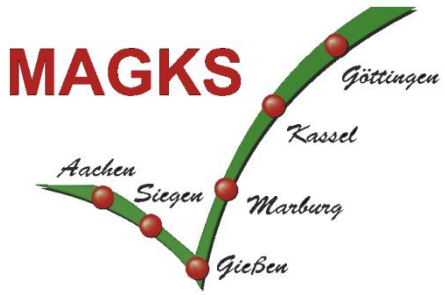

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The Impact of US Trade Sanctions on the Global Trade of Target Countries: Do the Political Institutions of the Targets Matter?

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Abstract

We investigate the effects of US-imposed trade sanctions on the global trade patterns of sanctioned countries by employing a gravity model that incorporates data spanning from 1980 to 2020 across 79 nations and other various factors, this study explores how sanctions impact trade dynamics. The results reveal that both partial and complete US sanctions lead to significant reductions in bilateral trade between the US and target countries, with complete sanctions showing a more substantial negative impact. Moreover, while partial import sanctions and comprehensive import and export sanctions reduce third countries' exports to and imports from target countries, partial export sanctions reduce only third countries' imports without notably affecting total trade or third countries' exports to the sanctioned nations. Finally, we show that target countries with stronger political institutions, as measured by democracy indicators, manage to alleviate some of the adverse effects of US sanctions on bilateral trade with both the US and third countries.

Keywords: Sanctions; Trade; Import; Export; Democracy; Political institutions; Gravity Model

1. Introduction

American President Woodrow Wilson characterized economic sanctions as a "peaceful, quiet, yet potent solution." Wilson had confidence in the distinctive effectiveness of economic warfare, a force that would apply "pressure… beyond the capability of any contemporary nation to withstand" (Hufbauer et al. 2016; Farzanegan and Batmanghelidj 2023). The idea is that economic sanctions impose such significant economic pain on a target country, that it is forced to comply or change the perceived wrong direction of its politics. A significant and growing number of studies focus on the economic costs of sanctions on the targets (with an emphasis on US/UN sanctions) such as (Laudati and Pesaran (2023); Farzanegan (2013); (2021); Dizaji (2019); (2021); Demir and Tabrizy (2022); Cheratian, Goltabar, and Farzanegan (2023); Farzanegan and Hayo (2019); Farzanegan, Khabbazan, and Sadeghi (2016); Ghasseminejad and Jahan-Parvar (2021); Ghomi (2022)) and other general studies on sanctions such as (Mulder 2022; Hess 2023; Mcdowell 2023; Farrell and Newman 2023; Demarais 2022; Dizaji and Murshed 2024; Dizaji 2022; Bergeijk 1989).

In our study, we contribute to the sanctions literature by empirically estimating the effects that imposed US trade sanctions have on a target country's trade. Moreover, we examine the moderating role of political institutions in target countries with respect to the trade effects of the US sanctions. The impact that a political system has on trade has been discussed in some studies. In a theoretical and empirical study, Mansfield, Milner, and Rosendorff (2002) conclude that the type of government can significantly influence a state's willingness to collaborate on economic matters. Leaders in democratic nations are more motivated to engage in international trade cooperation than their counterparts in non-democratic countries.

What has been neglected so far is the empirical analysis of the interacting impact of sanctions and a target country's political system on trade. The autocracy–democracy dimension could be important in determining the final impact of sanctions (Dizaji and van Bergeijk 2013). Dizaji (2019) highlights that a government's response to trade sanctions also depends on the quality of political system.

There have been countries with no significant democracy deficit which have also been targeted by different types of sanctions at some point. For example, some countries and organizations have imposed sanctions or called for boycotts in response to Israel's policies in the occupied Palestinian territories. The question is whether such countries have been more successful in reducing the negative impact of sanctions on trade. Another question is whether the changes in

a target country's political characteristics could change the ultimate effects of sanctions on trade.

As an example, Iran's political flexibility during the earlier years of President Ruhani's government could reduce the negative impacts of sanctions on Iran's trade flows. This is largely attributed to his willingness to compromise on Iran's nuclear program, which consequently alleviated Iran's sanctions (Dizaji 2018). In July 2015, following a series of intense negotiations between Iran and the permanent Members of the United Nations Security Council and Germany (P5+1), the two sides reached an agreement, known as the Joint Comprehensive Plan of Action (JCPOA). This agreement suspended a portion of the Islamic Republic's nuclear program. Subsequently, the Western powers lifted many of the previously imposed sanctions (Dizaji 2019). Most Iranian banks were reconnected to the SWIFT (Society for Worldwide Interbank Financial Telecommunication) network and were able to engage in international financial transactions which was vital for Iran's trade. According to the World Bank (2023a), the average annual growth rate of imports of goods and services in Iran, which was about -15% between the sanction years of 2012-2015, increased to an average growth rate of 6.3% two years after JCPOA (2016-2017). However, the US administration announced its unilateral withdrawal from the JCPOA in early 2018, leading to significant inflation and pressure on the country's economy and banking system. The US administration claimed that lifting the sanctions assisted Iran in using its new funds to build nuclear-capable missiles, support terrorism, and cause havoc throughout the Middle East and beyond (Dizaji and Farzanegan 2021). The Iranian conservative faction's views were reinforced by the US decision to unilaterally leave the JCPOA. The re-imposition of sanctions by the Trump administrations resulted in a major decline in Iran's average annual growth rate of imports, which dropped to annual average of -30% from 2018 to 2020.

For our analysis, we employ the gravity model approach, including 79 countries during a period of 1980 to 2020. The gravity model of international trade assumes that the amount of trade between countries is positively related to their size, as measured by their national incomes, and negatively related to the cost of transportation between them, as measured by the distance between their economic centers (Dell'Ariccia 1999; Wall 1999). The standard formulation of the gravity model has commonly extended to include other variables such as common language, common border, membership in regional trading blocs, political conditions, economic sanctions and so on (Hufbauer and Oegg 2003; Hufbauer et al. 1997; Rose 2004; Yu 2010; Dizaji 2018).

Our main results show that both partial and complete trade sanctions reduce US bilateral trade with target countries, controlling for a set of standard determinants of trade in the gravity model. This decreasing effect of US sanctions is statistically significant and is larger in size in the case of complete trade sanctions. We also show that improved political conditions in the target countries, captured by democracy indicators, mitigate part of negative effects of US sanctions on the bilateral trade between the US and target country.

In this study, we also differentiate between partial and complete and export and import sanctions imposed by the US and examine their effects on US trade with target countries. We find that complete export sanctions have the largest negative impact on US bilateral trade with target countries. Finally, the imposition of partial import sanctions and complete import and export sanctions by the US on specific target countries leads to a reduction in global trade, affecting both exports and imports with these target countries. Similarly, partial export sanctions from the US negatively impact third countries' imports from sanctioned nations, yet these sanctions do not significantly affect total trade between the target countries and third countries, nor do they notably impact third countries' exports to the sanctioned nations. The findings consistently demonstrate that complete US trade sanctions exert a more pronounced adverse effect on trade flows between third countries and target nations compared to the impact of partial US sanctions. However, higher quality political institutions in target countries could mitigate the negative impact of sanctions on trade with third countries.

The rest of the paper is structured as follows: Section 2 presents a review of the theory on possible positive and negative effects of sanctions on trade in target countries. Section 3 outlines the research methodology and data used. The findings are then presented and discussed in Section 4 and Section 5 provides concluding remarks.

2. Understanding the Impact of Sanctions on a Target Country's Trade: a Theoretical Framework and Literature Review

Trade sanctions imposed by the US can have both positive and negative effects on trade in target countries and this inconclusive impact justifies an empirical investigation. Paradoxically, in some cases, trade with the rest of the world may increase following the imposition of US trade sanctions on a target country. This counterintuitive effect can happen because of several factors and strategies employed by the target country and other international actors. Such factors may include diversification of trading partners following the sanctions. A target may amplify its efforts in securing other trading partners, even at higher transactional costs through offering a variety of discounts. For example, Ioannou et al. (2023) explain how sanctions have

forced Russia to change its global trade strategy since its invasion of Ukraine. They conclude that Russia has become increasingly reliant on trade partners not subject to sanctions, rendering its economy more vulnerable. Furthermore, it has been compelled to provide discounts on its commodity exports in order to attract new customers to replace partners from the Euro Area. Dizaji (2018) highlights the "policy of vision towards the East" and discusses how Iran has diversified its strategic allies in the post-war period by shifting towards Asian countries. The main reasons behind this policy shift were to diversify Iran's trading partners and international economic relations and to decrease the negative impacts of the sanctions imposed by the US and other Western countries.

A target may choose to bypass US-imposed sanctions to make such sanctions ineffective. This can involve using intermediaries, front companies, or financial institutions in other countries to stimulate trade. In a compliance note, the US Departments of Justice, Treasury and Commerce (2023) explained the use of third-party intermediaries and transshipment points by the Russian government to bypass sanctions. Donovan et al. (2023) also provide more details on bypassing sanctions by Iran.

De-dollarization and using alternative currencies may be another approach for a target country to manage such US-imposed sanctions. Shagina (2022) explains Russia's de-dollarization plan, which started in 2014 and intensified during 2022. She concludes that "overuse of sanctions could strengthen revisionist countries' desire to increasingly conduct their trade in non-dollar currencies in an attempt to avoid US oversight."

Targets may opt for more resistance by increasing reliance on domestic economy and replacing the affected external trade with more internal activity. Cheratian, Goltabar, and Farzanegan (2023) explain strategies that Iranian firms select to make sanctions less effective.

Increased support from other countries that do not agree with the US sanctions may also positively affect the target's global flow of trade. Increasing regional trade agreements may also be another channel to manage US sanctions, intensifying the target's trade with neighboring countries. For example, during an interview in June 2023 with the state TASS agency, Russian Deputy Prime Minister Alexei Overchuk stated that talks between the Eurasian Economic Union - which includes Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia - and Iran are in their final stages (Reuters 2023).

Increasing informal and unregulated trade following US sanctions may still be another factor in offsetting the effect of the sanctions. Farzanegan (2013) explains how sanctions may result in the expansion of the informal economy in Iran.

Some factors and mechanisms may also result in the decline in a target country's global trade following US trade sanctions. Financial isolation reduces a target country's capacity to conduct international trade since this depends on the transfer of funds via a global banking system. A clear example is how SWIFT disconnects banks for sanctions purposes. In 2012, in line with global and collaborative efforts to strengthen financial sanctions against Iran, EU Regulation 267/2012 was enacted. This regulation bars specialized financial messaging providers like SWIFT from offering their services to Iranian banks under EU sanctions. The SWIFT network, which operates under Belgian jurisdiction, is bound to adhere to this ruling, as affirmed by its host country's government. SWIFT fulfilled its regulatory obligation by severing connections with the relevant Iranian banks subject to EU sanctions. Dizaji (2021), by employing the parametric approach of stochastic frontier analysis (SFA) using data from different Iranian banks, shows that the intensity of sanctions is associated with increases in costs for Iranian banks. He finds a decreasing trend of the cost efficiency scores of Iranian banks over the period of sanctions.

In 2022, as part of the global and collaborative effort to escalate financial sanctions against Russia, specialized financial messaging providers, including SWIFT, were barred from providing services to specific entities as stipulated in EU Council Regulation (EU) 833/2014. SWIFT terminated its connectivity with all the designated Russian entities (along with their Russian-based subsidiaries). Furthermore, in line with EU Council Regulation (EU) 765/2006, which imposes a similar prohibition, SWIFT also terminated connections with the designated Belarusian entities and their Belarus-based subsidiaries.[1] The economic size of target and its influence in global energy and food market may also affect the implementation of this financial isolation. For example, Greene (2022) argues for the unwillingness of Washington and Brussels to take action which would result in significant restrictions on the payment channels of Russia. Completely disconnecting Russia's banks from the SWIFT network may result in higher energy prices which would then benefit Russia's government.

Losing key trading partners can also be another factor in lower levels of trade. Often, US trade sanctions are linked to secondary sanctions which penalize third-party countries and institutions that transact with the target country. For instance, when the scale of transactions between a foreign financial institution and a US-sanctioned country reaches a substantial level, that foreign entity faces the application of secondary sanctions. Upon designation, these secondary sanctions may either prevent US individuals from engaging in business with the

[1] https://www.swift.com/de/node/11306

foreign financial institution or require US banks to curtail or impose restrictions on the correspondent accounts held by that foreign financial entity in the United States.[2]

Supply chain disruptions following US sanctions may also be another reason for the decline in trade. International companies may voluntarily avoid doing business with a target country. They may halt inclusion of specific components or parts sourced from the target country in the final products they manufacture. Complexity and transaction costs following US sanctions may increase and discourage international trade with a target country. Sanctions may result in the devaluation of a target country's local currency, raising the price of imported goods which may in turn reduce official trade and increase smuggling (Zamani et al. 2021; Farzanegan 2009).

Higher import costs may also increase the export prices of sectors with a higher dependence on imported materials and thus, both exports and imports decline. Additionally, sanctions can result in a higher risk of conflict and instability, making trading partners more hesitant to continue collaboration in the long run (Dizaji and Murshed 2024). According to the World Bank Governance Indicators (World Bank 2023b), the worst perception of instability and conflict in Iran are observed in 2019-2020, during the maximum pressure campaign by the US against Iran, when the Trump government re-imposed sanctions. Sanctions, by increasing the risk of corruption and illicit trade, may also result in the higher risk of internal conflict in a target country (Farzanegan and Zamani 2022).

Obtaining trade financing such as letters of credit, insurance, or guarantees can become more challenging following sanctions, negatively affecting the flow of trade in a target country. Decreased foreign direct investment after sanctions may weaken the target's production capacity, resulting in weaker export capacity. Finally, Dizaji and van Bergeijk (2024) discuss that the impact of sanctions decreases over time as the economic and political system adjusts. Therefore, sanctions need to be comprehensive and quick; slow and partial sanctions may diminish their impact by spreading them out over time and reducing the likelihood of success.

3. Research Design

3.1. Data and Model

In this study, we use a gravity approach to explain the impact of US sanctions on its bilateral trade (exports plus imports) and exports and imports separately with target countries. Moreover, it investigates whether US sanctions affect the trade flows between the target

[2] https://ofaclawyer.net/economic-sanctions-programs/

countries and other non-US countries. We also investigate how a higher quality of political institutions in the target countries may mitigate the negative impact of sanctions on bilateral trade.

We arrange a time-series cross-section data. The time-series component is presented by year, running from 1980 to 2020, and the cross-section includes 79 countries. Controlling for GDP and distance, the model allows us to isolate the effects of trade restrictions as well as political changes. Besides economic size and geographical distance, we also include other variables that are expected to influence bilateral trade flows, such as the income levels (as measured by GDP per capita) and political characteristics of the trading partners, common language, and landlock status.

Our basic empirical model takes the following general format:

$$trade_{US-j} = \alpha + \beta_1 dist_{US-j} + \beta_2 lang_j + \beta_3 landlocked_j + \beta_4 GDP_{US-j} + \beta_5 GDPPC_{US-j} + +\beta_6 partsanc_{US} + \beta_7 compsanc_{US} + \varepsilon \quad (1)$$

Where:

$trade_{US-j}$ is the logged bilateral trade between the US and country j. There are three measures for this variable – exports from country j to the US, imports from the US, and total trade (exports plus imports) between the US and country j. The bilateral trade data are taken from Direction of Trade Statistics (International Monetary Fund (IMF)). For estimation purposes, the log-linear expression for the dependent variable is used.[3] It is expressed in US dollars and deflated by US industrial producer prices.[4]

GDP_{US-j} is the logged product of US GDP and GDP of country j. The GDP data in constant US$ are from CEPII database.

$GDPPC_{US-j}$ is the logged product of US GDP per capita and GDP per capita of country j. The GDP per capita data are taken from the CEPII database and is based on PPP.

$dist_{US-j}$ is the logged Population-weighted distance between most populated cities, measured in km, bilateral and comes from the CEPII database.

$landlocked_j$is a dummy variable set equal to 1 for landlocked countries.

[3] - The regression coefficient on a continuous logarithmic variable can be interpreted as an elasticity, that is, as the ratio of the percentage change in the dependent variable for each 1 percent change in the independent variable.

[4] - As Baldwin (1994) discusses, once panel data are to be used, it is necessary to use real data. Therefore, trade data are to be deflated.

$lang_j$ is a dummy variable set equal to 1 if the English language is the official or primary language in the sanctioned countries.

$partsanc_{US}$, $compsanc_{US}$: to capture the effect of US trade sanctions, we add a series of dummy variables to the model. With respect to the extent of the intervention, we separate US trade sanctions into two categories - partial trade sanctions ($partsanc_{US}$) and complete trade sanctions ($compsanc_{US}$). The information on the partial and complete sanctions are obtained from Global Sanctions Data Base (Felbermayr et al., 2020). These variables take the value of 2 if the sanctions are bilateral (simultaneous import and export sanctions). They take the value of 1 if sanctions are directional (exports only or imports only sanctions). They take the value of zero if there are no sanctions. Sanctions are often expected to be more effective if taken at a comprehensive level. Specifically, because extensive complete sanctions place comprehensive economic and financial pressures on the target, they should have greater impact than partial sanctions. ε *and* α are the error term and intercept, respectively.

3.2. Methodology

Some of the previous studies have used ordinary-least-squares (OLS) regression to estimate the gravity equations (Hufbauer and Oegg 2003; Hufbauer et al. 1997; Yang et al. 2004). Anderson and van Wincoop (2003) argue that the regular OLS estimates may be biased once researchers ignore controlling for "multilateral resistance" among trading partners, particularly when the data set is a panel. Standard cross-section estimates of the gravity model do not allow for heterogeneity in the regression equations. Different trading country-pairs could have unobserved specific country characteristics (Cheng and Wall, 2005). To address this issue, Rose and van Wincoop (2001) recommend using country-pair-specific fixed effects to control for other unobservable features between each pair of trading countries. Fixed effects models allow for unobserved or mis-specified factors that simultaneously explain trade volume between two countries and, for example, the probability that the countries will be in the same regional integration regime (Wall 2002 and 2003; Bayoumi et al. 2007; Matyas 1997). The fixed effects approach is conditional upon the values of the intercept terms and implies that individuals in the sample are considered "one of a kind" (Verbeek, 2017). According to (Cheng and Wall 2005), fixed effects modeling is a result of ignorance, as we do not have a good idea which variables (cultural, historical or political factors) are responsible for the heterogeneity bias, so we simply allow each trading pair to have its own dummy variable.

Moreover, since there is a long-standing problem with determining the appropriate measure of economic distance to capture transportation and information costs (see Mayer and Head 2002 for a review of the issue), an added benefit of the fixed effects model is that it eliminates the need to include distance in the regression. This is also true regarding other time-invariant variables.

The disadvantage with standard fixed effects estimations is that they preclude estimating the coefficients for time-invariant variables such as country group dummies. They also have to be dropped automatically because these variables are subsumed into the country-pair effects and are hidden from analysis (Wei and Frankel, 1997).[5] Serlenga and Shin (2004) argue that the fixed effects estimator ignores the potential correlation between the time-invariant variables and unobserved country-pair-specific effects, which may again lead to biased coefficient estimates. The coefficients for the time-invariant variables can be estimated by using a random effects (RE) model, which assumes that explanatory variables are uncorrelated with random effects (Bussière and Schnatz, 2009). The random effects model requires that intercept terms and error terms be mutually independent. The decision between the fixed effects and the random effects models can be based on the Hausman test. This tests whether the fixed effects and random effects are significantly different. The null hypothesis is that the preferred model is random effects versus the alternative fixed-effects (W. Greene 2008).

4. Results

The results for US bilateral trade are presented in Table 1, using dummy variables related to different types of sanctions, i.e., partial and complete trade sanctions. Model 1 uses pooled OLS regression to estimate the gravity equation. According to this model, the coefficients for the two main factors of the gravity equation– product of trade partners' GDPs and distance – bear the expected signs and are highly significant. The explanatory power of the model (R^2) is stable (0.8). The estimated coefficients for the common language dummy and landlocked country dummy are positive and highly significant at the 99 percent confidence interval or better. Both partial and complete US sanctions show negative and statistically significant impacts on US trade with sanctioned countries. The impact of complete trade sanctions is stronger than that of partial trade sanctions on US bilateral trade with sanctioned countries, supporting the idea that comprehensive sanctions are more effective than limited sanctions.

[5] Cheng and Wall (2005) have tried to eliminate this problem using the two-way fixed effects model in which country-pair and period dummies are used to reflect the bilateral relationship between trading partners.

With respect to the points discussed in the methodology section, we pursue the panel regression analysis in Models 2 and 3 instead of using the criticized simple pooled OLS model. The (Hausman 1978) test strongly rejects the null hypothesis that the random effect specification is appropriate (p-value = 0.00). Thus, we use the fixed-effects estimation for this model. The regression results for random effects are also reported in the third column of Table 1. According to both the fixed-effects and random effects estimations, the signs of the coefficients on product of GDPs, product of per capita GDPs, and partial and complete sanctions are as expected. Both partial and complete sanctions imposed by the US have negatively affected its bilateral trade with target countries. The complete sanctions have a larger depressing effect on bilateral trade flows, while partial sanctions cause a smaller detrimental effect on US bilateral trade with sanctioned countries. Complete trade sanctions in place reduce US bilateral trade flows with its sanctioned trading partners by about 76 percent while partial US sanctions have decreased US trade by 16 percent with the sanctioned countries.[6]

Table 1. *The Impact of US Trade Sanctions on Bilateral Trade Between the US and target countries (observations = 3239)*

Variables	Model (1) Pooled cross-section	Model (2) RE	Model (3) FE
intercept	-11.6***	-17.3***	-21.08***
	(-20.41)	(-8.07)	(-46.85)
distance	-1.15***	-0.37*	
	(-25.85)	(-1.63)	
language	0.22***	0.37	
	(4.99)	(1.54)	
Landlocked	-0.71***	-1.05***	
	(-12.92)	(-3.70)	
GDP	0.93***	0.24***	0.18***
	(67.1)	(6.23)	(4.48)
GDPPC	-0.01	0.88***	0.99***
	(-0.40)	(13.71)	(15.16)
partsanc	-0.23***	-0.18***	-0.17***
	(-5.62)	(-7.3)	(-7.13)
compsanc	-1.52***	-1.45***	-1.44***
	(-24.51)	(-33.12)	(-32.97)
R^2	0.80	0.60	0.60
Random effects-Hausman test (p-value)		0.00	

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

[6] The percentage change in trade is calculated as follows. First, we find the value of the natural number e taken to the estimated coefficient as an exponent. Then we subtract that value from 1.00. For example, the coefficient for complete sanctions in fixed effects model is –1.44. The value of the natural number *e* taken to the exponent –1.44 is 0.24. Subtracting that value from 1.00 gives a change of 0.76. This indicates that bilateral trade was 76 percent lower between two countries due to economic sanctions (see also Hufbauer and Oegg, 2003; Dizaji, 2018).

4.1. The Interaction Impacts of US Trade Sanctions and the Political Behavior of the Target Countries on Their Bilateral Trade

As reported in Table 1, all model specifications show that both directional and bilateral US sanctions have strong negative impacts on US bilateral trade. To estimate whether a better quality of democratic system in a target country can mitigate the negative impact of US sanctions on their bilateral trade, we employ the following model:

$$trade_{US-j} = \alpha + \beta_1 dist_{US-j} + \beta_2 lang_j + \beta_3 landlocked_j + \beta_4 GDP_{US-j} + \beta_5 GDPPC_{US-j} + \beta_6 \text{TSanc}_{US} + \beta_7 \text{ TSanc}_{US} \times polity_j + \varepsilon \quad (2)$$

$TSanc_{US}$ is a dummy variable capturing the intensity of the trade sanctions. Information on this variable is obtained from the Global Sanctions Data Base (GSDB, 2020). This variable is coded as an ordinal variable (0–6), which includes the categories of no sanctions (0), partial imports or exports sanctions (1), partial bilateral trade (both exports and imports) sanctions (2), complete imports or exports sanctions (2), directional partial sanctions and directional complete sanctions (3), complete bilateral (exports and imports) sanctions (4), bilateral partial sanctions and directional (only exports or imports) complete sanctions (4), directional partial sanctions and bilateral complete sanctions (5), bilateral partial sanctions and bilateral complete sanctions (6). Instead of using a mere dummy variable for economic sanctions, the seven-category ordinal measure better captures the impact of the sanctions. Specifically, because extensive sanctions place comprehensive economic and financial pressures on the target economy, they should have a greater substantial impact than limited or moderate sanctions (see Caruso, 2003; Dizaji, 2018 and 2021).

$polity_j$ is the target countries' political stability. The democracy levels in the trading partner countries affect their trade costs. For an importer, democracy influences trade costs via tariffs, whereas for an exporter, democracy improves institutions, product quality, and the level of trust that the international community places in its products. The democratic exporters improve the quality and reputation of its exports by paying more attention to consumer rights, enacting food and product regulations, and administering legal enforcement (Eichengreen and Leblang, 2008; Levchenko, 2007; Yu, 2007 and 2010). Previous research also suggests that democratic dyads trade more than the dyads under authoritarian regimes (Mansfield, Milner, and Rosendorff 2000; Groot et al. 2004). We use the Polity index, which is a widely used measure of political institutions. This is taken from the Polity IV data set and shows combinations of

autocratic and democratic characteristics of the political systems for different years (Marshall, Gurr, and Jaggers, 2019). This index goes from −10 (full autocracy) to 10 (full democracy). $TSanc_{US} \times polity_j$ is an interaction term of the scored sanctions variable with the index of democracy. We expect the sign of β_7 to be positive. This means that a higher rated political system in the target countries could moderate the negative impacts of US sanctions on bilateral trade.

Table 2 *The Interaction Impact of Political Conditions of the Target Countries and Economic Sanctions on US bilateral trade (observations = 3239)*

Variable	Model (1) Pooled cross-section	Model (2) RE	Model (3) FE	Model (4) FE
Intercept	-14.88***	-18.84***	-22.18***	-21.91***
	(-26.06)	(-9.27)	(-47.79)	(-45.65)
Distance	-0.83***	-0.27	-0.05	
	-19.69)	(-1.24)	(-0.99)	
Language	0.11**	0.49*		
	(2.17)	(1.91)		
Landlocked	-0.79***	-1.12***		
	(-13.34)	(-3.69)		
GDP	0.92***	0.19***	-0.04	0.03
	(60.67)	(4.63)	(-0.99)	(0.69)
GDPPC	0.02	0.99***	1.36***	1.24***
	(0.80)	(14.84)	(17.77)	(15.52)
Tsanc	-0.52***	-0.44***	-0.43***	-0.66***
	(-18.69)	(-25.66)	(-25.06)	(-22.69)
$TSanc \times polity$	0.02***	0.02***	0.02***	
	(5.43)	(6.82)	(6.62)	
$TSanc \times elecdem$				0.61***
				(7.82)
R^2	0.78	0.58	0.95	0.94
Random effects-Hausman test (p-value)		0.00		

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

The results of the gravity model using the interaction term between the target countries' political system and scored economic sanctions variable are reported in Table 2. The suggested four models in Table 2 are comparable with the models of Table 1 as we start again by estimating the simple pooled OLS and panel gravity random effects specifications. The Polity2 indicator (polity) is used as a measure of the political system in models 1-3. The results of the Hausman test strongly suggest that our model should be estimated using the fixed-effects approach. Like before, the main elements of the standard gravity model and related dummy variables namely, the product of GDPs and distance, common language, and landlocked

dummies, are significant and show the expected signs in the pooled OLS and random effects panel models.

The reported coefficients for the scored sanctions variable (*TSanc*) in all specifications are negative and significant, strongly supporting the earlier idea in research that US-imposed sanctions decrease its bilateral trade with target countries. The most interesting finding about the interaction terms between the polity2 index and sanctions variables is that its sign is positive and strongly significant. This indicates that the target countries could mitigate the impact of US trade sanctions on their trade with US by changing their political behavior to be more democratic.

In order to further test the robustness of the empirical results, we use an alternative new measure of democracy called electoral democracy in Model (4). This index is based on data from a large number of indexes gathered through the Varieties of Democracy (V-Dem) project. These data are collected from country experts, mainly academics from each country. Moreover, the latent country coding unit characteristics are estimated by Bayesian ordinal item response theory (IRT) modeling techniques from the collection of expert ratings (see Pemstein et al., 2022). The electoral part of democracy expresses the core value of making rulers responsive to citizens through competition for the approval of a broad electorate during periodic elections. In the V-Dem concept, electoral democracy is considered as the base of any other conception of representative democracy- liberal, participatory, deliberative, egalitarian, or some others. This index ranges from 0 to 1, where higher scores mean a higher extent to which the ideal electoral democracy is achieved (Coppedge et al., 2022). Again, our results using the electoral democracy index show that US sanctions have detrimental impacts on the bilateral trade between US and sanctioned countries but that the better quality of electoral democracy in target countries mitigates this effect.

4.2. Impact of US Export and Import Sanctions on Its Trade Flows with Target countries

To determine the differences in the impacts of import and export sanctions on US trade with target countries, we separate the exports and imports sanctions and define the following model:

$$trade_{US-j} = \alpha + \beta_1 dist_{US-j} + +\beta_2 lang_j + \beta_3 landlocked_j + \beta_4 GDP_{US-j} + \beta_5 GDPPC_{US-j} + \beta_6 EXpartsanc_{US} + \beta_7 IMpartsanc_{US} + \beta_8 EXcomsanc_{US} + \beta_9 IMcomsanc_{US} + \varepsilon \quad (3)$$

Where:

$EXpartsanc_{US}$ is a dummy variable which captures the impact of US partial export sanctions. It takes the value of 1 if partial export sanctions are imposed, and zero otherwise.

$IMpartsanc_{US}$ is a dummy variable which captures the impact of US partial import sanctions. It takes the value of 1 if partial import sanctions are imposed, and zero otherwise.

$EXcomsanc_{US}$ is a dummy variable which captures the impact of US complete export sanctions. It takes the value of 1 if complete export sanctions are imposed, and zero otherwise.

$IMcomsanc_{US}$ is a dummy variable which captures the impact of US complete import sanctions. It takes the value of 1 if complete import sanctions are imposed, and zero otherwise.

The results of the impact of exports and imports sanctions on US trade with target countries are reported in Table 3. According to the Hausman tests statistics, the fixed-effects approach is more suitable here. However, we also use the pooled OLS model and random effects approach to estimate this model as they enable us to know about the coefficient of the time-invariant variables.

The results of the pooled OLS model and random effect panel model confirm that the distance and landlocked variables have negative impacts on US trade with sanctioned countries, while product of GDPs, product of per capita GDPs, and common language have positive impacts. The reported coefficients for the partial import and export sanctions and complete import and export sanctions in all specifications are negative and significant. Moreover, the results show that the impact of complete export and import sanctions on US bilateral trade with sanctioned countries are stronger than the impact of partial export and import sanctions in all specifications. According to the fixed effects model, complete export and import sanctions in place reduce US bilateral trade flows with its sanctioned trading partners by about 90 percent and 39 percent, respectively, while partial export and import sanctions have decreased trade by 13 percent and 17 percent, respectively, ceteris paribus. Moreover, the results of the fixed effects model reveal that complete export sanctions have the strongest detrimental impact on US bilateral trade with target countries, compared to the other types of trade sanctions.

Table 3. *The Impact of Exports and Imports Sanctions on US Trade with Target Countries (observations = 3239)*

Variables	Model (1) Pooled cross-section	Model (2) RE	Model (3) FE
intercept	-11.59***	-17.41***	-21.83***
	(-20.40)	(-8.15)	(-47.99)
distance	-1.15***	-0.37*	
	(-25.80)	(-1.63)	
language	0.22***	0.38	
	(5.00)	(1.57)	
Landlocked	-0.72***	-1.04***	
	(-13.06)	(-3.68)	
GDP	0.94***	0.24***	-0.01
	(66.88)	(6.19)	(-0.31)
GDPPC	-0.02	0.89***	1.3***
	(-0.66)	(13.81)	(17.20)
EXpartsanc	-0.38***	-0.17**	-0.14**
	(-3.83)	(-2.54)	(-2.04)
IMpartsanc	-0.09	-0.19***	-0.19***
	(-0.96)	(-3.00)	(-3.05)
EXcompsanc	-1.4***	-2.33***	-2.34***
	(-3.45)	(-10.29)	(-10.33)
IMcompsanc	-1.59***	-0.54**	-0.5**
	(-4.04)	(-2.33)	(-2.13)
R^2	0.80	0.60	0.95
Random effects-Hausman test (p-value)		0.00	

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

Baldwin and Taglioni (2006) coin the so-called "silver medal error" of gravity model estimations which implies that the gravity theory merely explains one-way trade flows (e.g., country *i* exports to country *j*) rather than two-way bilateral trade (e.g., country *i* exports to country *j* and country *j* exports to country *i*). Accordingly, and in order to narrow the focus to the impact of sanctions on US exports to and imports from target countries, we also run the regression using the logarithm of real exports and the logarithm of real imports as dependent variables in separate models. The empirical estimates of the gravity model for US exports and imports are presented in Table 4. Models 1–3 considers the impacts of exports and imports sanctions on US exports to target countries.

According to the Hausman test results in Models 1 and 4, the fixed effects approach should be applied to test the impact of export and import sanctions on US exports and imports to and from target countries. However, the results of both random and fixed effects specifications imply that both partial and complete exports and imports sanctions have decreased US exports

to sanctioned countries and its imports from those countries. Therefore, US exports (imports) sanctions not only decrease US exports to (imports from) target countries but also decrease its imports from (exports to) target countries.

Table 4. *The Impact of Economic Sanctions on US Exports to and imports from Target Countries (observations = 3239)*

Variables	US Exports			US Imports		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
	RE	FE	FE	RE	FE	FE
intercept	-9.03***	-25.57***	-25.67***	-24.56***	-27.68***	-27.35***
	(-4.35)	(-74.32)	(-74.39)	(-8.71)	(-39.76)	(-39.54)
distance	-1.1***			-0.04		
	(-4.98)			(-0.14)		
language	0.3			0.70**		
	(1.31)			(2.27)		
Landlocked	-0.77***			-1.6***		
	(-2.79)			(-4.35)		
GDP	0.52***	0.72***	0.71***	0.03	-0.55***	-0.55***
	(13.61)	(47.27)	(47.72)	(0.57)	(-7.97)	(-8.09)
GDPPC	0.35***	0.43***	0.45***	1.35***	2.31***	2.29***
	(5.49)	(17.26)	(18.02)	(14.37)	(19.86)	(20.04)
EXpartsanc	-0.11*	-0.37***		-0.22**	-0.35***	
	(-1.57)	(-4.33)		(-2.14)	(-4.83)	
IMpartsanc	-0.18***		-0.28***	-0.21**		-0.32***
	(-2.88)		(-3.32)	(-2.22)		(-4.82)
EXcompsanc	-2.42***	-2.60***		-0.63*	-3.61***	
	(-10.56)	(-18.41)		(-1.83)	(-27.55)	
IMcompsanc	0.22		-2.63***	-3.39***		-3.93***
	(0.92)		(-19.80)	(-9.54)		(-29.59)
R^2	0.56	0.71	0.71	0.48	0.92	0.92
Random effects-Hausman test (p-value)	0.00			0.00		

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

4.3. Impact of US Export and Import Sanctions on Trade Flows between Target Countries and Third Countries

Few studies partially address the impact of sanctions on trade flows between the target country and third parties which are not directly involved in the imposition of sanctions (Caruso, 2003; Hufbauer et al., 1997; Yang et al., 2004; Dizaji, 2018). According to the literature, there are two ideas about how unilateral sanctions might affect the target country's relations with third parties (Dizaji 2018). The first one is the "sanctions-busting" view which indicates that third parties – governments and private actors – will likely attempt to capture the economic

opportunities created by the sender's decision to limit its economic ties with the target. This can also happen due to both the economic and political motivations of the third country, the later one known as the "Black knight effect" (Drury, 1998; Green, 1983; Hufbauer, Schott, and Elliott, 1990). The second view is called the "negative spillover" perspective. According to this view, unilateral sanctions will cause negative impacts on trade flows between the target and third countries. Third countries are aware of the possible repercussions and punishments from sanction busting by the sender and thus will better judge the risks of opening their markets to the target (Ang and Peksen 2007; Barber 1979; Galtung 1967; Lindsay 1986; Schwebach 2000). Another reason for negative spillover is that economic sanctions, through imposing an embargo on the target's products or withholding its financial assets, will in turn reduce the target's economic and financial ability to pay for imports from third countries (Lektzian, 2003; Weiss, 1999; Weiss et al., 1997). A different argument is expounded by (Bergeijk 1995), who describes the "network effects" of sanctions. Sanctions make changes in the world economic system. These changes also affect the economic opportunities of countries that are not directly involved in the conflict. Therefore, other countries will suffer from the trade disruption caused by sanctions.

One of our objectives in this study is to see if US trade sanctions have impacted the target countries trade with other global trading partners. To examine this issue, we employ the following model:

$$\overline{trade}_{jW} = \alpha + \beta_1 landlocked_j + \beta_2 \overline{GDP}_{jW} + \beta_3 \overline{GDPPC}_{jW} + \beta_4 EXpartsanc_{US} + \beta_5 IMpartsanc_{US} + \beta_6 EXcompsanc_{US} + \beta_7 IMcompsanc_{US} + \varepsilon \quad (4)$$

Where:

$\overline{GDP}_{jW}$ is the logged product of world GDP (excluding US) and GDP of country *j*.

$\overline{GDPPC}_{jW}$ is the logged product of world GDP per capita (excluding US) and GDP per capita of country *j*.

$\overline{trade}_{jW}$ is the logged bilateral trade between target country *j* and world (excluding US).

Alternatively, we also use $\overline{Exports}_{Wj}$ and $\overline{Imports}_{Wj}$, where:

$\overline{Exports}_{Wj}$ is the logged world exports (excluding US exports) to target country *j*.

$\overline{Imports}_{Wj}$ is the logged world imports (excluding US imports) from target country *j*.

Models 1 and 2 of Table 5 shows the impact of partial and complete exports and imports sanctions on world trade (excluding the US) with countries sanctioned by the US.

Models 3 and 4 show the random effects and fixed effects specifications regarding the impact of US sanctions on world exports (excluding the US) to countries sanctioned by the US.

Finally, Models 5 and 6 show the random effects and fixed effects approaches regarding the impact of US sanctions on world imports (excluding the US) from countries sanctioned by the US.

All specifications confirm the positive impact of the product of GDPs and product of per capita GDPs on world trade (excluding the US) with target countries. Both complete exports and imports sanctions have negative impact on trade flows (exports and imports) between trading nations (excluding the US) with US-sanctioned countries. This confirms the "negative spillover" hypothesis about US sanctions, indicating that unilateral sanctions will cause negative impacts on trade flows between the target and third countries (world excluding the US).

Partial imports sanctions imposed by the US on target countries decrease world trade (both exports and imports) with target countries. Partial exports sanctions imposed by the US have influenced third countries imports from sanctioned countries negatively, while their negative impact on total trade (between the target countries and third countries) and exports from third countries to target countries is not significant. The results with respect to all specifications in Table 5 indicates that complete trade sanctions have stronger detrimental impacts on trade flows between third countries and target countries, compared to partial sanctions.

Table 5. Impact of US Sanctions on Trade Flows Between Target Countries and Third countries

Variables	$\overline{\text{Trade}}$		$\overline{Exports}$		$\overline{Imports}$	
	Model (1) RE	Model (2) FE	Model (3) RE	Model (4) FE	Model (5) RE	Model (6) FE
intercept	-12.53***	-10.80***	-16.92***	-15.82***	-6.32***	-2.51***
	(-18.43)	(-14.24)	(-24.73)	(-19.83)	(-7.43)	(-2.64)
Landlocked	-0.23		-0.19		-0.19	
	(-1.14)		(-1.07)		(-0.77)	
GDP	0.69***	0.64***	0.78***	0.75***	0.49***	0.38***
	(35.66)	(29.73)	(40.3)	(33.34)	(20.23)	(14.12)
GDPPC	0.39***	0.48***	0.16***	0.22***	0.74***	0.94***
	(11.32)	(12.54)	(4.70)	(5.53)	(17.48)	(19.58)
EXpartsanc	-0.06	-0.05	-0.04	-0.04	-0.08*	-0.07***
	(-1.45)	(-1.35)	(-0.96)	(-0.89)	(-1.67)	(-1.52)
IMpartsanc	-0.13***	-0.14***	-0.13***	-0.13***	-0.13***	-0.13***
	(-3.75)	(-3.78)	(-3.37)	(-3.41)	(-2.89)	(-2.87)
EXcompsanc	-0.47***	-0.47***	-0.52***	-0.52***	-0.43***	-0.43***
	(-3.66)	(-3.67)	(-3.83)	(-3.82)	(-2.65)	(-2.65)
IMcompsanc	-0.51***	-0.5***	-0.55***	-0.55***	-0.46***	-0.44***
	(-3.80)	(-3.74)	(-3.89)	(-3.88)	(-2.75)	(-2.66)
R^2	0.83	0.97	0.81	0.97	0.76	0.96
Random effects-Hausman test (p-value)	0.00		0.00		0.00	

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

Table 6 examines whether the better quality of political institutions and electoral democracy can alleviate the detrimental impact of US sanctions on trade flows between target and third countries. The coefficients related to the scored trade sanctions coefficients (*TSanc*) reveal the negative impact of trade sanctions imposed by the US on bilateral trade between third and target countries. However, the positive coefficient of interacting terms

(TSanc × polity as well as TSanc × elecdem) in different specifications using both pooled cross-section and panel (random and fixed) models imply that a better quality of democracy and political system decreases the negative impact of US sanctions on bilateral trade between target countries and third countries.

Table 6. Interacting Impact of US Sanctions and Political System in Target Countries on Their Bilateral Trade with Third countries

Variables	Model (1) Pooled cross-section	Model (2) RE	Model (3) FE	Model (4) Pooled cross-section	Model (5) RE	Model (6) FE
intercept	-16.94***	-11.99***	-10.34***	-17.14***	-12.92***	-11.33***
	(-55.83)	(-17.61)	(-13.77)	(-57.05)	(-18.33)	(-14.43)
Landlocked	-0.55***	-0.26		-0.54***	-0.26	
	(-14.13)	(-1.24)		(-13.99)	(-1.25)	
GDP	0.79***	0.67***	0.63***	0.79***	0.69***	0.65***
	(83.03)	(34.98)	(29.53)	(84.53)	(35.04)	(29.48)
GDPPC	0.04***	0.42***	0.51***	0.03**	0.37***	0.46***
	(2.66)	(12.34)	(13.51)	(2.23)	(10.47)	(11.55)
TSanc	-0.09***	-0.15***	-0.15***	-0.21***	-0.26***	-0.26***
	(-4.94)	(-15.65)	(-15.52)	(-7.70)	(-16.43)	(-16.14)
$TSanc \times polity$	0.01*	0.01***	0.01***			
	(1.82)	(4.12)	(3.99)			
$TSanc \times elecdem$				0.27***	0.28***	0.27***
				(3.29)	(6.47)	(6.28)
R^2	0.84	0.83	0.97	0.84	0.83	0.97
Random effects-Hausman test (p-value)		0.00			0.00	

Note: t-statistics shown in parentheses. * Statistical significance at 10%, ** Statistical significance at 5%, *** Statistical significance at 1%.

5. Conclusion

We employ the gravity model as a framework to investigate the ramifications of US trade sanctions on both the bilateral trade between target countries and the US, as well as their trade interactions with other nations. Our comprehensive analysis encompasses a sample of 79 countries over the period between 1980 to 2020.

By controlling for various determinants that influence trade dynamics between nations within the gravity model, we utilize the pooled OLS, fixed effects, and random effects methodologies. The results consistently unveil a detrimental impact stemming from partial or comprehensive US trade sanctions. These sanctions manifest as a reduction in both imports and exports between the target countries and the US. Moreover, the repercussions extend beyond bilateral trade, exerting a negative influence on the trade connections between the target and third-party countries.

Central to our findings is the revelation that the quality of political institutions in the target countries plays a pivotal role in shaping the ultimate effects of US sanctions on trade.

Particularly noteworthy is the role of democratic institutions, where heightened levels thereof within target countries can serve as a mitigating factor, alleviating the detrimental impact of sanctions on both bilateral trade and trade involving third countries.

In conclusion, our study underscores the consistent adverse repercussions of US trade sanctions on various facets of international trade. Furthermore, it highlights the intricate interplay between political institutions and the trade consequences of such sanctions, with stronger democratic foundations within target countries serving to temper the adverse effects on trade flows.

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