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# Economic Sanctions and Human Security: The Public Health Effect of Economic Sanctions

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Despite the abundance of country-specific evidence and policy debate on the humanitarian effects of sanctions, there has not been any cross-national empirical research that examines the human cost of sanctions. In this study, I offer a quantitative analysis of the effect that economic sanctions have on public health conditions in target countries. I use the child mortality rate among under five-year olds as a proxy for health status and utilize time-series cross-nation data for the 1970–2000 period. According to the results, the public health effect of sanctions is largely conditional on the extent to which economic coercion is costly on the target economy. The United States as a sender is also likely to increase the negative impact of sanctions on public health conditions. The economic wealth of target countries is unlikely to play any significant interactive role in mitigating the effect of economic coercion on public health. Similarly, the involvement of an intergovernmental organization (IGO) in sanction imposition has no discernable impact on child mortality.

The use of economic sanctions to coerce nations is not new in foreign policy. Thucydides and Plutarch provide accounts of what is arguably the earliest recorded use of economic sanctions: the Megarian decree. In 432 BC, the Athenian assembly passed a decree at Pericles' behest embargoing all trades between Megara and the Athenian empire. The decision to impose economic sanctions was calculated to coerce Megara into complying with Athenian demands, as well as to deter Sparta and its allies (Baldwin 1985, 150–154). Sanctions not only have been used for centuries, but also have become an increasingly popular policy tool since the early twentieth century. Woodrow Wilson, the 28th president of the United States, in his oft-cited speech in 1919 advocated the use of economic sanctions by suggesting that ''Apply this economic, peaceful, silent, deadly remedy and there will be no need force….It does not cost a life outside the nation boycotted, but it brings pressure upon the nation that, in my judgment, no modern nation could resist'' (quoted in Padover 1942, 108).

Since Wilson's speech, the United States, the leading sanctioning country, has employed economic sanctions against over 30 countries for more than 120 times in the twentieth century (Hufbauer, Schott, Elliott, and Oegg 2007). Several major countries and intergovernmental organizations (IGOs) have also frequently resorted to economic coercion for self-interested or humanitarian

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concerns to cope with such issues as human rights violations, democratization, armed aggression, state-sponsored terrorism, nuclear proliferation, and drug trafficking. As opposed to Wilson's optimistic view that sanctions will likely force the targeted nations to concede to the economic pressure, an abundance of research suggests that foreign economic pressure often fails in achieving any major behavioral or policy change in the target under most circumstances (for example, Galtung 1967; Wallensteen 1968; Barber 1979; Baldwin 1985; Pape 1997). Scholars estimate that sanctions fail 65 (Hufbauer, Schott, and Elliott 1990; Hufbauer et al. 2007) to 95% of the time (Pape 1997). Indeed, the Megarian decree has the unfortunate honor of being the earliest instance of the failure of economic sanctions as well. The Megarians did not comply with Athenian demands, and Sparta was not to be deterred; within a year, Sparta declared war on Athens, thereby starting the Peloponnesian War.

Unlike the significant research on whether and under what circumstances economic sanctions work, our knowledge of the extent to which economic coercion is a ''silent, deadly'' tool as claimed by Wilson remains limited. With the growing public and media attention to the civilian sufferings in Iraq, former Yugoslavia, and Haiti in the 1990s, a number of studies have pointed out the humanitarian consequences of economic sanctions in target countries. One major shortcoming of this line of research has been their focus on one or a few prominent sanction cases without subjecting the suggested costs of sanctions to a large-N, empirical inquiry. Hence, given the lack of any comprehensive systematic research on the humanitarian effects of economic coercion, we know very little about the extent of the civilian sufferings caused by sanctions relative to some other major factors such as political oppression, poverty, demographic features, and civil wars.

The purpose of this study is to compliment and add to the existing literature on the consequences of sanctions offering a large-N, quantitative inquiry of the public health impact of economic sanctions. Utilizing time-series cross-national data for the 1970–2000 period, the data findings suggest that the cost of sanctions on the target economy and the United States as a sender country are the two significant sanction-related variables in predicting child mortality. The results also show that the IGO involvement in sanction imposition and the economic wealth of target countries are unlikely to play any significant role in mitigating or worsening the public health effect of economic coercion.

The rest of the paper proceeds as follows. In the following section, I refer to the relevant literature on the consequences of economic sanctions. Next, I discuss the theoretical framework on the public health impact of sanctions in target countries. In the next section, then, I report the research design used for the statistical analysis, followed by a discussion of the findings. In the conclusion, I discuss the policy implications of the findings and offer some suggestions for future research on economic statecraft.

## The Relevant Literature: Understanding the Consequences of Economic Sanctions

Recent studies on the political consequences of sanctions demonstrate that economic coercion worsens human rights conditions (that is, the level of government respect for physical integrity rights) in target countries as a result of failing to harm the political and military power of targeted elites, while creating more socioeconomic and political difficulties among ordinary citizens (Drury and Li 2006; Wood 2008; Peksen 2009). Other research shows that economic sanctions deteriorate the level of democracy (Peksen and Drury 2010) and press freedom (Peksen 2010) in target countries. According to this

line of research, the targeted regimes often use foreign economic pressure as a strategic tool in domestic politics to consolidate authoritarian rule and weaken the opposition. In addition, economic sanctions are likely to create new incentives for the political leadership to restrict political liberties and press freedom to undermine the challenge of sanctions as an external threat to their authority.

Focusing primarily on the economic grievance-violence nexus, some others suggest that economic sanctions might lead to political instability by destabilizing the target leadership (Marinov 2005; Escribà-Folch and Wright 2010) and inciting more violence in the form of protests and riots against the established regimes (Allen 2008). Escribà-Folch (2010), on the other, finds that economic coercion is an effective policy tool in decreasing the duration of intrastate conflicts. In the same article, the author also shows that sanctions led by international institutions are likely to increase the probability of conflict resolution whereas sanctions not involving international institutions are more likely to increase the likelihood of a military conflict in civil wars.

With the growing public and media attention to the civilian suffering in Iraq, former Yugoslavia, and Haiti in the 1990s, a number of scholarly work and policy reports (most of which are country-specific studies) point out the possible humanitarian consequences of economic sanctions (for example, Galtung 1967; Cortright and Lopez 1995; Haass 1997; Weiss, Cortright, Lopez, and Minear 1997; Gibbons and Garfield 1999; Muller and Muller 1999; Weiss 1999; Barry 2000; Heine-Ellison 2001; Lektzian 2003). The consensus in this literature is that innocent citizens are usually the primary victims and disproportionately suffer from the cost of the external economic pressures. This line of research shows that economic coercion might increase the poverty, unemployment, and inflation; undermine the effective functioning of public health services; impede the development of civil society; and affect the level of educational attainment in the sanctioned countries.

Despite the widespread belief that sanctions exacerbate civilian pain, there has not been any cross-national quantitative work that investigates the humanitarian cost of economic sanctions. While earlier case study evidence and policy reports provide us insights on how the causal chain might work between sanctions and civilian pain, they do not disaggregate the impact of sanctions from other key causes of civilian suffering such as political oppression, poverty, demographic features, and civil wars. We therefore know very little about the extent to which economic sanctions result in civilian sufferings relative to some other major predictors of humanitarian problems. Using a time-series cross-sectional data set with appropriate statistical methods, I attempt to overcome this shortcoming by empirically examining one of the most widely referenced humanitarian costs of sanctions: public health.

## Sanctions and Public Health

Economic sanctions might deteriorate public health conditions through restricting adequate access to basic needs such as food and medical supplies, deteriorating economic well-being of the target society, and impairing the effective functioning of health services (Garfield 1997, 1999; Gibbons and Garfield 1999; Barry 2000). Trade embargoes on agricultural products and inputs such as fertilizer and seeds cause food shortages and inflate food prices. The international restrictions on the purchase of medical equipment and pharmaceutical products damage the health infrastructure of the target state. Poorer nutrition as a result of food shortages and the lack of access to basic needs and medical services produce several public health problems in target countries. This includes an increase in the maternal and child mortality rates (CMRs), and outbreak or

spread of epidemics and diseases especially among the poor segments of the society.

Even when designed with humanitarian exemptions such as excluding certain types of goods and products—usually food, medicine, and medical supplies—from a sanction regime, economic coercion might still inadvertently harm the physical well-being of civilians. For instance, international sanctions on the imports of non-medical products and spare parts might decrease the effectiveness of the health system in providing health-care services and responding medical emergencies (Garfield 1999; Barry 2000). Earlier research shows that trade restrictions imposed on the products used for water and electrical supply systems weakened health services in Cuba, Iraq, and Haiti (Garfield 1999; Gibbons and Garfield 1999; Barry 2000). This is because various health services are dependent on the water and electric supply systems including the sanitation infrastructure and functioning of medical equipment such as X-ray facilities and ambulances. Similarly, fuel embargoes imposed against Haiti (Gibbons 1999; Gibbons and Garfield 1999) and Sierra Leone (Heine-Ellison 2001, 105–106) made it very difficult to distribute food, medicine, and other basic needs especially to those living in rural areas. These case studies indicate that even when sanctions are designed with humanitarian safeguards, they might not always be ''humane'' enough to avoid the civilian suffering.

Economic sanctions might also deteriorate the public health conditions through inflicting significant damage on the target state's economy. Economic coercion on average results in a 3% reduction in the target state's GNP (Hufbauer et al. 2007). Excluding those countries experiencing hyperinflation, the average inflation is about 37% following sanction imposition. Higher inflation and economic downturn as a result of sanctions create more unemployment and poverty. A decline in national economic and financial conditions subsequently reduces people's ability to afford health-care services to maintain a healthy life and standard of living.

Furthermore, economic hardships caused by sanctions might reduce the pool of financial resources available to the state to deal with public health issues. Specifically, economic disruption caused by sanctions reduces the state's tax revenues from domestic economic actors, and international trade and financial exchanges. A decline in the state revenues will force the government to cut health-care services. The state will spend less in the medical infrastructure such as hospitals, health-care centers, and the training of health professionals. Health services and other redistributive policies provided by the state are crucial for different segments of the society. Earlier research points out that public health spending matters more to the poor, and public spending in welfare policies often affects the poor more favorably than the non-poor (Bidani and Ravallion 1997; Gupta, Verhoeven, and Tiongson 2003). For example, Gupta et al. (2003: 694) find that a 1% increase in public spending on health reduces child mortality by twice as many deaths among the poor. Similarly, Le Grand (1987) finds a negative relationship between health inequality and the share of public spending on healthcare. The underprovision of health-care services will consequently generate more public health problems and human misery in the targeted countries.

The target political leadership—who controls the supply and redistribution of public resources—might also intentionally reduce health-care spending to redirect the state's resources in their favor (Weiss et al. 1997; Gibbons 1999). Economic sanctions restrict the flow of goods and services to the target state. This results in a decline in access to external economic and other essential scarce resources. Because the target government controls the flow of remaining resources within the country, political elites will divert shrinking public resources to themselves and their supporters to survive foreign economic

pressures. This suggests that social groups that are outside the government's support base will likely have much restricted access to health resources (made scarce by sanctions) as the target government cuts public health spending and directs the scarce resources to their supporters as a key means to pay-off their support. This will disproportionately affect the physical quality of life of the most disadvantaged groups. Hence, sanctions not only cause a decline in access to and the quality of public health services but also promote unequal redistribution of scarce resources including medicine and health-care services. Consequently, the lack of adequate access to medical supplies and services especially among the disadvantaged segments of the society will raise the human suffering from sanctions.

## Hypotheses

According to the discussion above, economic sanctions are likely to worsen public health conditions by restricting the access to basic needs, worsening economic well-being of civilians, and damaging the effective functioning of health services. Yet, the mere presence of sanctions in a country is unlikely to have any notable impact unless we account for the economic strength of the targeted country and the overall cost of sanctions on the economy. First, we expect that the suggested impact of economic sanctions on public health is likely to be conditioned by the economic health of the target country's economy. More specifically, sanctions against developed countries might be less harmful than sanctions against less developed countries. This is because countries with higher levels of economic development and stability might ameliorate the possible humanitarian costs of sanctions than the countries with poor economic conditions. Even when economic sanctions are costly on the economy, developed countries will have an economic surplus and more public or private resources to mitigate the suggested negative impact of economic coercion on public health and the physical well-being of civilians in general. I therefore hypothesize that *economic sanctions will likely deteriorate public health conditions, but this effect is conditioned by the economic strength of the targeted country.*

Second, the suggested public health effect of the coercion will be higher to the extent that sanctions inflict significant damage on the economy. Economic sanctions that cause significant economic hardship (as in the cases of comprehensive sanctions against Iraq and the former Yugoslavia during the 1990s) are more detrimental on the socioeconomic stability than partial financial and trade restrictions with no discernable economic effect. I therefore hypothesize that *higher economic cost of sanctions will result in greater civilian suffering.*

Third, economic sanctions that are involved by the IGOs or the United States might be more harmful on civilian livelihoods than other sanctions. These sanctions are more likely to be detrimental to the target state due to the pressure by multiple countries in the case of the IGO sanctions and due to the global economic dominance of the United States. Moreover, the sanctions involved by an IGO or the United States might also inflict some significant indirect economic pressure on the target economy. The risk-free party private and public actors from the sender and third party countries might cut their trade and financial relations with the target economy because of the pressure on the target regime from the international community. Similarly, the sanctions led by the United States as a global economic power and a major trading country of most countries might discourage the US companies and third party actors investing in or trading with the target. Sanctions are used by sender countries as a means of communicating disapproval and signaling resolve to targets and other countries (Barber 1979; Lindsay 1986; Schwebach 2000). Therefore, the economic agents of the sender and third party countries might choose not to develop ties with

the target not to jeopardize their economic interests with the sender countries.[1] This will result in further isolation of the targeted country from the global economy and greater economic damage. I therefore hypothesize that *sanctions involved by an IGO or the US are more detrimental to public health conditions of the target on average.*

## Research Design

To empirically analyze the impact of economic sanctions on public health, I utilize time-series cross-section data for the 1970–2000 period. Below, I offer a detailed discussion of the operationalization of the dependent and independent variables, and the methodological approach.

### *Dependent Variable*

I use the natural log of CMR as the dependent variable. It accounts for the mortality rate among children under five years of age per 1,000 children born. I utilize two different data sources including the CMR data gathered by the World Health Organization (WHO) (Ahmad, Lopez, and Inoue 2000) and the UNICEF (2004). Although the data from these two sources are highly correlated, their coverage is slightly different. The use of two different data sources also allows me to check the robustness of the findings to data specifications. The mortality rate in the WHO data varies from 4 (Singapore in 1999) to 423 (Cambodia in 1975). The CMR in the UNICEF data varies from 4 (Finland and Sweden in 1995, and Norway, Singapore and Sweden in 2000) to 400 (Mali in 1970). The WHO and the UNICEF gathered the mortality data using multiple sources such as national statistical databases, country or region-specific studies, and previous demographic or health surveys conducted by private institutions.

It is important to note here that I chose not to use infant mortality rate (that is, the number of infants who die before the age of 1 per 1,000 infants born) as an additional variable to assess the effect of sanctions on public health. Earlier research on economic sanctions by health experts suggests that ''it is better to focus on under-five mortality than under one-year old mortality'' to understand the impact sanctions might have on young children (Garfield 1999, 21; Garfield and Gibbons 1999; Barry 2000). This is because, compared with mortality among children under five years of age, infant mortality rate can be easily modified using a number of policy measures by the government including a concentration of scarce resources and healthcare on pregnant women and infants. Such policy adaptations by the target government may actually lead to a decline in infant mortality rate in countries under economic coercion. In Haiti, for instance, during the 1987–1994 period, infant mortality declined 38%, from 101 per thousand live births to 74 per thousand live births. During the same period, however, child mortality (among children 1 through 4 years of age) increased from 56 per

[1] Morgan and Bapat (2003) in their game theoretical model offer a detailed study of how sender countries create and enforce laws as part of the sanctions process to effectively interrupt the economic transactions between their national firms and the target countries. The Helms-Burton Act and the Iran/Libya Sanctions Act, on the other hand, are two well-known examples of how the United States tried to enforce third party loyalty and reduce sanction busting. In both acts, the US government threatened private and public actors of third countries with economic restrictions on the United States or with the US companies abroad, if they trade with or invest in hostile targets like Cuba, Iran, and Libya. Although the United States or other countries may not take official steps as in the cases of Cuba, Iran, and Libya during less salient sanction cases, it is likely that sender countries will closely watch how the third countries react in response to the imposition of sanctions and use diplomatic channels to convey their displeasure of sanction-busting attempts. However, the cooperation from third party actors may not always be fully attained. According to a recent study on sanction busting (Early 2009), in some sanction cases, even the sender country's close allies might attempt to sanction bust on the target's behalf.

thousand to 61 per thousand (Gibbons and Garfield 1999; 1501). Similarly, Garfield notes that infant deaths reached an all time low of 7.1 per thousand in Cuba in 1998. He attributes this successful outcome to the Cuban government's efficient use of scarce resources and use of a number of public health measures to mitigate the impact of sanctions on the most vulnerable: infants and pregnant women. The policy measures adopted by the Cuban government include ''a strong family doctor programme, food rationing, routine monitoring of weight and weight gain among pregnant women and young children, medical surveillances of pregnancies, long-range investments in general education, a high degree of social unity concerning child health, and wide public education on public health issues'' (Garfield 1999, 13). The examples of Haiti and Cuba clearly show that it is imperative to use the most relevant empirical measures for an accurate assessment of the humanitarian and other consequences of sanctions.

The missing data for child mortality especially for less developed countries is an important concern for any quantitative analysis. Unless we have sufficient time-series cross-national data for a significant number of independent states, this issue may lead to incorrect inferences due to the non-random nature of the missing observations. To address this issue, I utilize multiple imputations using the *Amelia II* data imputation program (King, Honaker, Joseph, and Scheve 2001).[2] Amelia II imputes the missing observations of the data based on the observed values of the non-missing variables in the same row and creates $m$ completed data set (in this case $m = 5$, the program default). In each of the $m$ completed data sets, the observed values are the same, while the missing observations are filled in with different imputations to reflect the range of uncertainty of the imputed data. I then use the average of the data from the $m$ data sets to obtain the coefficients and standard errors.

### *Independent Variables*

The first sanction variable is the *Economic Sanctions* variable that is coded as 1 for countries facing economic coercion in a given year and 0 otherwise. This dummy variable is utilized to analyze whether the presence of economic sanctions is associated with worse public health conditions in target societies. To empirically investigate whether the impact of sanctions vary depending on the target's level of economic capacity, I use a multiplicative interaction term between the sanctions variable and GDP per capita (Sanctions × GDP). We expect that the suggested corrosive impact of sanctions will be more significant for those poor countries under economic coercion.[3]

Another sanction variable included in the model is the *Sanction Costs*, which measures the average cost of sanctions on the target economy as a percentage

[2] Listwise deletion is another possible strategy to handle missing data. This method simply excludes the missing observations from analysis. It is not appropriate for this analysis since the mortality data are mostly missing for developing countries, which reflects the non-random nature of the missing data (King et al. 2001). Similarly, modified zero-order regression (Greene 2003) could be another alternative that replaces missing values of the dependent variables with zeros and includes a dummy variable indicating missing observations to the specification. Clearly, it is not as an effective solution to the missing data problem as the multiple imputation approach.

[3] I also explored the possibility that the regime type of the target plays a key interactive role in the public health impact of sanctions. To be able to remain in power and get re-elected, democratic leaders have more incentives to channel the state revenues and resources to the service of the populace through the provision of public goods and services (Przeworski, Alvarez, Antonio Cheibub, and Limongi 2000; Lake and Baum 2001; Bueno de Mesquita, Smith, Siverson, and Morrow 2003).Because autocratic leaders face no electoral constraints to remain in power, they are less likely to invest heavily in public services to satisfy the citizenry. If so, when put under foreign economic pressure, public health conditions in democratic states will likely become more susceptible to downward change. However, the results suggest that the regime type of target states does not play any statistically significant interactive role in mitigating or worsening the public health conditions.

of gross national product over the entire sanction episode. As hypothesized above, we expect that the economic damage caused by sanctions will likely play a key role in the extent of harm inflicted on civilian livelihoods.[4] The cost variable accounts for the overall direct and indirect impact of sanctions on the deprivation of markets and finances. To do so, it estimates the immediate trade and financial losses caused by the coercion. It also calculates the possible offsetting impact of the third party economic assistance to the target country (Hufbauer et al. 2007, 101–102.). In several sanction cases especially during the Cold War, target countries mitigated the destabilizing impact of sanctions with the financial assistance and trade credits provided by major powers and allies. It consequently reduced the intended economic damage of sanctions by sender countries and played some role in the failure of some sanction cases. For instance, in the case of US sanctions against Cuba, the Soviet Russia increased its trade ties and provided aid to the Cuban communist regime to undermine the unilateral US sanctions. The motivation behind the Russian support was to prevent Castro's regime from weakening due to economic burden of sanctions. The cost variable aims at reflecting these offsetting benefits to thoroughly assess the extent of damage inflicted on the target economy by sanctions.

To control for the sanctions involved by IGOs such as the United Nations and the European Union, I include the *IGO Sender* dummy variable. I also control for the sanctions imposed by the United States with the *US Sender* dummy variable in the model.[5] These variables are included in the analysis to examine whether the involvement of an IGO or the United States makes economic sanctions more damaging on the physical well-being of civilians.

The data for economic sanctions come from Hufbauer et al. (2007), which is the most widely used database for economic sanctions. The sanction data include both unilateral sanctions imposed by individual countries and multilateral sanctions imposed by multiple countries with or without the involvement of IGOs. The data analysis includes 96 different sanctions episodes.[6] The United States is the unilateral sender in 40 of those cases. An international organization is coded as a sender in 33 of the sanction episodes. Overall, the data comprise of 807 sanction years (19.88% of the data) and 3,252 non-sanction years (80.12%).

### *Control Variables*

A battery of control variables is included in the models to control for the impact of other major independent predictors of child mortality. The natural log of GDP per Capita controls for the effect of economic wealth and development. The quality of life in countries mired in poverty that lack economic

[4] ''Smart sanctions'' such as arms embargoes and international travel bans on the target state's officials are relatively new and became more popular in the post-2000 period. These sanctions are specifically designed to minimize the economic cost of the sanctions on the general public (Cortright and Lopez 2002; Wallensteen, Staibano, and Eriksson 2003). Hufbauer et al.'s data include 20 smart sanction cases (nine of which were imposed in the 1990s). I include them in the data analysis because they are almost ''always imposed in combination with selective export restrictions or aid suspension'' (Hufbauer et al. 2007, 138). Furthermore, the cost variable that controls for the overall economic impact of each sanction cases should also account for such sanction cases with minimal effects. When I dropped the sanction episodes involving such targeted sanctions in the analysis, there was no change in the findings.

[5] I also ran additional models to investigate whether the duration of economic coercion (i.e., number of years sanctions in place) plays any role on child mortality. The negative impact of sanctions on public health might be greater the longer sanctions are in place. The sanction duration variable was not statistically significant in the model to suggest a statistically significant association between the length of economic coercion and child mortality.

[6] Some target countries face more than one sanction in a given year. Because of the country-year format of the data, those cases are also considered as one sanction episode in the analysis.

resources will be much lower and people have more limited economic power to have access to essential health services. Furthermore, economic wealth and higher levels of income provide the state and private health actors with necessary financial resources to more effectively deal with public health issues (Pritchett and Summers 1996; Lake and Baum 2001; Ghobarah, Huth, and Russet 2003). Availability of financial resources allows the state and private actors to invest in hospitals and health technologies to meet the health needs of citizens. Moreover, economic wealth provides financial support to improve the pool of human resources (doctors and health-care specialists) to provide health services.

A *Democracy* variable accounts for the extent of the respect for political rights and civil liberties across countries. Democracies are more likely to offer essential public goods and welfare programs such as state-supported health-care and social security services and decrease the level of income inequality between the rich and poor that will consequently improve the overall physical quality of life in the society (Przeworski et al. 2000; Lake and Baum 2001; Bueno de Mesquita et al. 2003; but see also Ross 2006). This is because democratic leaders have more incentives to channel the state revenues and resources to the service of the populace through the provision of public goods and services to get re-elected and remain in power. Because autocratic leaders face no electoral constraints to remain in power, they are less likely to invest heavily in public services to satisfy the citizenry. This variable is taken from the Polity IV data set (Marshall and Jaggers 2002). Each country's democracy score ranges from −10 to 10, where 10 represents the highest level of democracy and is based on three major characteristics of a political regime that include: the regulation, competitiveness, and openness of executive recruitment; executive constraints; and regulation and competitiveness of political participation.

Scholars also find convincing evidence that presence of a civil war in a country will likely cause greater disruption to civilian lives (Ghobarah et al. 2003; Li and Wen 2005; Iqbal 2006). The violence associated with civil conflicts increases the risk of death and diseases by threatening the physical security of civilians, destroying the infrastructure such as hospitals and health-care centers, causing forced migration, and impeding the regular functioning of the economy. The ongoing armed conflict between the government forces and insurgents also pressures the state to channel public resources to cease the violence rather than spending for health and other public services to maintain a strong public health system. The *Civil War* variable is coded as 1 if a country is engaged a civil war with at least 25 battle-related deaths per year and 0 otherwise. The data for civil are from the Armed Conflict Dataset (Strand, Carlsen, Petter Gleditsch, Hegre, Ormhaug, and Wilhelmsen 2005) of the International Peace Research Institute, Oslo (PRIO).

I also include the annual percentage of *Population Growth* to control for the possible association between demographic pressures and the physical quality of life. In countries with greater population growth rates, there will more resource scarcity and failure in the state's ability to provide necessary public services to maintain high level of human development in the areas of health. The population growth data are from the World Bank (2004).

I ran a number of diagnostic tests (Levin and Lin 1993; Im, Pesaran, and Shin 1997; Wooldridge 2006) to check whether the CMR data have strong unit roots and hence violate the stationarity assumption. The tests revealed that there is strong temporal dependence in the data. I correct for the autoregressive process in the dependent variable using two different strategies. First, I include a one-year lag of the dependent variable in the models. I also applied a standard AR(1) estimator. I apply both of these specifications for consistency and as a robustness check. To control for the heteroscedasticity present in the model, the

TABLE 1. Results for the Effect of Economic Sanctions on Public Health DV=Child Mortality Rate (WHO)

| | *Lagged DV Models* | | *AR1 Models* | |
|---|---|---|---|---|
| | *Model 1* | *Model 2* | *Model 3* | *Model 4* |
| Sanctions | 0.032 (0.240) | −0.026 (0.248) | 0.048 (0.343) | −0.037 (0.359) |
| Sanctions × GDP | −0.041 (0.032) | −0.046 (0.032) | −0.059 (0.045) | −0.063 (0.046) |
| Sanction Costs | | 0.007 (0.003)** | | 0.010 (0.005)** |
| US Sender | | 0.227 (0.060)*** | | 0.287 (0.083)*** |
| IGO Sender | | −0.051 (0.065) | | −0.056 (0.096) |
| GDP per Capita (logged) | −0.552 (0.048)*** | −0.561 (0.048)*** | −0.807 (0.025)*** | −0.810 (0.025)*** |
| Democracy | −0.031 (0.003)*** | −0.031 (0.003)*** | −0.043 (0.003)*** | −0.042 (0.003)*** |
| Civil War | 0.067 (0.030)** | 0.074 (0.028)*** | 0.071 (0.038)* | 0.077 (0.036)** |
| Population Growth | 8.020 (9.230) | 8.060 (9.200) | 4.410 (8.400) | 4.440 (8.390) |
| Lagged Mortality | 0.321 (0.058)*** | 0.313 (0.058)*** | | |
| Constant | 7.317 (0.623)*** | 7.425 (0.619)*** | 10.76 (0.200)*** | 10.78 (0.201)*** |
| Observations | 4055 | 4055 | 4209 | 4209 |

(*Notes.* Panel corrected standard errors appear in parentheses. ***Significant at 1%, **significant at 5%, * significant at 10%.)

Panel Corrected Standard Errors (PSCSE) method is used in the models (Beck and Katz 1995).[7]

## Findings

Tables 1 and 2 report the results from the data analysis.[8] In Table 1, I use the WHO's CMR as the dependent variable. I repeat the analysis in Table 2 using the UNICEF's mortality data as the dependent variable. In each table, the first two models (models 1 and 2) report the results using the lagged DV method and models 3 and 4 use an AR1 estimator for temporal dependence. I begin the analysis with a partial model that tests the conditional hypothesis on the mitigating impact of economic wealth. Then, I run a full model that also includes the sanction costs, the US sender, and the IGO sender variables.

According to the results in Table 1, I find no significant support for the hypothesis that the strength of the target economy mitigates the effect of economic sanctions in target countries. Both the sanction variable and the interaction term are not statistically significant in predicting CMR. The results also show that the involvement of an IGO is unlikely to make sanctions more or less harmful to child mortality. The other two sanction variables—sanction costs and the US sender—in Table 1 are statistically significant in the expected direction. The findings therefore support the argument that as the cost of sanctions inflicted on the target economic increases, it is likely that there will be an increase in CMR in target countries. Economic sanctions are also likely to exact significant damage on the target country especially when levied by the United

[7] When the sanction variables are lagged one year to undermine any possible simultaneity bias between the dependent and independent variables, the results were very similar. I chose not to lag the sanction variables to be able to capture the immediate impact of foreign economic pressures in the target state. Specifically, we expect that the most significant damage caused by the sanctions will likely be in the first year. This is because following the first year of imposition the target state will likely find ways to mitigate the cost of sanctions and adapt to new circumstances created by the sanctions.

[8] Diagnostic tests revealed that there was no issue with multicollinearity in any of the estimations reported below.

Table 2. Results for the Effect of Economic Sanctions on Public Health DV = Child Mortality Rate (UNICEF)

| | *Lagged DV Models* | | *AR1 Models* | |
|---|---|---|---|---|
| | *Model 1* | *Model 2* | *Model 3* | *Model 4* |
| Sanctions | 0.126 (0.222) | 0.105 (0.221) | 0.273 (0.344) | 0.239 (0.345) |
| Sanctions × GDP | −0.045 (0.029) | −0.051 (0.029)* | −0.080 (0.045)* | −0.087 (0.046)* |
| Sanction Costs | | 0.005 (0.002)** | | 0.007 (0.004)** |
| US Sender | | 0.187 (0.056)*** | | 0.239 (0.089)*** |
| IGO Sender | | −0.073 (0.068) | | −0.086 (0.104) |
| GDP per Capita (logged) | −0.540 (0.047)*** | −0.547 (0.047)*** | −0.817 (0.034)*** | −0.820 (0.034)*** |
| Democracy | −0.030 (0.003)*** | −0.029 (0.003)*** | −0.043 (0.003)*** | −0.042 (0.003)*** |
| Civil War | 0.054 (0.025)** | 0.062 (0.024)*** | 0.0507 (0.034) | 0.056 (0.033)* |
| Population Growth | 2.170 (1.010)** | 2.160 (1.010)** | 1.810 (9.360)* | 1.810 (9.350)* |
| Lagged Mortality | 0.349 (0.056)*** | 0.342 (0.055)*** | | |
| Constant | 7.125 (0.603)*** | 7.218 (0.597)*** | 10.89 (0.263)*** | 10.91 (0.263)*** |
| Observations | 4055 | 4055 | 4209 | 4209 |

(*Notes.* Panel corrected standard errors appear in parentheses. ***Significant at 1%, **significant at 5%, *significant at 10%.)

States. As discussed above, the sanctions involved by the United States might be more harmful because of the US' global economic dominance that will not only inflict significant direct economic damage through the trade and financial restrictions but also will deter the US companies, and third party private and public economic actors trading with or investing in the targeted country. Note that this finding holds even when we control the overall cost of sanctions.

Table 2 repeats the data analysis using the UNICEF's mortality data as the dependent variable. The results reported in Table 2 are similar to the ones reported in Table 1, which confirms that the findings are robust to the use of an alternative data to measure child mortality. Specifically, the results show that the cost of economic sanctions and the United States as a sender country are the two significant sanction-related factors, while the sanctions dummy and the IGO variable show no major statistically significant effect on public health conditions. The interaction term used to test the conditional hypothesis on the interactive role of economic development is statistically significant in three of the four models in Table 2. But this appears to be not a robust finding since I find no support for the same variable in Table 1 and it is also not significant in model 1 in Table 2.

Among the control variables, I find strong support for the argument that democratic countries will likely have a lower CMR than countries with autocratic regimes. I also find that the higher levels of economic development have a strong positive impact on CMR. This finding holds even when I remove the GDP interaction term to test whether economic wealth has a positive impact on child mortality in general. Civil wars appear to increase the CMR as suggested by several studies in the literature. The population growth variable is significant only in the models using UNICEF's data. Finally, the lagged mortality variable used to control for the temporal dependence is also statistically significant in the expected direction.

Table 3 provides the substantive effects of the significant independent variables on the predicted value of CMR using model 3 in Table 1.[9] According to

[9] I converted the natural log values of the dependent variable back to real numbers in Table 3 to make the substantive impacts of the variables intuitively more clear.

TABLE 3. Predicted Values of the Child Mortality Rate (WHO)

| | *Initial Value* | *Unit Change* | *New Value (%Change)* |
|---|---|---|---|
| Sanction Costs | 62.17 | Mean + 1$\sigma$ | 64.75 (4) |
| US Sender | 62.17 | 0 $\rightarrow$ 1 | 83.93 (35) |
| GDP per Capita | 62.17 | Mean + 1$\sigma$ | 25.79 (59) |
| Democracy | 62.17 | Mean + 1$\sigma$ | 45.60 (27) |
| Civil War | 62.17 | 0 $\rightarrow$ 1 | 68.03 (9) |

(*Note.* The initial predicted value of the dependent variable is calculated by holding each continuous control variable at its mean value and each ordinal variable at zero. Then, the variable under consideration is increased from its mean value to one standard deviation above it (mean + 1$\sigma$) or from its minimum to maximum value (0 $\rightarrow$ 1) to determine its individual substantive effect.)

the results, when I raise the cost variable from its mean value to one standard deviation above it, I find a 4% increase in the predicted value of child mortality (from 62.17 to 64.75). Moving from no sanctions to the presence of US sanctions (0–1) increases the predicted value of the dependent variable by 35%. When I shift the GDP variable from its mean value to one standard deviation above it, there is a 59% decrease in the value of child mortality, while a change in the democracy variable from its mean value to one standard deviation above it reduces the predicted value of child mortality by 27%. Finally, moving from no civil war to civil war (0–1) increases the value of child mortality by 9%. Note that I only find a relatively modest impact of the cost variable on child mortality. This is mostly because the cost variable also accounts for the possible offsetting benefits of the sanctions (that is, third party economic assistance). The suggested impact would likely be higher if the variable had only reflected the negative impact of economic sanctions on the target economy.

## Conclusion

This study offers a quantitative assessment of the public health impact of economic sanctions. It is argued that economic sanctions might deteriorate public health conditions by restricting the access to basic needs, deteriorating economic well-being of civilians, and undermining the effective functioning of health services. The results from the data analysis point out that the human cost of economic sanctions is largely conditional on the extent to which sanctions are costly for the target's economy. Sanctions levied by the United States appear to be more detrimental to public health conditions on average than other sanctions even when we control the cost of the sanctions. The results also show that the economic wealth of target countries is unlikely to play any significant interactive role in mitigating or worsening the public health effect of economic coercion. Similarly, the involvement of an IGO in the imposition process does not statistically increase or decrease the effect of sanctions on child mortality. Overall, these findings provide some support for President Wilson's assertion that economic coercion as a non-violent policy option might become a ''silent, deadly'' tool, especially when they are costly for the target economy.

The research on sanctions so far has primarily studied whether and when economic coercion might be effective in foreign policy while mostly overlooking the possible consequences of sanctions. Given the possible humanitarian and other costs of economic sanctions, it is imperative for decision makers to consider the intended and unintended consequences of the use of economic coercion in assessing the overall success of economic sanctions. To undermine the civilian pain and improve the effectiveness of sanctions, sender countries should seek ways to put the pressure directly on the political elites who are in charge of the

wrongdoings. It must be, however, noted that even when sanctions are imposed with humanitarian exemptions, they do not guarantee the protection of civilians from the cost of sanctions. As suggested above, even trade limitations imposed on non-medical supplies and parts such as those used in electricity and water supplies might contribute to the collapse of medical services and generate a number of public health problems.

The use of sanctions more frequently in the forms of financial asset freezes, reduction or suspension of military arms sales and aid, and travel bans on target country's officials could be a way to target the political leadership (Cortright and Lopez 2002; Wallensteen et al. 2003). The significance of these so-called smart sanctions is that average citizens might suffer much less from them, since they are specifically pointed at the ruling elites. Yet, their success rate relative to other sanctions in inducing behavioral change in the target is still questionable, which might not necessarily make them more appealing for sender countries as punitive measures unless policy makers consider the inadvertent humanitarian cost of sanctions as an integral part of the success/failure debate.

Future research could further advance our understanding of the unintended consequences of sanctions by focusing on other political, economic, and social costs of sanctions in the target society. The extant sanctions literature is mostly state-centric and concentrates on the effect and consequences of the sanctions on the target society as a whole. A holistic approach to the study of economic statecraft might result in the neglect of the disadvantaged segments of the society, including women, children, and ethnic or religious groups. Future research could therefore focus on the level of suffering among disadvantaged groups to help us better gauge the severity of the effect sanctions might have on civilians.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Table S1.** Results for the effect of economic sanctions on public health.

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