

Spillover Effects of US Sanctions on Neighboring Countries

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ABSTRACT

Sanctions placed by the United States on foreign countries are intended to sway or change the target countries' actions through negative reinforcement. The success (or failure) of these sanctions are measured by if/how much the targeted country's behavior changes in line with what the US wants. The consideration of how much economic harm is done to the country is often limited. The consideration of how much economic harm is done to countries that border the sanctioned state is nonexistent. In this paper, I examine the economic spillover effects on the neighbors of sanctioned countries from 1960 to 2016. There is strong evidence that having a sanctioned neighbor results in a significant decrease in GDP, and this effect increases when additional neighbors are sanctioned. The main driving force behind this phenomenon is a decrease in foreign direct investment, or FDI, while other factors such as imports and exports were not significantly impacted.

INTRODUCTION

Since World War II, sanctions have been an increasingly prominent tool in foreign relations. They are used with the intent of changing the target country's behavior, often by cutting off trade, access to military equipment, or by limiting top leaders' access to financial institutions. While many countries have employed sanctions at some point or another, the most heavy-handed users are the United States, United Nations, and European Union (Felbermayr et al, 2020a). Sanctions are often evaluated by whether or not they were successful—did they bring about the change desired? Usually the answer is no; only 4 to 30% of sanctions can be called successful by some measure (Felbermayr et al, 2020b). Other times, sanctions are evaluated by the economic effects felt in the target country. Few papers, however, look at what happens to third-party countries during this period.

The purpose of this paper is to try to uncover what the effect of US sanctions are on the bordering countries of the targeted state. In particular, I am looking at economic markers: gross domestic product (GDP), imports, exports, foreign direct investment (FDI), and other similar measurements. It is beneficial to the US to understand the potential side-effects of levying sanctions against foreign countries. If, for example, the US were to implement a trade embargo on country A, it is important to understand the potential impact this can have on neighboring country B. That is not to imply that the effects will automatically be negative. There is room to argue that having a sanctioned neighbor could in fact be beneficial. If A loses the US as a major trading partner, A may trade more with B who can then act as a middleman in order to continue to get A's goods to the US. Of course, if B already had strong economic ties to A prior to the sanction, then negative economic effects to A could also trickle down to B more easily. If there are any significant economic side-effects in neighboring countries, the US should take that into

consideration when levying sanctions. It is possible that by levying sanctions, regional allies can be hurt (or helped) in the process.

Some research has already been done on the spillover effect of UN sanctions. However, UN sanctions are (ideally) implemented by all UN members, and as such can be highly effective when utilized correctly. The study by Slavov (2007) found that usually there were negative spillover effects from UN sanctions on nearby countries. For my research, however, I wanted to analyze what the impacts of a single country's sanctions could be, and the US was the best candidate for this task. The US has one of the largest economies in the world, rivaled only by China. The US also has established trade relations with almost every country in the world, save for certain select countries such as North Korea. China also has trade relations with almost every country, but is notorious for being against sanctions as a policy in general and has even vetoed UN sanctions against countries such as North Korea and Iran (Reilly, 2013). The US, on the other hand, is rather sanction-happy. Since 1960, the US has implemented over a hundred sanctions across dozens of countries. The only other comparable institution in terms of number of sanctions levied is the EU. However, since the EU is composed of multiple member states, it does not fit my definition of a single country implementing sanctions. Thus, the US is the best country to use for this study to observe the largest impacts of a single nation's sanctions.

As one may expect, this is not exactly an easy topic to study. One obvious source of bias is the reason the US implements sanctions in the first place. Many times, the US implements sanctions as a result of internal conflict or war. War can cause a serious detrimental effect on the economy, which can easily spill over into neighboring countries, even if they themselves are not involved in the fighting. Of course, there may also be simultaneous economic shocks to a given region, such as drought or an economic recession, that can overlap with sanctions and confound

the data. Economies are so complex that attempting to isolate the impact of a single variable requires a significant undertaking.

Despite this, I have done my best to devise a methodology that minimizes the potential sources of bias in my regressions. My treatment is, as mentioned, having a neighbor(s) sanctioned by the US during a given year, and my outcome variables are various economic measurements such as GDP and imports. I have utilized datasets from a variety of sources to come up with one ultimate dataset. The founding dataset comes from the Global Sanctions Database, which contains records of every sanction levied by every country and organization from 1960 to 2016, including specifications on if it was a financial, trade, travel, arms, or military assistance sanction. I will be taking advantage of these specifications and running separate regressions to look at some of these sanction types individually. The second dataset is from GeoDataSource and contains an index of every country and what countries they share a border with. This datasource reflects modern-day borders, so I had to do some data editing to include countries such as Yugoslavia and the German Democratic Republic during the years applicable. The World Bank provided all of the economic variables and population data. Lastly, the Atlas of Economic Complexity is a great resource for more complex import and export data, and I used one of their datasets to obtain data on trade between the sanctioned country and its neighbors from 1962 to 2018.

My plan is to use a two-way fixed effect regression, allowing me to control for country-specific and time-specific effects. That way any inherent qualities that may impact the way a neighboring country deals with a sanctioned neighbor are controlled for with the within-country analysis, and any years that had overlapping events that could cause economic changes such as famines or wars were controlled for as well. I also included multiple controls in

my regression, including controls for if the UN and/or EU also had simultaneous sanctions, population of countries, and if the country itself was also sanctioned at the same time as its neighbor. Additionally, I performed robustness tests to verify that the results are consistent and accurate.

While I was unsure of the direction that the spillover effects would go, I hypothesized that countries are not really affected by sanctioned neighboring countries unless they are trade or financial sanctions. These sanctions have the biggest potential economic effects on the sanctioned country, which in turn leads to the biggest potential spillover effects on neighboring countries. Trade may increase or decrease between neighboring countries, but other aspects such as trade or foreign direct investment from the US to a neighboring state may increase as the US limits its trade or investment in the now-sanctioned country.

Many studies, including Yang et al (2004), Felbermayr et al (2020b), and Hufbaeur et al (2007) have been done on the effect of sanctions on the target state. To the best of my knowledge, however, no other paper has attempted to analyze the spillover effects resulting from the sanctions of a single state across as large a time period as I am covering (1960-2016) or as many countries (over 100). The benefits of covering such a large period of time and all regions of the world is that it provides a better understanding and prediction of the effects of US sanctions over individual case studies or smaller data sets that may be hard to extrapolate a general pattern from.

LITERATURE REVIEW

Some work has been done on the spillover effects of certain types of sanctions on third-party or neighboring countries. The European and Middle East and Central Asia

Departments at the International Monetary Fund evaluated the spillover effects of sanctions placed upon Russia on former Soviet-bloc countries (Stepanyan et al 2015). They identified that there were indeed negative spillover effects on former Soviet states and the main mechanisms for impact were lower amounts of trade, remittances, and FDI from Russia. One confounder of this study is that in 2014, Russia experienced a simultaneous crisis with falling oil prices, which also contributed to the economic downturn in neighboring countries. Using IMF data comparing GDP growth from 2013 to 2015, they were able to determine that the economic troubles in Russia negatively impacted GDP growth in neighboring countries, causing up to 4 percentage points of negative growth in countries like Belarus and Moldova. The authors also noted that previous trade agreements with Russia limited how much neighboring countries were able to diversify exports away from Russia in the economic downturn, which increased their chances of experiencing spillover effects. This study on the former Soviet-bloc, while much narrower in scope than this paper, provides us some insight into potential side effects of US sanctions. Of course, in this instance, the country being sanctioned is the main economic powerhouse in the region. There is far less information on what happens when smaller economies are sanctioned.

In a similar vein, Canes (2000) analyzed the spillover effects of sanctions on oil, specifically focusing on the case of Iraq. However, this analysis was not limited to only neighboring countries. Instead, the focus was on the type of trade relations third-party countries have with a sanctioned oil-producing country: those that consume oil, those that produce alternative energy sources, and those that export to the now-crippled economy of the targeted country. The paper found that sanctioned countries can lose part of the market share, causing other producers to be able to raise prices. Consumers conversely were affected by the rising costs of goods. Of course, this paper has only investigated what happens during sanctions of major oil

producing countries. However, it is not unreasonable to think that this effect can extend to other industries. If neighboring countries have similar exports, these effects may reappear in my research. These two papers show that on a small scale, both positive and negative spillover effects can occur from sanctions. These effects suggest the impacts depend on the industries of both countries as well as the level of trade between them. Thus, the question of what exactly the average overall economic spillover effects of US sanctions are still remains unanswered by these papers.

Another key publication I have looked at in my research is the paper by Slavov (2007). Slavov's paper evaluates the spillover effects resulting from UN sanctions from 1989 to 2000 and includes 82 countries, using data sources such as the World Trade Analyzer and IMF for economic information. Using a gravity model, which predicts how much trade countries should have between each other based on geographic proximity and size of their economies, he found that neighboring countries were often "innocent bystanders" to UN sanctions, experiencing lower amounts of trade with the rest of the world during sanctions. However, this was not a universal truth. On a case-by-case basis, 42% of neighboring countries experienced a negative and statistically significant impact, while 16% actually had a positive statistically significant impact. The rest of the cases were statistically insignificant. Again, this result influenced me to be open-minded about the potential effects I could see upon observing the effects of US-only sanctions. There is, of course, a huge difference between US and UN sanctions; (theoretically) UN sanctions involve the cooperation of all members, while US sanctions do not require any other state to also participate and will likely have a smaller overall impact. Thus, it is reasonable to believe that US sanctions will have a smaller economic impact than fully enforced UN sanctions. This decrease in magnitude may result in less severe spillover effects as well, or even

allow for positive effects to appear. This study also covers a relatively narrow time period.

Having a larger range of years will allow me to see trends over time and grant more predictive power for future sanction cases.

One paper that specifically analyzed the effects of US sanctions is the paper by Yang et al (2004). The paper focused mainly on the trade between the US and the target country, and noted that trade is not impacted by selective sanctions. However, Yang et al found the very interesting effect that if the US imposed comprehensive sanctions, the sanctioned country increased trade with the EU and Japan in order to make up for the loss in trade. The potential ramifications for my research include the fact that if a sanctioned country is able to subvert any potential economic downturns from US sanctions by increasing trade with other countries, neighboring countries may not feel any shocks from US sanctions, even if sanctions are comprehensive. Of course, there is the possibility that the lag between implementation of US sanctions and the target state securing additional trade or support from other major economies can still result in some opportunity for the target country to feel pressure from the sanctions and for neighboring countries to experience relevant spillover effects.

The final research I have used investigates a different mechanism for spillover effects to reach neighboring countries. Barry and Kleinberg (2015) conducted research on US FDI to third-party countries during a round of sanctions. Using the US Bureau of Economic Data from 1966 to 2000, they found the US companies were likely to invest in countries that would engage in sanctions-busting against the sanctioned state based either on previous sanctions-busting activity or the amount of economic ties they had to the target state. Neighboring countries can be targets for this FDI as a means for the US companies to covertly continue trade with the sanctioned nation. Barry and Kleinburg noted that this effect was strongest in countries for which

the sanctioned country was dependent on for trade. This produced my final idea that neighboring states may benefit from increased FDI as US companies invest in nearby countries to get around sanctions. Despite my reservation in predicting whether trade flows will be positive or negative, I anticipate that FDI investment will increase in neighboring countries across the board, although the magnitude may change depending on the strength of the aforementioned economic ties.

THEORY

In this thesis, the main question I will be attempting to answer is how do US sanctions impact neighboring countries' economies. When formulating this topic, I did not have a specific hypothesis in mind. Both positive and negative effects seemed plausible based on the research done above. And of course, there is a possibility that sanctions may positively affect one measurement of economics (such as FDI) while simultaneously negatively affecting another measurement (such as GDP growth). The main mechanism I will be exploring is trade between the sanctioned country and neighbor. I predict that countries with strong economic ties to a sanctioned neighbor will be the greatest affected; again, this gain could be positive or negative. If the sanction is enough to cause, say, a recession in the target country, then a country with strong economic ties may face similar, albeit less intense, economic shocks due to a significant trading power having less capacity to import goods. On the other hand, a sanctioned country may increase trade with a neighboring country after losing a trading partner with the US, increasing the economic prosperity of said neighboring country. Another potential mechanism worth exploring is the US or other countries investing more with a neighboring country after sanctioning a given state. This could have a significant positive effect if the sanctioned and neighboring country have close economic ties, thus encouraging more foreign investment from

companies wishing to bust sanctions. Any of these effects would support my hypothesis that US sanctions have some kind of spillover effects. Of course, it is possible that multiple mechanisms could occur at the same time, cancelling out the effects of one another and resulting in US sanctions having no significant spillover effects. However, I believe that if we look at the right variables and mechanisms, some patterns will appear.

Of course, despite my best efforts, it may be the case that any outcomes we observe could be explained by other phenomena. As noted in the literature review above, when a country faces sanctions, it often tries to turn to other countries for trade opportunities to make up for the ones lost with the US. It may be possible that these third-party countries, in working with the sanctioned country, create spillover effects that may appear to be a direct result of US sanctions themselves. Also, while I have created controls for other actors such as the UN and EU, I did not eliminate the possibility of other individual countries also sanctioning the same country as the US at the same time. If these countries have stronger economic ties to the sanctioned country than the US, it may be their sanctions and not the US' that create the observed effects. Overall, the main alternative explanations for any results seen in my paper is that it is the direct or partial result from other countries' response to the US sanctions. Economic trade and foreign policy do not exist in a bubble between two countries; other states may try to interfere and counter actions that attempt to harm a state they are allied with, or at least a state they do not wish to see economically crippled.

EMPIRICAL DESIGN

As mentioned previously, the unit for analysis in my study is country-year. Since sanctions levied against nations are typically left in place for a period of years, this time frame is

more appropriate to use than months or decades. There is also the important factor that the vast majority of data sources used in this paper provide their data in the country-year format as well. The variation in my data comes from the number of neighbors a country has that have sanctions placed on them in that given year. By comparing years when countries do or do not have sanctioned neighbors, or when they have a greater or lower number of sanctioned neighbors, I can attempt to see the impact of having sanctioned neighbors on a country's economy.

In my analysis, I used two treatment variables: an absolute form and intensive form. The absolute form is simply a sum of the number of sanctioned neighbors in a given year (with the total ranging from 0 to 12), while the intensive form is the number of sanctioned neighbors divided by the total number of neighbors (with the result ranging from 0 to 1). My dependent variables are the log form of GDP, GDP growth (annual %), the log form of imports (% of GDP), the log form of exports (% of GDP), poverty (% of population), unemployment (% of labor force), and the log form of net incoming foreign direct investment (FDI). I took the log of GDP, imports, exports, and FDI in order to make the distribution of values more normal and increase the validity of my results.

In order to account for the numerous potential confounders, I added multiple controls to my regression analysis. The most important controls I added were controls that accounted for whether or not the UN, EU, or the European Economic Community (the predecessor to the EU) had also levied sanctions against the neighboring country during the same year. As mentioned previously, UN and EU/EEC sanctions also carry the high potential to disrupt a country's economy, causing potential spillover effects. Not accounting for them would run the risk of invalidating the results of this paper. These controls were calculated in the same manner as the treatment variable; in the absolute regression, total sums were used, while fractions were used in

the intensive form. I also included controls to account for whether or not the country being analyzed was also under sanctions during the same time period (either by the US, UN, EU, or EEC). Lastly, I used population as a control variable in order to take into account the size of each country.

Table 1. Descriptive statistics of main variables

Variable	N	Mean	Std. Dev.	Min	Max
Year	11,226	1988.799	16.484	1960	2016
<i>Treatment variables</i>					
Number of sanctioned neighbors	11,226	1.059	1.598	0	12
Total neighbors	11,226	2.891	2.633	0	16
Fraction of neighbors sanctioned	8,376	0.361	0.370	0	1
Number of arms sanctions on neighbor	11,226	0.296	0.647	0	5
Number of military sanctions on neighbors	11,226	0.481	1.091	0	10
Number of trade sanctions on neighbors	11,226	0.375	0.897	0	12
Number of financial sanctions on neighbors	11,226	0.584	1.129	0	7
<i>Outcome Variables</i>					
Log of GDP	8,996	22.859	2.481	15.993	30.560
Log of imports (percent of GDP)	7,933	3.524	0.679	-4.159	6.058
Log of exports (percent of GDP)	7,925	3.324	0.756	-5.226	6.071
GDP growth	8,643	3.917	6.439	-64.047	149.973
Log of net income FDI	6,692	18.916	3.129	2.303	27.322
Poverty (percent of population)	720	30.073	16.827	0.4	83.3
Unemployment (percent of labor force)	3,467	8.038	6.237	0.05	57
<i>Controls</i>					
Number of UN sanctions on neighbors	11,226	0.166	0.496	0	4

Number of EU sanctions on neighbors	11,226	0.244	0.634	0	4
Number of EEC sanctions on neighbors	11,226	0.017	0.132	0	2
US sanction on observed country	11,226	0.271	0.445	0	1
Arms sanction on observed country	3,045	0.233	0.423	0	1
Military sanction on observed country	3,045	0.449	0.498	0	1
Trade sanction on observed country	3,045	0.304	0.460	0	1
Financial sanction on observed country	3,045	0.573	0.495	0	1
UN sanction on observed country	3,045	0.135	0.341	0	1
EU sanction on observed country	3,045	0.171	0.377	0	1
EEC sanction on observed country	3,045	0.010	0.097	0	1
Population	10,967	2.57E+07	1.05E+08	4375	1.38E+09

Note: All economic variables are in US dollars

The above table contains the descriptive statistics of the variables used in the regressions. Some important characteristics to note is that while “Number of sanctioned neighbors” and “Total neighbors” both have N counts of 11,226, “Fraction of neighbors sanctioned” only has an N count of 8,376 due to the fact that you cannot divide by zero. This means that island nations with zero neighbors are excluded in these regressions, which is appropriate given the nature of this research. The economic outcome variables also have varying N counts due to the fact that for some years economic data is not available, or certain economic measurements (namely poverty) did not start being measured until years after the start date of this data set.

The hardest part of establishing causation in this paper is simply the fact that sanctions are a response to a perceived problem (the justification of the use of sanctions is a debate outside the scope of this paper) which can, on their own, cause potential economic spillover effects in neighboring countries. War, terrorism, and other similar violent scenarios can depress a country’s economy and send shockwaves to nearby countries, thus making it hard to decipher what is the

effect of the initial problem and what is the effect of the sanctions levied in response. Any other simultaneous economic shocks such as famine or a recession caused by independent reasons can also interfere with establishing a causal relationship between sanctions and the relevant economic outcomes.

By using country and year fixed effects, I hope to avoid the majority of the problems listed above. By doing a within-country and within-year analysis, anything that might explain why a certain country or a certain year experienced the economic impacts it did can be controlled for. This would be able to account for wars, trade disputes, or other economic impacts and help rule out the identification problems stated before. Thus, the final model can be represented as:

$$Y_{CT} = \alpha + \beta \text{sanctions}_{CT} + \gamma_C + \delta_T + \Phi X_{CT} + \epsilon_{CT}$$

Where C= country, T= time (year), α = constant, β = the causal relationship between my treatment and outcome, γ = country fixed effects, δ = year fixed effects, X= my controls, and ϵ is the error term. I utilize robust standard errors throughout this paper.

RESULTS

In order to determine the full spillover effects from US sanctions, I added a lag of one year to both forms of the treatment. Economic impacts do not always show up in the same year the shock occurs; sometimes it takes a year or so to see results, so adding a lag to the treatment can help us see the impacts of sanctions more clearly. I also added weights to some of my regressions using the amount of trade between the sanctioned country and neighbor; the main table shown here has both the absolute and intensive form of the treatment with lags and weights. Results of the regressions run without lags and without weights can be found in the appendix.

Table 2. Main regression results, with lag and weights

<i>Economic Outcome Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net income FDI (log)
Number of sanctioned neighbors	-0.027*** (0.008)	0.016 (0.198)	0.014 (0.009)	-0.009 (0.011)	-0.745 (1.233)	-0.228 (0.149)	-0.095** (0.044)
R-squared	0.982	0.220	0.672	0.678	0.961	0.915	0.838
Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fraction of neighbors sanctioned	-0.131*** (0.050)	-0.041 (1.237)	0.080 (0.052)	-0.100 (0.061)	-3.788 (5.144)	-1.208 (0.956)	-0.885*** (0.218)
R-squared	0.982	0.222	0.672	0.677	0.961	0.913	0.841
Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Additionally, I ran regressions on individual types of sanctions, namely trade, financial, arms, and military. I only included the type of treatment variable (absolute or intensive) that provided the most statistically significant results for each type of sanction.

Table 3. Results by type of sanction, with lag and weights

<i>Economic Dependent Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net income FDI (log)
Trade (Absolute)	0.015 (0.015)	-0.275 (0.452)	-0.008 (0.026)	-0.028 (0.030)	1.314 (1.604)	0.229 (0.231)	-0.124** (0.062)
Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
R-squared	0.982	0.221	0.674	0.679	0.961	0.915	0.838
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Financial (Absolute)	-0.059*** (0.018)	0.704 (0.540)	-0.046 (0.019)	-0.089 (0.020)	0.319 (1.726)	0.004 (0.362)	0.129 (0.094)
Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
R-squared	0.982	0.222	0.675	0.682	0.961	0.915	0.838
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Arms (Intensive)	-0.171** (0.080)	4.493* (2.339)	-0.233*** (0.077)	-0.199** (0.094)	0.350 (8.105)	2.297 (1.792)	0.904** (0.389)
Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
R-squared	0.982	0.226	0.674	0.678	0.961	0.913	0.839
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Military (Intensive)	-0.083* (0.040)	0.991 (1.345)	0.132*** (0.051)	-0.173*** (0.056)	-2.903 (4.659)	0.396 (0.884)	-0.278 (0.192)

Number of observations	1,813	1,778	1,691	1,691	248	864	1,707
R-squared	0.982	0.223	0.674	0.679	0.962	0.913	0.838
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Results in the unweighted version (see table A5 in the appendix) are similar to the ones above, although in the unweighted version the results of the trade sanctions on the log of GDP is statistically significant.

Across all regressions I have run, one result remained constant; countries that have at least one sanctioned neighbor experience a decrease in GDP. As shown in the table 2, when a nation has one additional neighbor sanctioned, their GDP decreases by 2.7 percent, a result significant to the 1%. Amongst other absolute regressions, which can be seen in the tables in the appendix, this value can range from 1.8 percent (absolute regression with lag, unweighted) to 3.9 percent (absolute regression done on trade sanctions with lag, unweighted). In the intensive regression in table 2, we can see that if 100 percent of a country's neighbors are sanctioned, its GDP will decrease by over 13%, a result also significant to the 1%. This means if half of its neighbors are sanctioned, for example, it would experience a drop of 6.5%. This demonstrates that there is a net harm to third-party countries bordering a nation under sanction by the US.

Perhaps the more surprising result of this paper is the observed effects to a country's net incoming FDI. Despite earlier predictions that FDI would rise in neighboring countries due to US firms increasing ties to countries that would act as middlemen between the firms and the sanctioned states, in almost all absolute regression results, FDI decreased anywhere from 8

percent to an incredible 16 percent. This result seems to contradict the earlier findings of Barry and Kleinberg, although this discrepancy could be because Barry and Kleinberg were looking at countries that previously already had stronger economic ties to the sanctioned country, which may not necessarily be the sanctioned country's neighbors. Imports and exports were not significantly affected in my main table, although imports were positive and statistically significant in regressions run without weights (see tables A1 and A2 in the appendix) while exports tended not to be statistically significant in any direction.

When analyzing by type of sanction, the results are slightly different to the main results. Trade sanctions were the only sanctions to have a negative statistically significant impact on FDI; arms sanctions actually had a positive impact significant to the 5%. More consistent with the main findings, financial, arms, and military sanctions all resulted in a negative coefficient for the log of GDP. However, more notably, both arms and military sanctions produced statistically significant effects on both imports and exports (although the direction of the effect on imports is different). My best guess is that despite my attempts to account for confounders with country and year fixed effects, certain confounders such as war are unavoidable in arms and military sanctions. This is because arms and military sanctions are typically levied on countries that are either currently in or are approaching a state of conflict. Conflict can have huge economic effects on an entire region, and this impact would be amplified even further if the neighboring country is the one under attack by the sanctioned neighbor. Therefore, it is very difficult to separate the inherent connection between arms and military sanctions with ongoing conflicts.

After looking at all of the results, decreased FDI appears to be the main mechanism driving GDP down. No other economic variable besides GDP is as consistently statistically significant and negative as net incoming FDI, and the smallest statistically significant decrease of

FDI is a staggering 8 percent. Considering the mean amount of net incoming FDI is over 4 billion US dollars, a decrease of anywhere between 8 and 16 percent can equate to hundreds of millions of dollars. This would be able to impact the economy enough to drop GDP by a percentage point or two as seen above. One potential explanation for this phenomenon is the FDI may originate from the country being sanctioned, and the economic hardship in the sanctioned state means companies can no longer invest much abroad. This may be especially true if the sanctioned state is a larger regional economy such as Russia or India; this would be in line with the findings of Stepanyan et al (2015), who found that FDI from Russia to former Soviet-bloc countries decreased when Russia was placed under heavy international sanctions in 2014.

At the beginning of this paper, I postulated that economic spillover effects from US sanctions on neighboring countries could be positive or negative. The evidence strongly suggests that these countries experience a net negative effect and this effect is not an insignificant amount. Considering that a normal healthy economy is typically expected to grow by a few percentage points a year, the fact that a neighboring country's economy may shrink by over 2% is not a fact that should be ignored.

CONCLUSION

The purpose of this paper was to establish the spillover effect of US sanctions on neighboring countries. Previous research did not present a clear answer to this question, and both positive and negative results seemed plausible initially. By using a series of both absolute and intensive regressions, along with multiple economic outcome variables, I have been able to conclude that this effect is negative, and largely driven by a decrease in foreign direct investment. Variables that some may assume would play a larger role in this decrease in GDP,

particularly imports and exports, are not statistically significant in the majority of the regressions reported here. Instead, a variable I had initially presumed would be positive (FDI) wound up being the main mechanism behind the decrease in GDP. I suspect this is due to the sanctioned countries' crippled economies being no longer able to support investment abroad, therefore reducing the amount of FDI to their neighbors.

While this paper makes a good attempt to understand the potential effects of sanctions on neighboring countries, more research needs to be done on this subject in order to fully understand the cause and effects of the results seen here. More research on the separate types of sanctions could reveal more mechanisms for the decrease in GDP. Specifically, research on arms and military sanctions and their inherent ties to ongoing conflict is needed in order to tease out the spillover effect of the sanctions themselves, the effect of the fighting occurring simultaneously, and effects of other potential responses to conflict such as foreign aid to the besieged country. Additionally, although the point of this paper was to establish general trends for what happens economically after US sanctions are put into place, more specific studies on sanctions in certain regions of the world or certain decades can reveal important information on the universality of these results.

Finally, more thorough research into the exact mechanisms that drive down FDI in neighboring countries is important. It is relevant to understand where this decrease is coming from: either the sanctioned country itself, other third-party nations like the US, or a combination of the two. If the decrease is from the sanctioned countries, and the US is inclined to prevent or lessen the negative spillover effect of sanctions, encouraging American-based companies to invest more in these affected nations to offset the loss of FDI could be a good way to accomplish this goal.

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APPENDIX

Table A1. Absolute and intensive regressions without weights or lag

<i>Economic Outcome Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net incoming FDI (log)
Number of sanctioned neighbors	-0.018** (0.007)	-0.257 (0.184)	0.024** (0.010)	0.010 (0.011)	2.163** (0.993)	0.098 (0.113)	-0.035 (0.035)
Number of observations	2,502	2,443	2,301	2,301	288	1,090	2,231
R-squared	0.980	0.199	0.713	0.711	0.954	0.897	0.821
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fraction of neighbors sanctioned	-0.042 (0.038)	-2.517*** (0.962)	0.085* (0.051)	-0.078 (0.055)	8.072** (3.464)	-0.023 (0.630)	-0.561*** (0.162)
Number of observations	2261	2205	2094	2094	279	994	2041
R-squared	0.978	0.197	0.709	0.695	0.953	0.896	0.814
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Table A2. Absolute and intensive regressions with lag, no weights

<i>Economic Outcome Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net incoming FDI (log)
Number of sanctioned neighbors	-0.018*** (0.006)	-0.115 (0.149)	0.020*** (0.008)	-0.005 (0.009)	0.568 (0.848)	0.093 (0.107)	-0.079*** (0.031)
Number of observations	2,496	2,440	2,296	2,296	288	1,085	2,231
R-squared	0.980	0.199	0.713	0.711	0.952	0.896	0.822
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fraction of neighbors sanctioned	-0.066 (0.034)	-1.394 (0.885)	0.081* (0.042)	-0.082* (0.045)	2.125 (3.461)	0.408 (0.611)	-0.725*** (0.147)
Number of observations	2,255	2,202	2,089	2,089	279	989	2,041
R-squared	0.978	0.195	0.708	0.695	0.950	0.896	0.815
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Table A3. Absolute and intensive regressions with import weights, lag

<i>Economic Dependent Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net income FDI (log)
Number of sanctioned neighbors	-0.031*** (0.008)	0.031 (0.200)	0.014 (0.009)	-0.006 (0.01)	-0.822 (1.223)	-0.206 (0.153)	-0.079* (0.043)
Number of observations	1,793	1,758	1,672	1,672	247	863	1,692
R-squared	0.982	0.228	0.726	0.727	0.963	0.915	0.843
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fraction of neighbors sanctioned	-0.151*** (0.050)	-0.111 (1.257)	0.069 (0.049)	-0.092 (0.056)	-4.056 (5.074)	-1.114 (0.994)	-0.802*** (0.216)
Number of observations	1,793	1,758	1,672	1,672	247	863	1,692
R-squared	0.982	0.231	0.725	0.726	0.963	0.913	0.845
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Table A4. Absolute and intensive regressions with export weights, lag

<i>Economic Dependent Variables:</i>	GDP (log)	GDP Growth	Imports (log)	Exports (log)	Poverty	Unemployment	Net income FDI (log)
Number of sanctioned neighbors	-0.021** (0.008)	0.031 (0.207)	0.009 (0.010)	-0.015 (0.012)	-0.352 (1.358)	-0.242 (0.151)	-0.091** (0.045)
Number of observations	1,787	1,751	1,666	1,666	246	861	1,681
R-squared	0.982	0.219	0.643	0.660	0.963	0.915	0.831
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fraction of neighbors sanctioned	-0.107** (0.052)	0.353 (1.267)	0.072 (0.056)	-0.124* (0.066)	-2.754 (5.610)	-1.296 (0.949)	-0.835*** (0.220)
Number of observations	1,787	1,751	1,666	1,666	246	861	1,681
R-squared	0.982	0.220	0.643	0.659	0.964	0.913	0.833
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%; Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself

Military (Intensive)	-0.069* (0.035)	0.781 (0.963)	0.125*** (0.044)	-0.078* (0.046)	-0.54 (3.053)	0.328 (0.665)	-0.29* (0.151)
Number of observations	2,255	2,202	2,089	2,089	279	989	2,041
R-squared	0.978	0.195	0.709	0.696	0.951	0.896	0.814
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are included in parenthesis below the coefficient; Significance level: * 10%, ** 5%, *** 1%;
Controls: simultaneous UN, EU, and EEC sanctions on neighbors, population, and US, UN, EU and EEC sanctions on the country itself