key users. However, it is difficult to determine an exhaustive list of factors that contributed to the widely time-varying frequencies. Literature suggests that rising congress participation in the US (Hufbauer et al., 2008), substitution between military actions versus economic sanctions, and increasing tendency to resort to multilateral sanctions instead of unilateral sanctions (Rosenberg et al., 2016) all played a role in determining the frequencies of sanctions. For evidence, we plot the share of multilateral sanctions on a yearly basis in panel (d) of Figure 1. Consistent with the literature, we find a significant increase in the share of multilateral sanctions over time. This is driven by the globalizing trend in country relations where unilateral sanction becomes less effective if the target country can resort to other trading countries.

We conclude this section by reaffirming that there are systematic variations in the pattern of sanctions driven by time-varying sender characteristics. These characteristics include regulatory changes (for US and EU), geopolitics changes (for UNSC) and an increasing proclivity for smart sanctions. Based on these findings, we motivate our IV strategy in the next section.

3 Empirical Strategy

A key challenge to identifying the effects of sanctions on growth is the issue of endogneity. This section discusses the source of endogeneity and we propose an instrument variable that exploits the variations in sanctions aggressiveness that are exogenous to target countries.

3.1 Endogeneity Issue

Let Y_{jt} denote (real) GDP per capita for a target country j in year t. Also let S_{jt} denote the number of sanctions that country j receive in year t. An intuitive OLS specification

can be conceived as:

$$\log(Y_{jt}) = \beta_S S_{jt} + \Phi_j + \Psi_t + \eta_{jt} \tag{1}$$

where β_S is the coefficient of interest; Φ_j is a set of country fixed effects; Ψ_t is a set of year fixed effects and η_{jt} is the error term.

Conditional on Φ_j and Ψ_t, the estimate of β_S is likely to be biased as the imposition of sanctions itself is an endogenous outcome determined by both sender and target countries' time-varying characteristics. Consider for example, UN sanctions on Liberia in 1992 due to its lingering civil conflicts (UNSC Resolution 788).[5] Due to endogneity, an OLS regression cannot distinguish whether the change in Y_{jt} is an outcome of UN sanctions or that of civil conflicts. To overcome this problem, we use an instrument variable to estimate the causal effect of sanctions on GDP per capita.

3.2 Instrument Variable

To fix the ideas, let S_{ijt} denote a dummy variable that equals to one when a sender country i imposes sanctions on country j in year t. Conceptually, the outcome S_{ijt} is a function of both sender country aggressiveness $\mathcal{S}_{it}$ and target country characteristics χ_{jt}:

$$S_{ijt} = S_{ijt}(\mathcal{S}_{it}, \chi_{jt}) \tag{2}$$

where we conceptualize $\mathcal{S}_{it}$ as a latent variable that governs the temporal variations in sanctions frequencies that we observe in Figure 1 and χ_{jt} is the characteristics of country j in year t that triggered the sanctions (such as civil conflicts in Liberia in 1992). We refer to the term $\mathcal{S}_{it}$ as the *aggressiveness* of country i in year t.

A main concern of endogeneity is that χ_{jt} affects the GDP per capita Y_{jt} beyond the correlation with S_{ijt}, and becomes a direct determinant of GDP per capita. Thus, we use following steps to construct an IV that captures the $S_{ijt}(\mathcal{S}_{it}, \cdot)$ component of sanctions, which are assumed to be exogenous to GDP per capita in the target country.

3.2.1 Stage Zero

Preceding a conventional first-stage to the 2SLS estimation, we introduce a "stage zero" to predict the number of sanctions that country j would have faced solely based on exogenous variables. First, we parameterize $S_{ijt}(\mathcal{S}_{it}, \cdot)$ as a function of $\mathcal{S}_{it}$ as follows:

[5] The 1992 UN sanctions on Liberia took the form of arms embargo and aimed at ending the civil conflicts.

$$S_{ijt} = \beta_0 + \beta_1 \mathcal{S}_{it} + \beta_2 \mathcal{C}_{ij} + \beta_3 \mathcal{S}_{it} \cdot \mathcal{C}_{ij} \tag{3}$$

where $\mathcal{C}_{ij}$ is a variable that measures the pre-determined country-pair characteristics that affect the likelihood of country i imposing a sanctions against country j. We posit that the imposition of S_{ijt} is driven by country i's aggressiveness in year t ($\mathcal{S}_{it}$), pre-determined country-pair characteristics ($\mathcal{C}_{ij}$) and their interaction term.

In a similar setting, Rajan and Subramanian (2008) argue that bilateral foreign-aid decisions are determined by two countries' *history* and the sender country's potential *influence* on the target country. Following this idea, we proxy $\mathcal{C}_{ij}$ with $\hat{\mathcal{C}}_{ij}$, which is defined as a linear function of history variables $\{LANG_{ij}, \{COL^k_{ij}\}_k\}$ and influence variables $\{\log(distance_{ij}), POP_i/POP_j\}$. To explain, $LANG_{ij}$ is a dummy variable that equals 1 if two countries share a common official language and COL^k_{ij} is a set of dummy variable that indicate whether country j was ever a colony to country i prior to 1950. The superscript k takes a value from $k \in \{GBR, FRA, PRT, OTH\}$, which represents the colonizer being UK, France, Portugal and other colonizers respectively. $\log(distance_{ij})$ is the measure of distance between country i and j and POP_i/POP_j is the ratio of population between country i and j in 1950.

To estimate equation (3), we further proxy $\mathcal{S}_{it}$ with $\hat{\mathcal{S}}_{it}$, which is defined as:

$$\hat{\mathcal{S}}_{it} = \sum_{j \in J^{-j}} S_{ijt} \tag{4}$$

where we use J^{-j} to denote the set of all countries except for country j. Namely, the variable $\hat{\mathcal{S}}_{it}$ is defined as the total number of all sanctions imposed by country i against other countries except for country j in year t. We leave out country j in constructing $\hat{\mathcal{S}}_{it}$ to prevent any mechanical correlation from χ_{jt} to $\hat{\mathcal{S}}_{it}$. We believe that $\hat{\mathcal{S}}_{it}$ is a good proxy variable for $\mathcal{S}_{it}$, since the frequency of sanctions reflects the aggressiveness of sender countries and that we can estimate equation (3) to predict the probability of bilateral sanctions *without* relying on country j specific factors that triggered sanctions.

Thus, we propose the following regression model as a feasible way to estimate equation (3):

$$S_{ijt} = \beta_0 + \beta_1 \hat{\mathcal{S}}_{it} + \beta_2 \hat{\mathcal{C}}_{ij} + \beta_3 \hat{\mathcal{S}}_{it} \cdot \hat{\mathcal{C}}_{ij} + D_t + \epsilon_{ijt} \tag{5}$$

where we additionally include year fixed effects D_t to capture any residual temporal trends.

In stage zero of our empirical strategy, we estimate equation (5) using a Probit speci-

fication. We express the fitted values of S_{ijt} with $\hat{S}_{ijt}$. Next, we aggregate $\hat{S}_{ijt}$ across all sender countries to derive our instrument $\hat{S}_{it}$ defined as:

$$\hat{S}_{jt} \equiv \sum_{i} \hat{S}_{ijt} \tag{6}$$

S_{jt} is a valid instrument for S_{jt} in equation (1), as it does not contain any information from χ_{jt}.

We also construct instruments $\hat{S}^z_{it}$ for different types of sanctions z listed in Table **??**. For each sanctions type z, the instrument variable $\hat{S}^z_{it}$ is constructed by replacing $\hat{S}_{ijt}$ with $\hat{S}^z_{ijt}$ in equation (6), which are in turn fitted values of equation (5) with replacement of $\hat{S}_{it}$ with $\hat{S}^z_{it}$. Intuitively, our IV construction procedure explicitly accounts for the fact that different types of sanctions have experienced heterogeneous trends that vary by senders and time.

3.3 IV Regressions

Based on the instrument variable $\hat{S}_{it}$ that we obtain from stage zero, we proceed with 2SLS IV regressions conventionally. In our first stage regressions, we regress our endogenous variable S_{jt} on our instrument variable $\hat{S}_{jt}$ along with all other exogenous covariates in the second stage.

Our baseline specification for the second stage IV regression is:

$$\log(Y_{jt}) = \beta_0 + \beta_S S_{jt} + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \eta_{jt} \tag{7}$$

where Y_{jt} is the real GDP per capita for country j in year t; S_{jt} is the endogenous total number of sanctions on country j; Φ_j is the country fixed effects; D_t is the year fixed effects; $\Phi_j \cdot D_t^{10y}$ is the interaction term between country fixed effects and 10-year fixed effects; $R_j \cdot D_t$ is the interaction term between the region fixed effects of country j and year fixed effects, and finally η_{jt} is the noise term. In this specification, we interact country fixed effects with 10-year fixed effects to control for any country-specific structural change in GDP per capita. We also control for the interaction between region and year fixed effects to fully account for any regional differences in temporal trends.

The first-stage regression that precedes the IV regression in equation (7) is specified as:

$$S_{jt} = \beta_S^{1st} \hat{S}_{jt} + \Phi_{jt}^{2nd} + \epsilon_{jt} \tag{8}$$

where Φ_{jt}^{2nd} is loosely defined as all exogenous covariates in equation (7).

To gauge the long-run impact of sanctions on growth, we also estimate equation (7) by replacing the dependent variable with $\log(Y_{jt}^{Ty})$, the geometric average of GDP per capita up to T years after year t:

$$Y_{jt}^{Ty} \equiv \left(\prod_{\tau=1,\ldots,T} Y_{j(t+\tau)} \right)^{\frac{1}{T}} \tag{9}$$

In our baseline specification, we consider the effects of sanctions up to 10 years after sanctions ($T = 1, \ldots, 10$).

3.4 Further Remarks

The spans of sanctions differ widely. Around 49% of all sanctions cases are lifted within 3 years; yet some sanctions last almost throughout the sample period (e.g. US sanctions on Cuba (since 1962 to present) and UN sanctions on North Korea (since 1961 to present). To account for the different lengths of sanctions, our key independent variable S_{jt} is defined as the total number of sanctions *in place* against country j in year t.

In our baseline specification, S_{jt} is the number of sender countries who impose sanctions on country j regardless of their size. To account for the variations in sender-country sizes and their potential differential effectiveness in sanctions, we experiment with a normalized metric S_{jt}^{*}, which is defined as:

$$S_{jt}^{*} \equiv \sum_{i} \pi_{i,1960} \cdot S_{ijt} \tag{10}$$

where $\pi_{i,1960}$ is the sender country's GDP share in 1960. In other words, if a country is sanctioned by the entire rest of the world, she will face close to 1 sanctions measured in S_{jt}^{*} (except for herself). This leads to inflation of estimated β_S as expected, but the signs and significance of estimated β_S do not change the conclusion of our paper.

We also consider slight variations of our dependent variables in our baseline specification. Specifically, we experiment with *growth rate* of GDP per capita in year t defined as $\%\Delta Y_{jt} \equiv (Y_{jt} - Y_{jt-1})/Y_{jt-1}$. The results stay almost the same. When we explore the mechanisms that lead to economic growth, we use institutional variables such as a binary measure of democracy from Acemoglu et al. (2019). Before we present our main regression results, we briefly discuss our data source and the definition of variables.

4 Data Source and Summary Statistics

We briefly discuss our data and key summary statistics. We defer further details to Appendix **??**.

4.1 Data

Our main dataset is the GSBD (Global Sanctions Data Base) collected by Felbermayr et al. (2020). The GSDB dataset provides case-by-case information on 726 publicly traceable sanctions over the 1950-2016 time period. Compared with other sanctions database, the GSDB dataset excels in the length of time periods and its comprehensiveness in terms of sanctions senders. From the GSDB dataset, we extract information about sender/target country names, years of imposition and termination, and types of sanctions.

From the original GSDB dataset, we focus on top 56 countries that account for 95% of sanctions-years, which are the sum of sanctions weighted by their duration years. We posit that focusing on top target countries provides two key advantages. First, inclusion of a large number of countries that never receive sanctions adds pressures to both first-stage and IV regressions without providing any variations to our key regressor of interests S_{it}, as we include a full set of country dummy variables interacted with a full set of decade dummy variables. Second, we posit that it is naturally more relevant to study the effects of sanctions on sanctions-prone countries (e.g. Iraq) than that on sanctions-proof countries (e.g. Australia). Due to missing values in the GDP variable, four countries – North Korea, Somalia, Syria and Eritrea – are dropped from our sample.

The real GDP per capita (in 2010 USD) data are from the World Development Indicators from the World Bank. We construct a T-year average GDP per capita using the formula in equation (9). The country pair characteristics that we use to implement our stage-zero regressions are from the CEPII dataset (Head et al., 2010). We also use a binary variable from Acemoglu et al. (2019) to indicate whether a target country is a democracy in a given year. We refer readers to Table **??** for further details about definitions of variables and their sources.

4.2 Types of Sanctions

A major contribution of our paper is to show that the outcome of sanctions vary vastly by their types. As we have described in Introduction, a key contention in the literature has been between the use of trade sanctions versus smart (a.k.a targeted) sanctions (Drezner, 2011; Rosenberg et al., 2016). As such, we group the original sanctions types provided in

Table 3: Types of Sanctions

Sanctions Types	Description
trade sanctions	Trade sanctions are defined as measures that aim to restrain economic interactions with a target country by limiting international trade.
financial sanctions	Financial sanctions involve freezing the exchange of financial assets and investments. Foreign assets can be frozen as a while or partially for certain individuals, influential politicians or leaders in industry (targeted sanctions).
travel restrictions	Travel restrictions restrict the freedom of geographical movement of individuals. The GSDB identifies: (1) travel restrictions for people into the sender country; and (2) journeys from the sanctioning to the sanctioned country.
arms embargo	Arms sanctions restrict arms sales. Specifically, the GSDB documents whether arms exports to and / or arms imports from a sanctioned country are temporarily banned.
military assistance restrictions	Military assistance sanctions cover restrictions monetary, personal and training assistance.
other sanctions	Other types of sanctions include primarily diplomatic measures (such as the exclusion from or the interruption of diplomatic relations with the African Union) as well as flight and harbor restrictions.

Notes: This table presents the classification of sanctions provided in GSDB.

GSDB into four classifications: trade, financial-and-trade, arms-and-military and others (See Table 3 for details).

To explain, we combine financial and travel sanctions into a single category, as these two types of sanctions are the two most representative smart sanctions (Rosenberg et al., 2016). In general, we find that travel restrictions are imposed on top of financial sanctions against key foreign individuals (Hufbauer et al., 2008). In the GSDB dataset, travel and financial sanctions have the highest pairwise correlation coefficient of 0.77. Another benefit of combining two smart sanctions is to provide a more transparent head-to-head comparison with trade sanction in terms of their outcomes.

We also combine arms embargo and military assistance restrictions into a single cat-

egory. There are two reasons for this. The first one, which is driven by the natural data pattern, is that arms embargo and military restrictions have the second highest pairwise correlation of 0.73. The second reason, which is a technical one, is that our strategy to instrument imposition of sanctions on a target country j with those imposed on other countries do not perform well against arms and military sanctions (generating low F-statistics in the first stage regression). We conjecture that the high specificity nature of arms and military sanctions, which entails that the sender country already has some form of arms sales and military assistance in place, restricts the application of our IV strategy.

In addition to the financial-and-travel sanctions and arms-and-military sanctions mentioned above, we consider *trade* and *other* sanctions as two other standalone categories (See Table 3 for details). Finally, we follow Rosenberg et al. (2016) and use *smart sanctions* as a pronoun for financial-and-travel sanctions.

4.3 Summary Statistics

We present the basic summary statistics for GDP per capita and the democracy variables in Table 5. From column (1) to column (3), we present the average, minimum and maximum of variables specified in each row. In the first row, we show the unconditional average log-GDP per capita in our sample is 7.29. From row 2 to row 4, we show the unconditional *difference* between 3,5 and 10-year average log-GDP per capita after year t with the log-GDP per capita in year t. From column (1) of Table 5, we observe that countries on average are experiencing growth in GDP per capita as shown by the increment in the difference in the GDP per capita.

From row 5 to row 8, we show the similar statistics for the binary democracy indicator from Acemoglu et al. (2019). We observe that the unconditional average of the democracy index is 0.29; we also observe that countries in our sample experience a transition into democracies as shown by the increment in the difference in the democracy indicator.

In column (4) and (5), we compare the mean of variables conditional on whether a country received a sanctions $(S_{jt} > 0)$ or not $(S_{jt} > 0)$. In column (6), we show the p-value of the statistical test whether the two conditional means are statistically different. In the first row of column (4) and (5), we observe that countries that are subject to sanctions, on average, have higher GDP per capita to start with. From row 2 to row 4, we observe that both groups are experiencing GDP per capita growth, but the sanctioned countries experience a more rapid GDP per capita growth.

Finally, we compare the conditional average of democracy levels of two groups. We observe in row (5) and (6) that sanctioned countries have a higher level of democracy. We

Table 4: Summary Statistics for Different Types of Sanctions

sanctions	**mean**	**median**	**sd.**	**min**	**max**
All	14.51	1.00	26.96	0.00	89.00
Trade	5.95	0.00	18.50	0.00	89.00
Fin./Trav.	8.04	0.00	22.28	0.00	89.00
Other	11.97	0.00	26.51	0.00	89.00

Notes:

Table 5: Summary Statistics for GDP per capita and Democracy

	(1) **mean**	(2) **min**	(3) **max**	(4) **mean($S_{jt}=0$)**	(5) **mean($S_{jt}>0$)**	(6) **p-value**
Panel A						
$\log(Y_{jt})$	7.33	4.88	10.81	6.98	7.59	0.00
$\log(Y_{jt}^{3y}) - \log(Y_{jt})$	0.03	-0.80	0.90	0.02	0.04	0.00
$\log(Y_{jt}^{5y}) - \log(Y_{jt})$	0.05	-0.71	1.03	0.03	0.06	0.00
$\log(Y_{jt}^{10y}) - \log(Y_{jt})$	0.09	-0.70	1.26	0.05	0.12	0.00
Panel B						
Dem_t	0.30	0.00	1.00	0.27	0.33	0.01
$Dem_{t+3} - Dem_t$	0.02	-1.00	1.00	0.01	0.03	0.27
$Dem_{t+5} - Dem_t$	0.04	-1.00	1.00	0.02	0.05	0.05
$Dem_{t+10} - Dem_t$	0.08	-1.00	1.00	0.05	0.13	0.00

Notes:

(i)
(ii)

also observe that both groups experience a transition to democracies, but the sanctioned groups experience a faster transition and the gap of transitions between two groups become significant after 5 years after sanctions.

In Figure 5, we show the bi-modal distribution of functions in general. We observe that across all types of sanctions, most countries receive 0 or 1 sanctions in a given year. On the right-hand side of the distribution, however, we note that there is another distribution mass due to multilateral sanctions.

5 Results

5.1 Stage Zero

The results from estimation equation (3) are shown in Table 6. In the first column of Table 6, we drop the interaction term $\hat{S}_{it} \cdot \hat{C}_{ij}$ to ease the interpretation of coefficients. We observe that in column (1), not surprisingly, our proxy variable for sender country's aggressiveness $\hat{\mathcal{S}}_{it}$ is highly correlated with its sanctions on country j. Note that we already exclude the mechanical correlation between S_{ijt} and $\hat{\mathcal{S}}_{it}$, as $\hat{\mathcal{S}}_{it}$ is defined as the "leave-out" aggregation of all sanctions from sender i except against target j. The positive and significant coefficient on $\hat{\mathcal{S}}_{it}$ confirms our earlier discussion that sender countries' sanctions are highly correlated across target countries in a given year, partly driven by their own institutional factors.

In column (1), we also observe that the coefficient of the population ratio is negative, meaning that a target country is less likely to be sanctioned if she has a smaller population. The coefficient of bilateral distance is negative, suggesting that a sender country is more likely use sanctions for influence if the target is geographically close. The coefficient for the common language is positive and significant, meaning that sanctions are more likely if the target country shares a common official language with the sender country. There is also a great heterogeneity in likelihood of sanctions depending on the colonial ties. We find that relative to the reference group (i.e. no colonial relationship), the UK, France and Portugal colonial ties can significantly reduce the likelihood of sanctions; whereas other colonial ties increase it.

Due to the interaction terms, it is difficult to interpret the coefficients in column (2) through (6) in Table 6. Nevertheless, we remind readers that we base our further results on regression results from column (2) through (6).

Table 6: Bilateral Sanctions Probability - Stage Zero

Dep. Var.	(1) Any S_{ijt}	(2) Any S_{ijt}	(3) z=Trade S^z_{ijt}	(4) z=Fin./Trav. S^z_{ijt}	(5) z=Other S^z_{ijt}
$\hat{\mathcal{S}}_{it}$	0.0476***	0.0427***			
	(0.000633)	(0.000857)			
$\hat{\mathcal{S}}^z_{it}$			0.0784***	0.0353***	0.0201***
			(0.00163)	(0.00152)	(0.00130)
POP_i/POP_j	-0.0149***	-0.0517***	-0.0385***	0.0146***	-0.0425***
	(0.00129)	(0.00193)	(0.00247)	(0.00310)	(0.00203)
$\log(distance)$	-0.109***	-0.111***	-0.152***	-0.0449***	0.109***
	(0.00392)	(0.00572)	(0.00604)	(0.00828)	(0.00705)
$LANG$	0.117***	-0.0300**	-0.172***	0.124***	0.102***
	(0.00794)	(0.0132)	(0.0164)	(0.0211)	(0.0147)
$COL-GBR$	-0.0687	-0.241**	0.537***	0.538***	0.297***
	(0.0429)	(0.117)	(0.161)	(0.0972)	(0.0833)
$COL-FRA$	-0.429***	-0.467***	-0.125	-0.164	-0.442**
	(0.0573)	(0.157)	(0.195)	(0.206)	(0.175)
$COL-PRT$	-0.671***	-1.518***	0.575	-0.313	-1.084***
	(0.150)	(0.458)	(0.474)	(0.481)	(0.279)
$COL-OTH$	0.253***	0.477***	0.294***	0.492***	0.717***
	(0.0345)	(0.0715)	(0.0837)	(0.0774)	(0.0641)
Observations	336,336	336,336	336,336	336,336	331,240
Year FE	✓	✓	✓	✓	✓
$\hat{\mathcal{S}}_{it} \cdot \hat{\mathcal{C}}_{ij}$		✓			
$\hat{\mathcal{S}}^z_{it} \cdot \hat{\mathcal{C}}_{ij}$			✓	✓	✓

Notes:

(i) This table shows the regression results from estimating equation (3). Please see section 3.2.1 for the definition of variables. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(ii) In the first column, we dropped the interaction term to ease the interpretation of coefficients.

(iii) The number of observations differ across regression specifications, as in some years, the year fixed effect perfectly predicts the failure ($S_{ijt} = 0$), inferring a coefficient of negative infinite. Samples in those years are dropped from estimation.

5.2 First Stage

To examine the performance of our constructed instrument variable, we use OLS to estimate a simplified version of our first stage regression:

$$S_{jt} = \beta_0 + \beta_S^{1st} \hat{S}_{jt} + \epsilon_{jt} \tag{11}$$

Note that this is a simplified version of our first stage regressions without the exogenous covariates Φ_{jt}^{2nd} in second stages. We report the estimation results of equation (11) in Table 7. Note that all coefficients of $\hat{S}_{jt}$ and $\hat{S}_{jt}^{z}$ are close to one, meaning that our constructed instrument variables can almost predict the incidence of sanctions on country j one-for-one. The corresponding F-statistics reported at the bottom of Table 7 show the robustness of our instrument variables. However, in our IV regression results, the reported first-stage F-statistics are generally less than those reported in Table 7 for two reasons. First, due to lack of full availability in the GDP data, we do not utilize the full sample as in Table 7. Second, inclusion of exogenous covariates Φ_{jt}^{2nd} tend to reduce the F-statistics of our instrument variables.

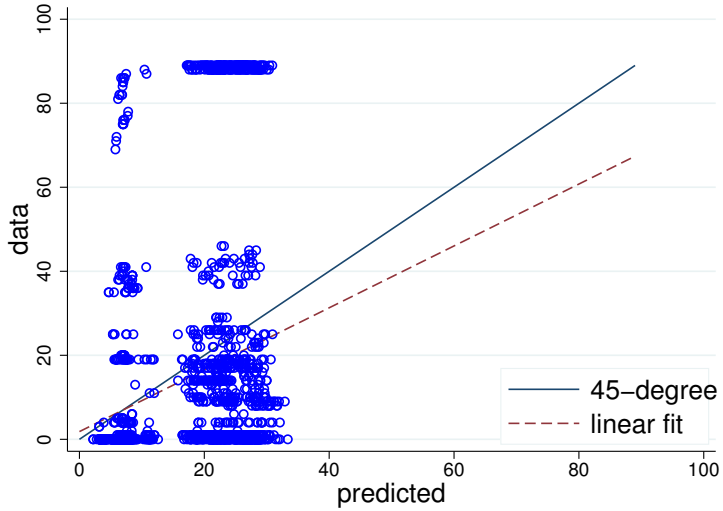
Table 7: First Stage Regressions (Full Sample)

	(1)	(2)	(3)	(4)
		z=Trade	z=Fin./Trav.	z=Other
Dep. Var.	S_{jt}	S^z_{jt}	S^z_{jt}	S^z_{jt}
$\hat{S}_{jt}$	0.932***			
	(0.0419)			
$\hat{S}^z_{jt}$ (z=Trade)		0.823***		
		(0.0663)		
$\hat{S}^z_{jt}$ (z=Fin./Trav.)			0.962***	
			(0.0393)	
$\hat{S}^z_{jt}$ (z=Other)				1.025***
				(0.0403)
Constant	0.874	0.985**	0.218	-0.242
	(0.645)	(0.455)	(0.364)	(0.542)
Observations	3,808	3,808	3,808	3,808
Adjusted R^2	0.115	0.039	0.136	0.145
F-statistic	494.99	154.20	599.43	646.44

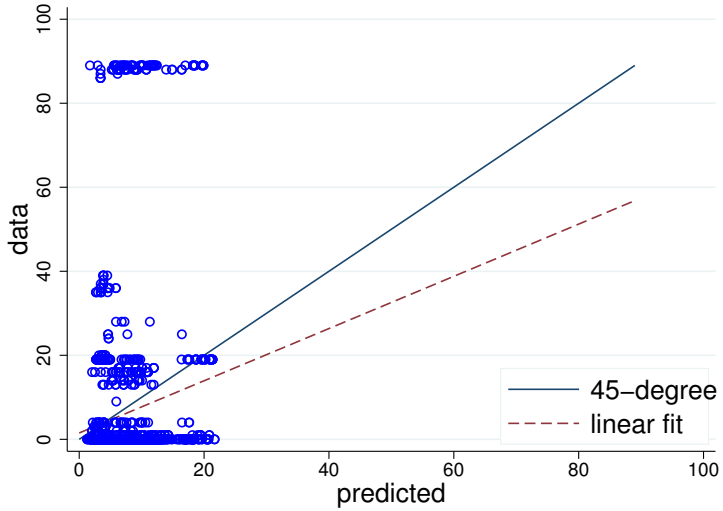
Notes: This table shows the estimation results of the simplified version of our first stage regressions. The regression specification is in equation (11). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 2: Correlation of Sanctions with Instruments (Predicted Sanctions)

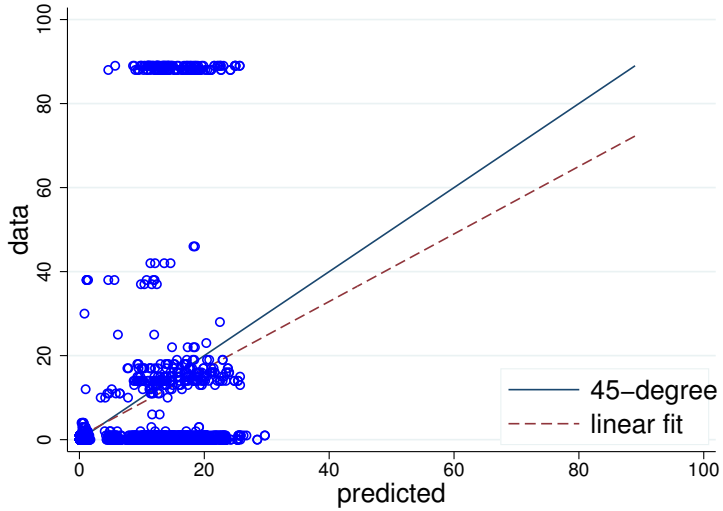
(a) Any



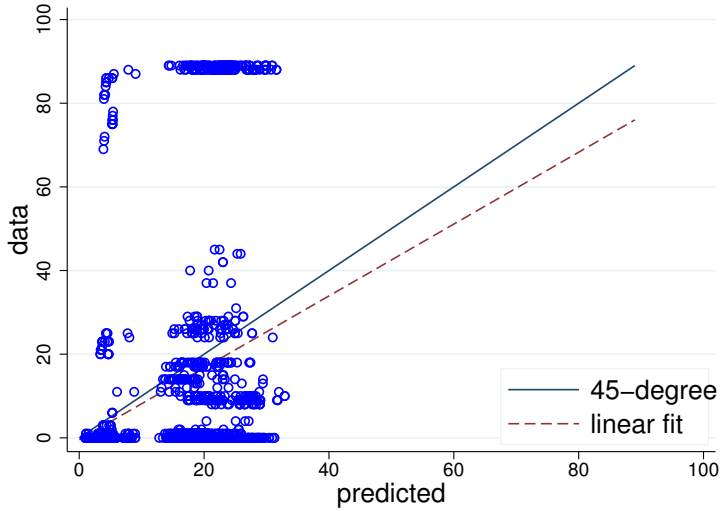
(b) Trade



(c) Financial/Travel



(d) Others



Notes: This figure shows the correlation between the occurrence of sanctions in the data and the occurrence of predicted sanctions.

5.3 OLS Estimation

Before we present our main IV regression results, we report our OLS estimation results under the same specification in equation (7). By comparing the OLS estimation results and the IV estimation results, we can understand the direction of bias caused by the endogenity issue, which stems from χ_{jt}, the target-country characteristics that incurred sanctions.

In Table A.9, we report our baseline OLS results using the (logarithm of) GDP per capita of the target country in the year of sanctions as dependent variables. All coefficients presented in Table A.9 are multiplied by a factor of 100 to ease interpretation. All regressions reported in Table A.9 include two sets of fixed effects as additional controls. The first set of fixed effects is the full set of region dummy variables interacted with the full set of year dummy variables; the second set of fixed effects is the full set of country dummy variables interacted with the full set of decade dummy variables. Essentially, the coefficients presented in Table A.9 show the correlations between the number of sanctions that country j receive and the contemporaneous GDP per capita conditional on covariates.

In column (1) of Table A.9, we observe that, after accounting for differences in country, region and time, one increment in sanctions is associated with 0.12% decline in GDP per capita. At the bottom of Table A.9, we also present the sample standard deviation of the number of sanctions. Combined with this information, the interpretation of column (1) results is that a standard deviation increase in the number of sanctions is associated with around 3.15% contemporaneous decline in GDP per capita.

From column (2) to column (5), we present the OLS estimation of equation (7) separately by the types of sanctions. In general, we observe highly consistent estimation results range from -0.11 (arms-and-military) to -0.15 (smart sanctions). In column (6), we experiment with a "horse-race" of all types of sanctions. It appears that trade and financial sanctions are associated with a significant decline in GDP per capita.

In Table A.10, we present the same estimation results as in Table A.9 except that we use the 10-year geometric average of logarithm of GDP per capita after sanctions. In Table A.10, we observe that signs of coefficients are mixed. Overall, we observe in column (1) that sanctions in general are associated with 0.03% increase in 10-year average GDP per capita.

Table 8: OLS Regressions (GDP per capita)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt} \times 100$, OLS Regressions				
S_{jt}	-0.119***				
	(0.0213)				
S^z_{jt} (z=Trade)		-0.137***			-0.0647**
		(0.0239)			(0.0314)
S^z_{jt} (z=Fin./Trav.)			-0.148***		-0.0978**
			(0.0246)		(0.0385)
S^z_{jt} (z=Other)				-0.105***	-0.0174
				(0.0222)	(0.0346)
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	26.96	18.50	22.28	26.51	

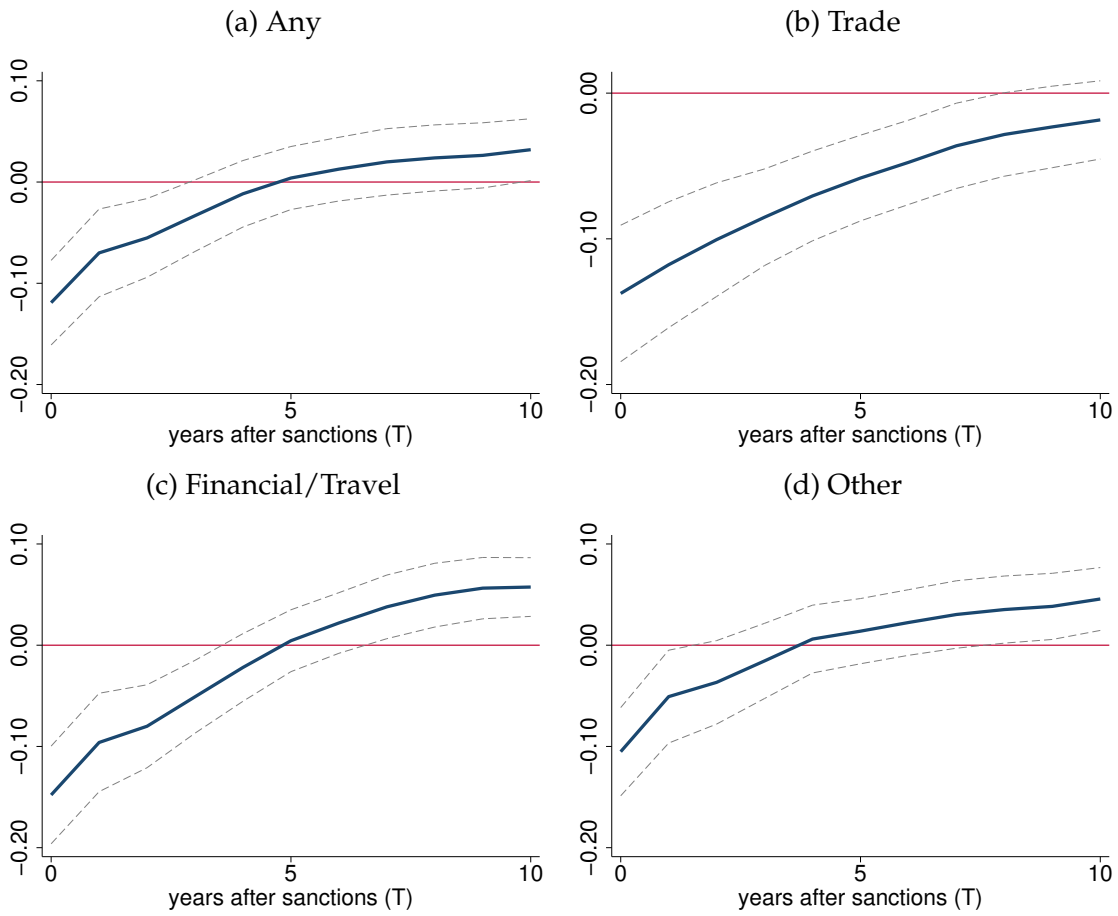
Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: OLS Regressions (GDP per capita (10Y-Avg.))

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, OLS Regressions				
S_{jt}	0.0320**				
	(0.0156)				
S_{jt}^{z} (z=Trade)		-0.0184			-0.117***
		(0.0137)			(0.0213)
S_{jt}^{z} (z=Fin./Trav.)			0.0575***		0.115***
			(0.0148)		(0.0271)
S_{jt}^{z} (z=Other)				0.0457***	0.0395
				(0.0158)	(0.0240)
Observations	1,728	1,728	1,728	1,728	1,728
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	25.34	18.69	19.73	24.95	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 3: OLS Regression Coefficients of S_{jt} (S_{jt}^z)
Dependent Variable: T-year Average log(GDP per capita) after Sanctions



Notes: This figure shows the OLS estimates of β_S in equation (7) with T-year average logarithm of GDP per capita as the dependent variable. The regression specifications are the same as column (1) through (5) in Table A.9 and A.10. For $T = 0$, the dependent variable is the logarithm of GDP per capita in the year of sanctions. The solid line is the point estimates of coefficients and the dashed line shows the 95% confidence intervals.

In Figure 3, we plot the estimates of β_Ss by using the T-year average of GDP per capita (after sanctions) as dependent variables ($T = 0, \ldots, 10$). The regression specifications are the same as column (1) through (5) in Table A.9 and A.10. The solid lines represent the point estimates of β_Ss for each year and the dashed line shows the 95% confidence intervals. As can be seen from the figure, when $T = 0$ (corresponding to Table A.9), sanctions are associated with a lower GDP per capita. Across all types of sanctions, we find that β_Ss become not as negative with the increment in T, and that as T approaches 10 (corresponding to Table A.10), smart and other sanctions are associated with a positive change in GDP per capita.

However, as we discussed earlier, OLS estimation results are interpreted as observational correlations after accounting for cross-country, regional and temporal differences. The key obfuscation stems from inability to separate the effects of sanctions on growth and that of target country characteristics χ_{jt} (such as civil conflicts in Liberia) that give rise to sanctions in the first place. To address this issue, we present our IV estimations results.

5.4 IV Estimation

Our prior beliefs regarding the direction of OLS bias is negative. Namely, we posit that target country specific factors that incur sanctions (such as civil conflicts, territorial invasions, and human rights violations) generally lead to a decline in GDP, and thus the negative coefficients in Table A.9 may be spurious.

We present the IV analogue of Table A.9 in Table 10. In column (1) of Table 10, we observe that sanctions, in general, has a negative impact on contemporaneous level of GDP per capita. This is especially true for trade and other sanctions (column (2) and (5)). However, we observe that smart sanctions have positive impact on GDP per capita in column (3). At the bottom of Table 10, we note that all first-stage F-statistics are well above the conventional value of 10 except for column (4), meaning that our IV strategy fails against arms-and-military sanctions.

To explain the the magnitude of coefficients, column (2) of Table 10 suggests that an extra trade sanctions leads to a 0.125% decline in the target country. In light of sample standard deviation of trade sanctions being around 18, we conclude that one standard deviation increase in trade sanctions leads to a 2.31% decline in contemporaneous GDP per capita. Although this is slightly below the OLS estimates (2.51%), we deem a 2.75% decline in contemporaneous GDP per capita to be economically significant. We note that column (2) is confirming the previous findings (from an opposite perspective) that inter-

national trade leads to economic growth (Frankel and Romer, 1999; Feyrer, 2019).

In column (3) of Table 10, we find that smart sanctions have a statistically and economically significant positive impact on the target country. To explain, we find that one extra smart sanction leads to 0.17% higher GDP per capita in the target country. In column (5), we note that other sanctions (diplomatic sanctions or harbor restrictions) lead to around 0.12% lower GDP per capita in the target country. Finally in column (6), we pool all types of sanctions into a single regression except for the arms-and-military sanctions, which exhibit a very low first-stage F-statistic. We find that the signs of coefficients from column (2) to (5) are preserved.

To gauge the long run impact of sanctions on growth, we also use 10-year average GDP per capita of target countries after sanctions as dependent variables and present the IV estimation results in Table 11. In column (1), we find that sanctions, without disaggregation by types, increase the 10-year average GDP per capita of the target country by 0.09% for each extra sanctions. Trade sanctions in column (2) does not have a significant impact on 10-year average GDP per capita of the target country. Smart sanctions in column (3), however, have a significant and positive impact on the target country's 10-year average GDP per capita.

Column (4) shows that our instrument strategy does not perform well against the arms-and-military sanctions, and column (5) suggests that other sanctions also have a positive and significant impact on target countries' long run GDP per capita, although their magnitude is much less than smart sanctions. Similarly in column (6), we experiment with a horse-race of sanctions, where we note results from column (2) through (5) are reversed. Specifically, we find that only smart sanctions have a positive and significant impact on target country's growth; trade and other sanctions have have negative effects.

Table 10: Contemporaneous Impact of Sanctions on GDP per capita (IV)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt} \times 100$, IV Regressions				
S_{jt}	-0.0859**				
	(0.0406)				
S^z_{jt} (z=Trade)		-0.128***			-0.362***
		(0.0450)			(0.104)
S^z_{jt} (z=Fin./Trav.)			0.169**		0.346***
			(0.0789)		(0.125)
S^z_{jt} (z=Other)				0.250	
				(0.564)	
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	26.96	18.50	22.28	26.51	
First Stage F-statistic	165.86	127.52	62.90	1.82	24.46

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11: Impact of Sanctions on GDP per capita (10Y-Avg.) (IV)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, IV Regressions				
S_{jt}	0.0940***				
	(0.0342)				
S_{jt}^{z} (z=Trade)		-0.0217			-0.559***
		(0.0283)			(0.123)
S_{jt}^{z} (z=Fin./Trav.)			0.417***		0.762***
			(0.0772)		(0.147)
S_{jt}^{z} (z=Other)				0.966	
				(1.108)	
Observations	1,728	1,728	1,728	1,728	1,728
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	25.34	18.69	19.73	24.95	
First Stage F-statistic	114.40	112.91	41.63	0.82	16.40

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12: Impact of Sanctions on GDP per capita (10Y-Avg.) (IV, 10Y-Cumulative Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, IV Regressions				
$\sum_t S_{jt}$	0.0101				
	(0.0119)				
$\sum_t S_{jt}^z$ (z=Trade)		-0.0263***			-0.181***
		(0.00955)			(0.0497)
$\sum_t S_{jt}^z$ (z=Fin./Trav.)			0.131***		0.245***
			(0.0371)		(0.0639)
$\sum_t S_{jt}^z$ (z=Other)				0.213	
				(0.240)	
Observations	1,573	1,573	1,573	1,573	1,573
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	221.43	141.49	169.45	218.75	
First Stage F-statistic	53.96	66.11	30.12	1.08	10.50

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In Figure 4, we plot the effects of sanctions on T-year average GDP per capita in target countries ($T = 0, \ldots, 10$), which correspond to column (1) through (5) in Table 10 and 11. We find in panel (a) that, over time, effects of sanctions on GDP have a rising trend from a negative starting point in year 0.

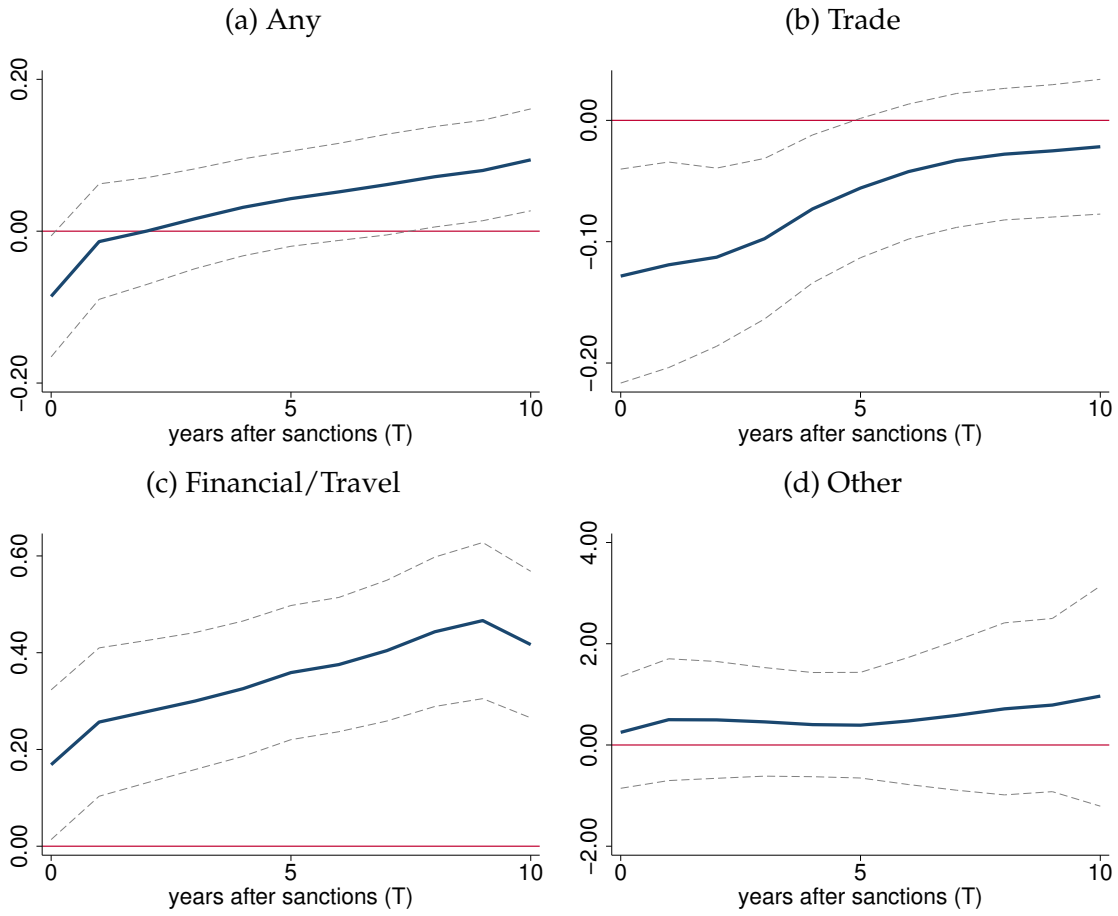
As the first key takeaway from Figure 4, we observe in panel (b) that trade sanctions cause a significant drop in GDP per capita in the target country since $T = 0$ and the negative impact spans over 5 years. We also note that in panel (b) the negative impact of trade sanctions are alleviated over time. This is due to relatively short span of sanctions in general and trade volume generally recovers slowly after trade embargo is lifted.[6]

The second key takeaway from Figure 4 is that, in panel (c), we observe that the impact of smart sanctions on GDP per capital quickly becomes positive since $T = 0$ and rises in magnitude. In section 6, we discuss in details that smart sanctions generally enhance the institutions in the target country that lead to economic growth.

Finally in Figure 4, we note that other sanctions do not appear to have a significant impact on the target countries' GDP per capita.

[6]Recall that around half of sanctions are lifted within 3 years.

Figure 4: IV Regression Coefficients of S_{jt} (S_{jt}^z)
Dependent Variable: T-year Average log(GDP per capita) after Sanctions



Notes: This figure shows the OLS estimates of β_S in equation (7) with T-year average logarithm of GDP per capita as the dependent variable. For $T = 0$, the dependent variable is the logarithm of GDP per capita in the year of sanctions. The solid line is the point estimates of coefficients and the dashed line shows the 95% confidence intervals.

5.5 Robustness Checks

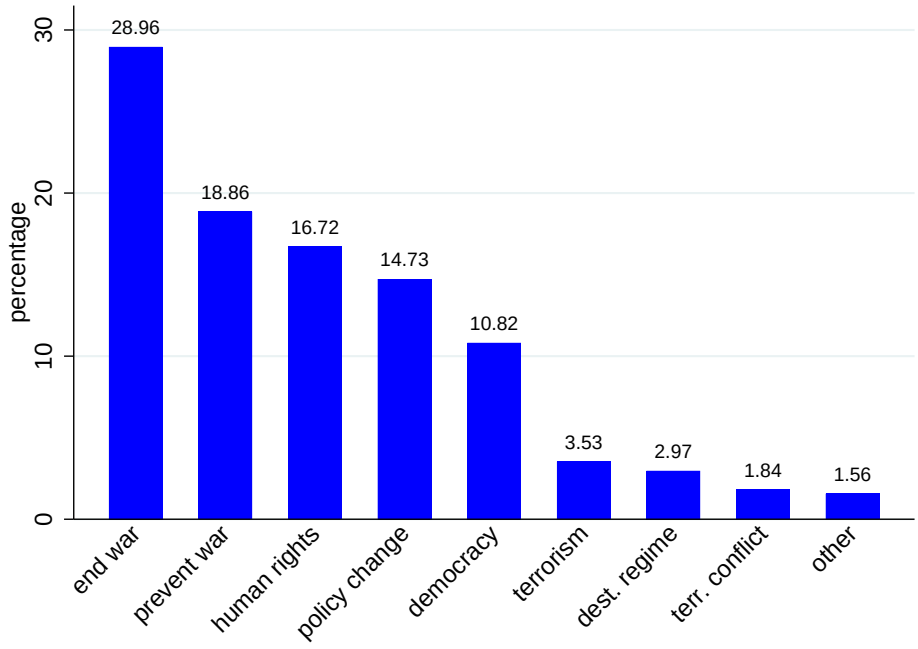
In this section, we discuss the robustness checks for our main results. For brevity, we describe the specifications and their key findings in the main text. We refer readers to Appendix A for the regression results.

6 Mechanism

In this section, we explore the mechanisms through which sanctions can potentially affect the economic performance in the target country. As shown in Figure 5, we note that the proclaimed objectives of sanctions are generally in favor of target country's economic growth. Commonly-held objectives of sanctions are "to end or prevent wars", "to end human rights violations" and "to restore or establish democracy". We posit that if sanctions are designed to provide a more stable macroeconomic environment and lead to a positive institutional change, it might spell positive economic growth in the target country.[7]

[7] We note that the GSDB dataset indicates that sanctions have around 40% success rates in terms of achieving the proclaimed objectives of sanctions.

Figure 5: Distribution of Sanctions by Proclaimed Objectives



Source: Global Sanctions Database (GSDB)

6.1 Effects of Potential Mechanisms

As such, we examine a few macroeconomic indicators that are relevant for growth and observe how they are affected by economic sanctions. To be specific, we adopt the following regression specification:

$$\mathcal{Y}^{10y} = \beta_0 + \sum_z \beta_S^z S_{jt}^z + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \eta_{jt} \tag{12}$$

where $\mathcal{Y}^{10y}$ is one of the 10-year average of the mechanism variables (averaged from year $t+1$ to $t+10$); $\sum_z \beta_S^z S_{jt}^z$ are the effects of type z sanctions. In this section, we consider trade and smart sanctions ($z \in \{\text{Trade}, \text{Fin./Trav.}\}$) to contrast their differences. Motivated by the objectives of sanctions provided in Figure 5, we consider following mechanism variables.

- *Trade/GDP*: Trade (import plus export) as a percentage of GDP from the World Development Indicator.
- *Democracy*: Dichotomous indicator from Acemoglu et al. (2019) that equals to 1 if the target country is a democracy in a given year.
- *Unrest*: Dichotomous indicator generated from Banks and Wilson (2017) that equals

to 1 if the target country has a social revolt or revolution in a given year.

- *TFP*: Measure of total factor productivity from the Penn World Tables (**?**).
- *Terrorism*: Dichotomous indicator generated from Banks and Wilson (2017) that equals to 1 if terrorist attacks occurred in the target country in a given year.
- *War*: Dichotomous indicator from the Uppsala Conflict Data Program that equals to 1 if there is a civil or an inter-state wars in the target country in a given year.
- *Investment/GDP*: Net investment in nonfinancial assets as a percentage of GDP from the World Development Indicator.

We present the estimation results of equation (12) in Table 13. From column (1) through (4), we find that trade sanctions have negative effects on trade, democracy and TFP and increases social unrest in the target country; whereas smart sanctions have the exactly opposite effects in the same categories. From column (5) through (7), we do not find that trade sanctions or smart sanctions have a significant impact on terrorism, war or investment as a percentage of GDP. Although it is difficult to provide an exhaustive list of potential mechanisms, we believe that Table 13 provides a rather comprehensive view of why smart sanctions can improve the economic performance in the target country, and trade sanctions have the opposite effects.

Table 13: Effects of Sanctions on Potential Mechanisms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IV Regressions						
Dep. Var.	Trade/GDP	Dem.	Unrest	TFP	Terr.	War	Inv./GDP
S^z_{jt} (z=Trade)	-0.147*	-0.00709**	0.00324**	-0.00347***	-0.000172	0.000139	-0.00740
	(0.0815)	(0.00319)	(0.00165)	(0.00130)	(0.00278)	(0.00133)	(0.00910)
S^z_{jt} (z=Fin./Trav.)	0.209**	0.00943**	-0.00470**	0.00418***	0.00146	-0.000917	0.00139
	(0.102)	(0.00396)	(0.00183)	(0.00159)	(0.00301)	(0.00141)	(0.00845)
Observations	1,329	1,242	1,573	882	1,728	1,728	230
Countries	48	49	53	30	53	53	20
Region × Year FE	✓	✓	✓	✓	✓	✓	✓
Country × 10-Year FE	✓	✓	✓	✓	✓	✓	✓
First Stage F-statistic	41.77	34.73	44.69	29.30	60.08	60.08	31.28

Notes:

(i) This table shows the IV estimation results of the effects of trade and smart sanctions on potential channels for growth. The definitions of the dependent variables are in order:

- Trade: 10-year average of trade (import plus export) share of GDP in percentage points
- Dem.: 10-year average of dichotomous measure of democracy
- Unrest: 10-year average of dichotomous measure of whether the country has social riots or revolutions
- TFP: 10-year average of TFP
- Terr.: 10-year average of dichotomous measure of whether the country has terrorism activities
- War: 10-year average of dichotomous measure of whether the country has a civil or an inter-state wars
- Inv./GDP: 10-year average of investment share of GDP in percentage points

(ii) All dependent variables are averaged from year $t+1$ (one year after sanctions are imposed) to $t+10$.

(iii) Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

6.2 Do Sanctions Work Better for Non-democracies?

As shown in section 6.1, smart have a significant and positive impact on the level of democracy in the target country. This is consistent with Figure 5 that restoring or establishing democracy is a common objective of sanctions.

Acemoglu et al. (2019) forcefully argues that democracy is a driving force for economic growth. Based on this, we further hypothesize that if sanctions can lead to economic growth in target countries by means of improving their level of democracy, economic sanctions might be especially more impactful for non-democratic target countries.

To test this hypothesis, we propose a following regression specification:

$$\log(Y_{jt}^{10y}) = \beta_0 + \beta_S^* S_{jt} \cdot Dem_{jt} + \beta_S S_{jt} + \beta_{Dem} Dem_{jt} + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \eta_{jt} \quad (13)$$

where β_S^* is the coefficient of the interaction term between the number of sanctions that country j received in year t (S_{jt}) and whether the country is a democracy in year t (Dem_{jt}). Under this specification, our key coefficients of interests are β_S^* and β_S. To be specific, if sanctions improve target countries' GDP per capita by means of transitioning them into democracy, we expect that the impact of sanctions to be insignificant or negative conditional on the target country already being a democracy, implying an insignificant or negative β_S^*. To the contrary, the hypothesis implies a positive and significant β_S, meaning that economic sanctions lead to economic growth conditional on the target country being a non-democracy.

To estimate equation (13), however, the challenge lies in the endogeneity of Dem_{jt}. Intuitively, whether the target country j is a democracy may be correlated with other unobservables that might confound the dependent variables. To address this issue, we construct an instrument variable Dem_{jt} à la (Acemoglu et al., 2019). To be specific, our instrument variable for the level of democracy is defined as:

$$\hat{Dem}_{jt} = \frac{1}{|R^{-j}|} \sum_{j' \in R^{-j}} Dem_{j't} \quad (14)$$

where R^{-j} is the set of countries in region R where the country j belongs to *except for* country j; $|R^{-j}|$ is the number of countries that belong to the set R^{-j}; and $\sum_{j' \in R^{-j}} Dem_{j't}$ is the sum of the democracy index of countries that belong to R^{-j}. Intuitively, $\hat{Dem}_{jt}$ measures the average level of the democracy in the region where country j belongs to except for country j. Acemoglu et al. (2019) argues that this instrument can reasonably predict the level of democracy in country j, while being exogenous to the GDP per capita

in country j conditional on full sets of country and year fixed effects.

Thus, we use $\hat{Dem}_{jt}$, $\hat{S}_{jt}$ and $\hat{S}_{jt}\cdot\hat{Dem}_{jt}$ to respectively instrument Dem_{jt}, S_{jt}, $S_{jt}\cdot Dem_{jt}$ in equation (13) and report the estimation results in Table 14. In column (1), we observe that sanctions have a positive and significant impact on the 10-year average GDP per capita conditional on the target country being a non-democracy. However, conditional on the target country being a democracy, sanctions have negative and significant impact on GDP per capita.

In column (2), we observe a reversed pattern for trade sanctions. Specifically, trade sanctions have a negative impact on growth conditional on non-democracy, and a positive impact conditional on democracy. Although this is not consistent with our democracy hypothesis, it is consistent with the view that trade sanctions can lead to compliance only if the target country governments are concerned about the collateral damage on the mass public. This generally occurs in a democracy. Thus, it is plausible that trade sanctions may lead to positive institutional change in the target country if she is a democracy.

For financial sanctions in column (3), we observe that financial sanctions are effective in raising target countries' 10-year average GDP per capita if they are non-democracies. If the target countries are democracies, financial sanctions have a significant and negative impact on GDP per capita. The signs of coefficients are consistent with our hypothesis that sanctions can potentially increase the target countries' GDP per capita by transitioning them into democracies.

From column (3) co column (6), we do not observe an apparent patter relating to the effects of sanctions contingent on the target country democracy. We note that arms embargo has a slight negative impact on target countries if they are a democracy.

7 Conclusion

Table 14: Impact of Sanctions on GDP per capita (10Y-Avg.) (IV, Interacted with Democracy)

	(1)	(2)	(3)	(4)
Dep. Var.	$\log(Y_{jt}^{10y}) \times 100$, IV Regressions			
S_{jt}	0.357**			
	(0.147)			
$S_{jt} \times Dem$	-0.935**			
	(0.440)			
S_{jt}^{z} (z=Trade)		-0.124***		-0.932***
		(0.0472)		(0.179)
$S_{jt}^{z} \times Dem$ (z=Trade)		0.273***		1.132***
		(0.101)		(0.352)
S_{jt}^{z} (z=Fin./Trav.)			0.662***	1.165***
			(0.162)	(0.207)
$S_{jt}^{z} \times Dem$ (z=Fin./Trav.)			-1.542**	-1.471***
			(0.712)	(0.435)
Dem	9.655	-6.638***	11.45**	3.215
	(5.910)	(1.766)	(5.367)	(2.488)
Observations	1,700	1,700	1,700	1,700
Countries	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓
First Stage F-statistic	48.32	39.03	14.86	26.67

Notes: This table shows the IV estimation of effects of sanctions on 10-year average GDP per capita interacted with a democracy variable. The democracy variable is a binary variable indicating whether the target country is a democracy at the year of sanctions. We follow Acemoglu et al. (2019) to use the regional average democracy level (except for the target country) as an instrument for the target country's level of democracy. The regression specification is in equation (13). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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Appendices

A Robustness Checks of Main Results

A.1 Sanctions Weighted By Sender Countries' GDP in 1960

In this section, we perform robustness checks on the main empirical results by weighting sanctions by the GDP of sender countries as a percentage of World GDP in 1960.

Table A.1: First Stage Regressions (Full Sample, Weighted Sanctions)

	(1)	(2)	(3)	(4)
		z=Trade	z=Fin./Trav.	z=Other
Dep. Var.	S_{jt}	S^z_{jt}	S^z_{jt}	S^z_{jt}
$\hat{S}_{jt}$	0.746***			
	(0.0305)			
$\hat{S}^z_{jt}$ (z=Trade)		0.773***		
		(0.0599)		
$\hat{S}^z_{jt}$ (z=Fin./Trav.)			0.860***	
			(0.0268)	
$\hat{S}^z_{jt}$ (z=Other)				1.067***
				(0.0358)
Constant	0.0813***	0.0535***	0.0395***	0.0240***
	(0.00727)	(0.00603)	(0.00399)	(0.00504)
Observations	3,808	3,808	3,808	3,808
Adjusted R^2	0.136	0.042	0.213	0.189
F-statistic	597.85	166.34	1029.04	890.02

Notes: This table shows the estimation results of the simplified version of our first stage regressions. The regression specification is in equation (11). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.2: OLS Regressions (GDP per capita, Weighted Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt} \times 100$, OLS Regressions				
S_{jt}	-14.67***				
	(2.456)				
S^z_{jt} (z=Trade)		-13.72***			-6.245**
		(2.723)			(3.135)
S^z_{jt} (z=Fin./Trav.)			-15.84***		-9.639***
			(2.373)		(3.162)
S^z_{jt} (z=Other)				-13.74***	-5.940*
				(2.584)	(3.321)
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	0.29	0.23	0.24	0.26	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.3: OLS Regressions (GDP per capita (10Y-Avg.), Weighted Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, OLS Regressions				
S_{jt}	0.722				
	(1.607)				
S_{jt}^{z} (z=Trade)		-4.062***			-8.575***
		(1.574)			(1.955)
S_{jt}^{z} (z=Fin./Trav.)			3.440**		4.453**
			(1.444)		(2.214)
S_{jt}^{z} (z=Other)				4.151**	5.364**
				(1.846)	(2.632)
Observations	1,728	1,728	1,728	1,728	1,728
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	0.28	0.24	0.23	0.25	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.4: Contemporaneous Impact of Sanctions on GDP per capita (IV, Weighted Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt} \times 100$, IV Regressions				
S_{jt}	-13.21***				
	(5.049)				
S^z_{jt} (z=Trade)		-11.84			-24.99
		(11.17)			(16.85)
S^z_{jt} (z=Fin./Trav.)			13.99		22.13
			(9.799)		(13.88)
S^z_{jt} (z=Other)				-177.7	
				(265.9)	
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	0.29	0.23	0.24	0.26	
First Stage F-statistic	120.01	31.25	39.80	0.54	21.12

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.5: Impact of Sanctions on GDP per capita (10Y-Avg.) (IV, Weighted Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, IV Regressions				
S_{jt}	2.112				
	(4.010)				
S_{jt}^{z} (z=Trade)		-10.19			-51.98***
		(6.858)			(19.83)
S_{jt}^{z} (z=Fin./Trav.)			46.78***		68.06***
			(12.38)		(21.04)
S_{jt}^{z} (z=Other)				-198.8	
				(212.8)	
Observations	1,728	1,728	1,728	1,728	1,728
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	0.28	0.24	0.22	0.25	
First Stage F-statistic	90.71	27.85	20.56	1.05	17.64

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A.2 Using Cumulative Number of Sanctions as Independent Variables

Table A.6: OLS Regressions (GDP per capita (10Y-Avg.), 10Y-Cumulative Sanctions

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, OLS Regressions				
$\sum_t S_{jt}$	-0.0150***				
	(0.00291)				
$\sum_t S_{jt}^z$ (z=Trade)		-0.0193***			-0.0200***
		(0.00320)			(0.00491)
$\sum_t S_{jt}^z$ (z=Fin./Trav.)			-0.0133***		0.00299
			(0.00345)		(0.00562)
$\sum_t S_{jt}^z$ (z=Other)				-0.0122***	-0.00152
				(0.00300)	(0.00493)
Observations	1,573	1,573	1,573	1,573	1,573
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	221.43	141.49	169.45	218.75	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A.3 Using the 10th Year GDP per capita as Dependent Variables

Table A.7: OLS Regressions (10th Year GDP per capita after Sanctions)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, OLS Regressions				
S_{jt}	0.0321				
	(0.0221)				
S_{jt}^{z} (z=Trade)		0.0175			-0.0828***
		(0.0213)			(0.0318)
S_{jt}^{z} (z=Fin./Trav.)			0.0814***		0.129***
			(0.0237)		(0.0369)
S_{jt}^{z} (z=Other)				0.0465**	0.0212
				(0.0226)	(0.0298)
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	24.29	18.68	17.94	23.83	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.8: Impact of Sanctions on 10th Year GDP per capita after Sanctions (IV)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	$\log Y_{jt}^{10y} \times 100$, IV Regressions				
S_{jt}	0.131***				
	(0.0435)				
S_{jt}^{z} (z=Trade)		0.00363			-0.456***
		(0.0374)			(0.160)
S_{jt}^{z} (z=Fin./Trav.)			0.308***		0.615***
			(0.109)		(0.194)
S_{jt}^{z} (z=Other)				2.851	
				(5.246)	
Observations	2,103	2,103	2,103	2,103	2,103
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	24.29	18.68	17.94	23.83	
First Stage F-statistic	123.95	111.97	32.83	0.30	13.11

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A.4 Using Growth Rate of GDP per capita as Dependent Variables

Table A.9: OLS Regressions (GDP per capita, Growth Rates)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	Y_{jt}, Growth Rates $\times 100$, OLS Regressions				
S_{jt}	-1.374				
	(1.457)				
S^z_{jt} (z=Trade)		-1.058			-1.423
		(1.701)			(2.504)
S^z_{jt} (z=Fin./Trav.)			0.309		2.994
			(1.689)		(2.745)
S^z_{jt} (z=Other)				-1.316	-2.525
				(1.504)	(2.376)
Observations	2,049	2,049	2,049	2,049	2,049
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	27.03	18.42	22.33	26.58	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.10: OLS Regressions (GDP per capita (10Y-Avg.), Growth Rates)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	Y_{jt}^{10y}, Growth Rates $\times 100$, OLS Regressions				
S_{jt}	-0.593*				
	(0.346)				
S_{jt}^{z} (z=Trade)		0.252			-0.278
		(0.382)			(0.381)
S_{jt}^{z} (z=Fin./Trav.)			0.785*		2.570***
			(0.437)		(0.597)
S_{jt}^{z} (z=Other)				-0.462	-1.822***
				(0.365)	(0.437)
Observations	864	864	864	864	864
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	24.15	17.80	18.34	23.94	

Notes: This table shows the OLS estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.11: Contemporaneous Impact of Sanctions on GDP per capita (IV, Growth Rates)

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	Y_{jt}, Growth Rates $\times 100$, IV Regressions				
S_{jt}	-0.613				
	(2.880)				
S^z_{jt} (z=Trade)		-1.516			-4.459
		(4.185)			(7.905)
S^z_{jt} (z=Fin./Trav.)			2.437		4.675
			(5.937)		(8.968)
S^z_{jt} (z=Other)				-3.974	
				(8.552)	
Observations	2,049	2,049	2,049	2,049	2,049
Countries	53	53	53	53	53
Region $\times$ Year FE	✓	✓	✓	✓	✓
Country $\times$ 10-Year FE	✓	✓	✓	✓	✓
SD of Indep. Var.	25.96	17.69	21.35	25.49	
First Stage F-statistic	90.88	90.59	46.50	14.55	46.32

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the logarithm of GDP per capita of the target country in the year when S_{jt} number of sanctions are in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.12: Impact of Sanctions on GDP per capita (10Y-Avg.) (IV, Growth Rates)

	(1) IV	(2) IV
VARIABLES	GR_gdppc	GR_gdppc
S_{jt}	-0.225	
	(1.032)	
S^z_{jt} (z=Trade)		-0.589
		(0.801)
Observations	864	864
Countries	53	53
Region $\times$ Year FE	✓	✓
Country $\times$ 10-Year FE	✓	✓
SD of Indep. Var.	23.28	17.12
First Stage F-statistic	15.15	22.04

Notes: This table shows the IV estimation results of our baseline regression specification. The regression specification is in equation (7). The dependent variable is the 10-year geometric average of logarithm of GDP per capita of the target country after the year when S_{jt} number of sanctions were in place in year t. All regression coefficients (and their standard errors) are multiplied by a factor of 100 to ease interpretation. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

B Additional Tables and Figures

Table B.1: List of Countries

	country	first year	last year	avg. GDPpc growth	democracy	sanctions-years
1	South Africa	1960	2015	0.93	0.33	1505
2	Iraq	1968	2015	4.69	0.00	1287
3	China	1960	2015	6.85	0.00	1064
4	Sudan	1960	2015	1.49	0.14	983
5	Cuba	1970	2015	2.57	0.00	875
6	Liberia	2000	2015	-0.01	0.64	784
7	Rwanda	1960	2015	2.02	0.00	735
8	Macedonia	1990	2015	1.20	0.95	699
9	Sierra Leone	1960	2015	0.54	0.34	696
10	Cote d'Ivoire	1960	2015	0.45	0.04	671
11	Bosnia and Herzegovina	1994	2015	11.48	0.00	562
12	Lebanon	1988	2015	2.43	0.26	556
13	Iran	1960	2015	1.71	0.00	502
14	Angola	1980	2015	0.73	0.00	497
15	Fiji	1960	2015	1.74	0.80	467
16	Libya	2000	2015	2.78	0.00	461
17	Azerbaijan	1990	2015	3.55	0.05	414
18	Myanmar	1960	2015	4.18	0.04	395
19	Albania	1980	2015	2.70	0.58	304
20	Slovenia	1990	2015	1.81	0.90	301
21	Bulgaria	1980	2015	2.59	0.65	300
22	Mongolia	1981	2015	3.10	0.60	273
23	Zimbabwe	1960	2015	0.66	0.20	270
24	Togo	1960	2015	1.12	0.00	261
25	Eritrea	1992	2011	1.96	0.00	258
26	Belarus	1990	2015	3.18	0.19	243

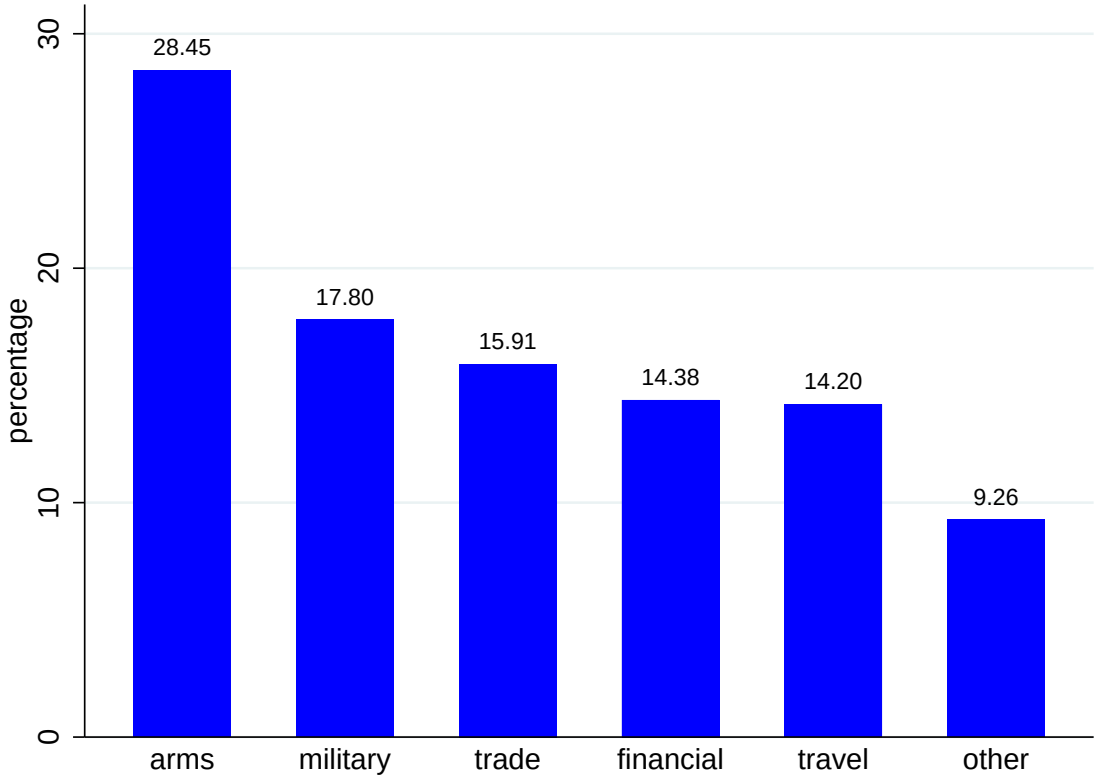
Table B.2: List of Countries (Cont.)

	country	first year	last year	avg. GDPpc growth	democracy	sanctions-years
27	South Vietnam	1984	2015	4.92	0.00	227
28	Guinea-Bissau	1970	2015	0.60	0.38	226
29	Kenya	1960	2015	1.39	0.19	218
30	Central African Republic	1960	2015	-0.75	0.20	217
31	Croatia	1995	2015	2.59	0.69	216
32	Haiti	1970	2015	-0.38	0.27	213
33	Moldova	1995	2015	3.16	1.00	206
34	Israel	1960	2015	2.49	1.00	198
35	Nigeria	1960	2015	1.40	0.45	187
36	Guinea	1986	2015	1.33	0.04	176
37	Egypt, Arab Rep.	1960	2015	2.88	0.00	155
38	Afghanistan	2002	2015	4.53	0.00	129
39	Yemen, North	1990	2015	-0.24	0.00	123
40	Ethiopia (excludes Eritrea)	1981	2015	2.45	0.50	123
41	Niger	1960	2015	-0.67	0.31	120
42	Malagasy Republic	1960	2015	-0.93	0.31	120
43	Gambia, The	1966	2015	0.23	0.62	117
44	Burundi	1960	2015	0.27	0.16	110
45	Poland	1990	2015	3.71	1.00	102
46	Mauritania	1960	2015	1.10	0.02	84
47	Hungary	1991	2015	2.19	1.00	83
48	Mali	1967	2015	1.71	0.43	77
49	Pakistan	2002	2015	2.01	0.33	64
50	Cambodia	1993	2015	3.78	0.11	58
51	Kuwait	1995	2015	-0.56	0.00	21
52	Portugal	1980	2015	1.74	1.00	9

sanction objectives	"*policy change* - sanctions aimed at enforcing a domestic (i.e., an economic, political or social) policy change in the sanctioned state."	The Globa
	"*destabilize regime* - sanctions aimed at destabilizing the regime of a sanctioned state or just to exert political influence. In particular, for older sanction cases this objective includes cases where ideological reasons evoke sanctions (e.g., to prevent the spread of communism)."	
	"*territorial conflict* - sanctioning and sanctioned states are parties to a militarized conflict over territory."	
	prevent war - sanctions aimed at de-escalating amilitary conflict with other countries.	
	terrorism - sanctions aimed at motivating a country to stop sustaining or tolerating terroist groups.	
	end war - sanctions aimed at ending inter-state war, instra-state war, civil wars, and territorial conflict, including genocide.	
	human rights - sanctions aimed at ending human rights violations in sanctioned states, including minority rights violations.	
	democracy - sanctions aimed at restoring democratic order mostly after a coup d'etat.	
	other sanctions - other objectives include ending drug trafficking, changing trade practices, releasing imprisoned citizens and fighting corruption.	

variable	description	source
GDP per capita	GDP per capita measured in year 2000 dollars	World Bank Development Indicators
unrest	a binary variable that equals one if there occurrence of riots and revolts	Cross-National Time-Series (CNTS) Data Archiv,Acemoglu et al. (2019); Banks and Wilson (2017)
democracy	a binary variable that equals one if the country is a democracy	Acemoglu et al. (2019)
country ties	$COMLANG$, $CURCOL$, $COMCOL$, POP, $distance$, see Appendix for details	Head et al. (2010)
sanctions type, sanctions objective	see Appendix for details	Felbermayr et al. (2020)
Political Terror Scale		

Figure B.1: Sanction Types



Notes:

(i)
(ii)

C Smart Sanctions and Comprehensive Sanctions

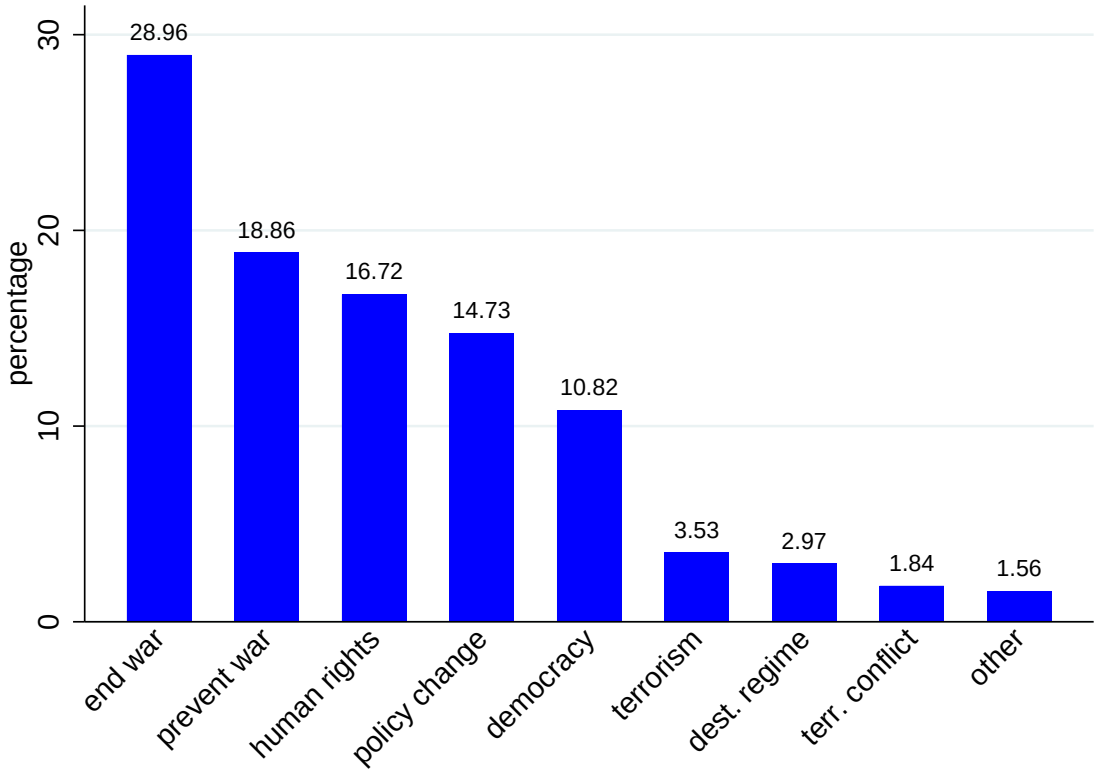
The concept of "smart sanctions" are popularized by Cortright and Lopez (2002) In the introduction of Drezner (2011):

> "As the negative externalities of comprehensive trade sanctions became apparent in the 1990s, many scholars have advocated for smart sanctions... (S)mart or targeted sanctions... are designed to hurt elite supporters of the targeted regime, while imposing minimal hardship on the mass public."

Quotations from Drezner (2011):

> "Multiple UN agencies started to voice concerns about the Security Council's implementation of comprehensive sanctions Reinisch (2001). UN Secretary-

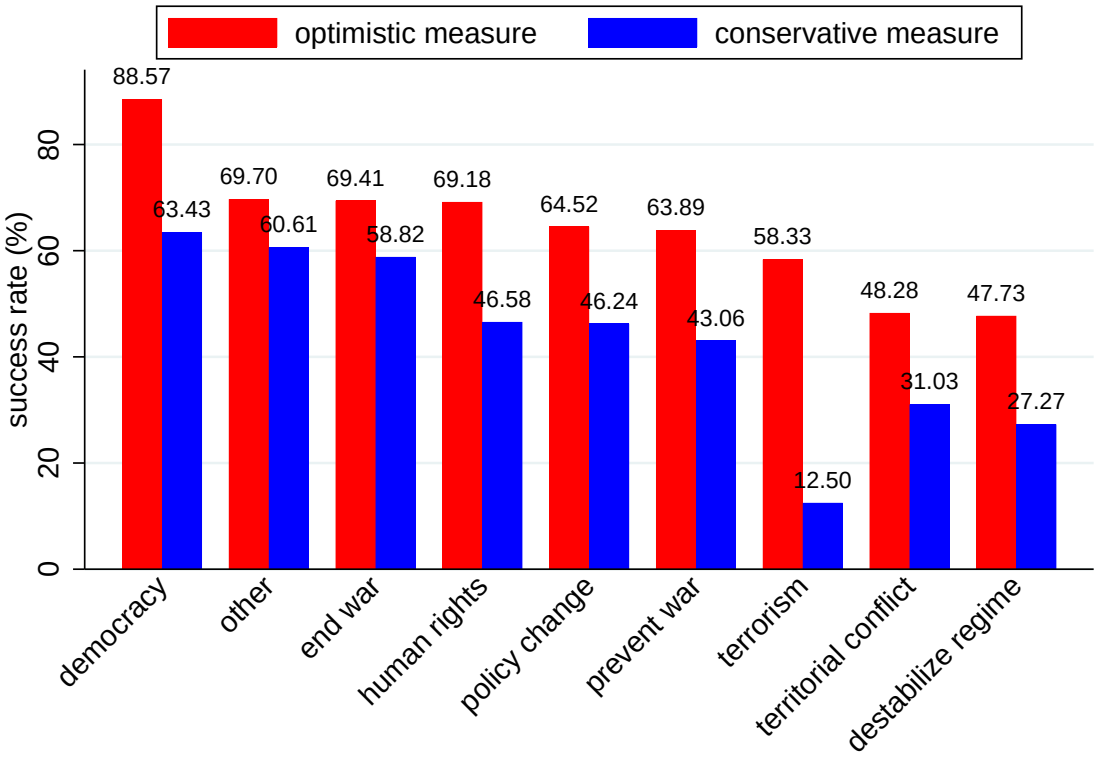
Figure B.2: Sanction Objectives



Notes:

(i)
(ii)

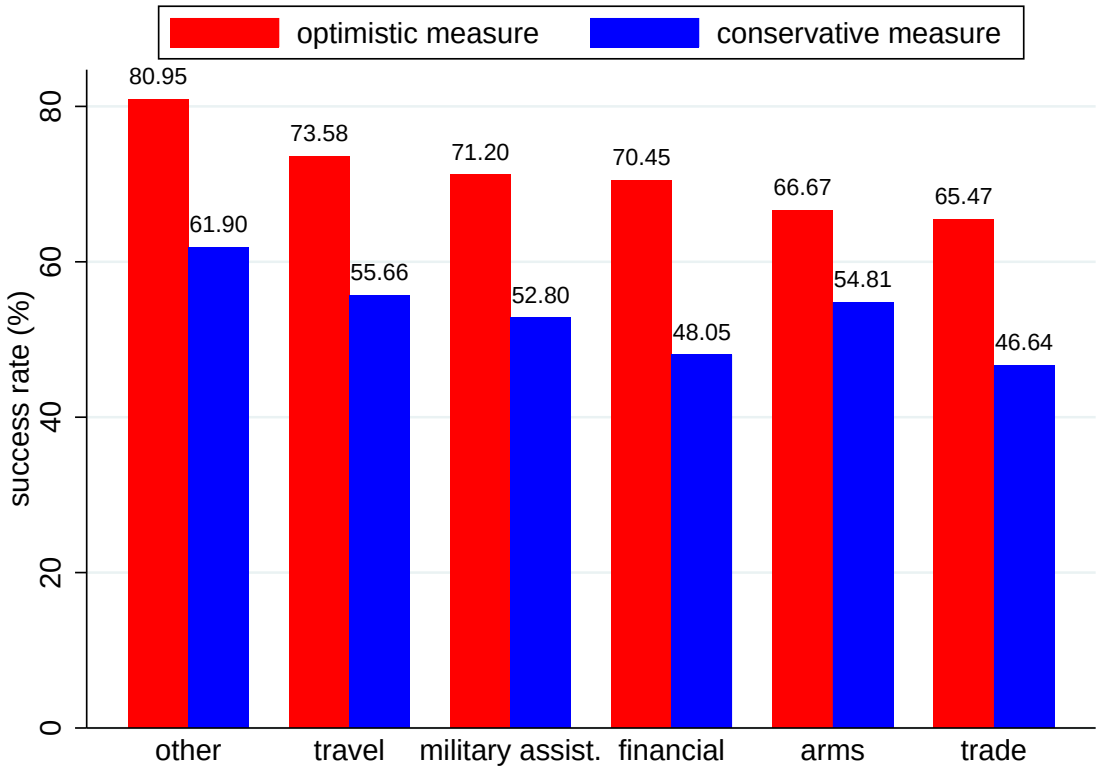
Figure B.3: Sanction Success Rate by Objectives



Notes:

(i)
(ii)

Figure B.4: Sanction Success Rate by Types



Notes:

(i)
(ii)

Generals Boutros Boutros-Ghali and Kofi Annan both labeled sanctions as a "blunt instrument" and asked whether the suffering inflicted on vulnerable groups was a legitimate means of exerting pressure on political leaders."

"Smart sanctions could raise the target regime's costs of noncompliance while avoiding the collateral damage that comes with comprehensive trade embargoes. The most prominent country-wide examples included financial sanctions, asset freezes, travel bans, restrictions on luxury goods, and arms embargoes."

"For humanitarian and human rights activists, smart sanctions seemed the best way to enforce norms in the global system without imposing needless costs on the most powerless members in the targeted societies."

"Bipartisan support for targeted sanctions also emerged in the United States – particularly for financial sanctions... These acts of financial statecraft proved effective in forcing target countries to alter their policies."

However, there is a controversy regarding the effectiveness of targeted sanctions:

"After reviewing the United Nations sanctions during the 1990s, Cortright and Lopez note that "the obvious conclusion is that comprehensive sanctions are more effective than targeted or selective measures. Where economic and social impact have been greatest, political effects have also been most significant.""