

**Sanctions and Economic Growth: Do Sanction
Diversity and Level of Development Matter? The
Impact of Sanction on Economic Growth**

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ABSTRACT

Economic sanctions, as peaceful means of forcing political process, demonstrate different levels of efficiency. Although the goal is to have some control over targeted countries without the commitment of troops, such actions usually have negative consequences: deteriorating health status and escalating levels of poverty within the population. Nevertheless, despite their limited scope, their use is widespread, making them a crucial component in the complex interplay of international politics and economics. Sanctions have been used for a variety of purposes, including to alter foreign policy, as punishment, and to deter military conflict. Despite extensive debates about their efficacy, the use of sanctions has grown over time as a first-order foreign policy tool, particularly for the United States.

The panel data used in this research include 168 countries over the period from 2000 to 2018 for analysis of the impacts of sanctions on economic. The variables include real GDP per capita, gross capital formation, and trade openness. The augmented Solow growth model is estimated using the System Generalized Method of Moments (GMM) method to control for potential endogeneity and unobserved heterogeneity problems. Dummy variables are included that allow for an assessment of the individual effects of various groups of sanctions, including unilateral versus multilateral actions, and the role of political and economic institutions. The study finds that the impact of economic sanctions on GDP growth is indeed dependent on the type and intensity of the imposed sanctions. Broad-based sanctions are generally much more negative, in particular in developing countries, while multilateral measures tend to correlate more strongly with recessions. Results also indicate that even though sanctions have the

potential to retard economic development, most especially in countries with weaker institutional frameworks, their impact is relatively less severe in developed economies.

Conversely, the findings of the research indicate that effectiveness of sanctions is as well essentially affected by prevailing political and economic conditions in the target country besides the nature of the imposed sanctions themselves. Economic sanctions can bring about economic stagnation, further poverty, and decrease in democratic institutions particularly in developing nations. Countries with strong institution levels or those that may have formed other economic relationships can be able to withstand adverse effects linked with economic restrictions. The research underlines how a nuanced understanding of the mechanisms through which sanctions work within diverging contexts is needed, and calls for more tactical and targeted approaches in order to ensure that their intended political objectives are met without exacerbating humanitarian crises.

Keywords: Institutions, Sanctions, Sustainable Growth, GMM

ÖZ

Ekonomik yaptırımlar, siyasi süreci zorlamanın barışçıl yolları olarak farklı verimlilik seviyeleri gösterir. Amaç, asker taahhüdü olmadan hedeflenen ülkeler üzerinde bir miktar kontrol sahibi olmak olsa da, bu tür eylemlerin genellikle kötüleşen sağlık durumu ve nüfus içinde artan yoksulluk seviyeleri gibi olumsuz sonuçları olmaktadır. Bununla birlikte, sınırlı kapsamlarına rağmen, yaptırımlar yaygın olarak kullanılmaktadırlar. Bu durum, yaptırımları uluslararası politika ve ekonominin karmaşık etkileşiminde önemli bir bileşen haline getirmektedir. Yaptırımlar, dış politikayı değiştirmek, ceza olarak ve askeri çatışmayı caydırmak olmak üzere çeşitli amaçlar için kullanılmıştır. Etkililikleri hakkında kapsamlı tartışmalara rağmen, yaptırımların kullanımı, özellikle Amerika Birleşik Devletleri için, zamanla birinci dereceden bir dış politika aracı olarak büyümüştür.

Bu çalışma, yaptırımların ekonomik büyüme üzerindeki etkisini incelemek için 2000'den 2018'e kadar uzanan 168 ülkeden panel verileri kullanmaktadır. Veriler, kişi başına düşen reel GSYİH, brüt sermaye oluşumu ve dış ticaret açıklığı gibi değişkenleri içermektedir. Potansiyel içselliği ve gözlemlenemeyen heterojenliği ele almak için Genelleştirilmiş Momentler Yöntemi (GMM) sistemiyle birlikte Genişletilmiş Solow büyüme modeli kullanılmıştır. Çalışmaya kukla değişkenlerin dahil edilmesi, tek taraflı ve çok taraflı eylemler ve siyasi ve ekonomik kurumların rolü dahil olmak üzere çeşitli yaptırım türlerinin farklı etkilerinin analizine olanak tanır.

Analiz, ekonomik yaptırımların GSYİH büyümesi üzerinde yaptırımların türüne ve kapsamına bağlı olarak değişen bir etkiye sahip olduğunu ortaya koymaktadır. Geniş yaptırımlar, özellikle gelişmekte olan ülkeler üzerinde daha belirgin olumsuz bir etkiye sahip olma eğilimindeyken, çok taraflı yaptırımlar ekonomik gerilemelerle daha güçlü bir korelasyon göstermektedir. Sonuçlar, yaptırımların ekonomik büyümeyi, özellikle daha zayıf kurumlara sahip ülkelerde engelleyebileceğini, ancak etkinin gelişmiş ekonomilerde daha az şiddetli olduğunu gösteriyor.

Çalışma, yaptırımların etkinliğinin hedef ülkenin politik ve ekonomik bağlamına ve uygulanan yaptırımların doğasına büyük ölçüde bağlı olduğu sonucuna varmaktadır. Yaptırımlar, özellikle gelişmekte olan ülkelerde ekonomik gerilemeye, artan yoksulluğa ve zayıflamış demokratik kurumlara yol açabilir. Ancak, güçlü kurumsal veya alternatif ekonomik ortaklıklara sahip ülkeler, yaptırımların olumsuz etkilerine karşı daha donanımlı olabilir. Çalışma, yaptırımların farklı bağlamlarda nasıl işlediğine dair ayrıntılı bir anlayışa duyulan ihtiyacın altını çizmekte ve insani krizleri daha da kötüleştirmeden amaçlanan politik hedeflerine ulaşılmasını sağlamak için daha stratejik ve hedefli yaklaşımlar çağrısında bulunmaktadır.

Anahtar Kelimeler: Kurumlar, Yaptırımlar, Sürdürülebilir Büyüme, GMM

DEDICATION

To my family...

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Chapter 1

INTRODUCTION

The literature of international economics stresses that a strong political and economic relationship between states is crucial for the world's big challenges and economic development. According to Gilpin (2016), international cooperation and relevant institutions are needed in order to sustain global prosperity. Economic interdependence through trade and investments fosters development and creates jobs (Mahmudov et al., 2023). On the other side, however, globalization can also expose states to crisis and economic shocks (Rosecrance & Stein, 2006). Interactions between countries can enhance their adaptive capacity in overcoming economic challenges. Trade relationships and labor market institutions of partner countries influence unemployment rates and comparative advantages (Boulhol, 2008; Heap, 1994).

Global economic integration brings about new opportunities but also risks: events in one country may be strongly felt in another via financial flows and supply chains (Gardner et al., 2019). In the case of growing interdependence among the world's economies, this means that geoeconomics has been brought into being as the major driving element in international relations and growth economics. Geoeconomics, popularly put within a realist framing, is the strategic use of economic tools (Vega, 2021); it reflects a complex interaction of politics, economics, and power in a global perspective (Shahzad, 2022).

These movements are in the direction of economic sanctions, considered non-violent options for military intervention. Economic sanctions over the last two decades have become one of the primary tools of international politics in which states have normally sought to exercise their influence without resorting to military force (Chingono et al., 2013; Zveriev, 2024). While sanctions may range between diplomatic and political to all ways economic, its effectiveness can very well be questioned (Smeets, 2019). So far, in this modern world, its globalized character has aided and hindered the effect of sanctions: interdependence could make a state more vulnerable but also perhaps provide alternative trading partners. (Chingono et al., 2013). These measures generally hit the most vulnerable sections of populations and carry a lot of ethical issues (Gordon, 1999), besides their limited success in achieving their intended political objectives (Smeets, 2019). Notwithstanding, in practice, sanctions are continuously used in interstate relations (Sedliar, 2017). Apart from a strict adherence to increasing global stability, political considerations do make a difference in how sanctions are applied (Zveriev, 2024).

There is evidence that the economic sanctions have impacted the targeted country's public health. Sanctions decrease access to basic life requirements, including medical supplies and health care (Ahmadi & Amiri, 2015; Asgardoont et al., 2022), resulting in predisposition to diseases of an infectious nature and malnutrition (Garfield et al., 1995). They also contribute negatively toward the pharmaceutical industry and the medical trade (Miromanova, 2023), hence medicine and medical equipment shortages (Asgardoont et al., 2022). In fact, sanctions can lower government spending on health, while increasing household spending on health care (Ahmadi & Amiri, 2015). Generally, economic sanctions are among the major social determinants of health

which impact the overall wellbeing and health of the populations under target (Kokabisaghi, 2017).

The rare effectiveness of sanctions usually has lethal effects on the economy of the country on which the sanctions will be imposed. Various researches prove that sanctions decrease democracy levels and freedom of politics along with more human rights violations of target countries (Peksen & Drury, 2010; Peksen, 2009; Akter & Hossain, 2023). Sanctions risk increased authoritarianism, political instability, and civil strife (Wood, 2008; Herbert, 2022). They often result in the suffering of civilians economically and can lead to the exacerbation of humanitarian crises (Herbert, 2022). Generally, evidence indicates that economic sanctions often generate destructive unintended consequences and may indeed be counterproductive to their very intent.

Empirical research on economic sanctions has consistently shown, time and again, the negative impacts they have on target countries. Sanctions indeed depress growth in GDP; UN sanctions diminish growth by 2.3-3.5 percentage points, while US sanctions diminish growth by 0.5-0.9 percentage points (Neuenkirch & Neumeier, 2015). They also raise inequality in incomes (González, 2022; Jeong, 2020) and poverty, increasing the poverty gap by 2.3 to 5.1 percentage points (Neuenkirch & Neumeier, 2015). Sanctions disturb the flow of trade (Caruso, 2003) and increase the vulnerability to currency crisis (Peksen & Son, 2015). This will also be reflected adversely in all consumption, investment, government expenditures, and FDI economic indicators (Gutmann et al., 2023). Especially, comprehensive sanctions will have these effects more drastically (González, 2022; Neuenkirch & Neumeier, 2015). These bear very wide implications, from levels of living and death to human rights in the target country (Rodríguez, 2024), at very high humanitarian costs of economic sanctions.

The latter ones deal with the analysis of the influence of sanctions on such separated countries as Iran and Russia. It came out that sanctions influenced negatively on the economic structures, decline in macroeconomic indicators, and financial markets (Rasoulinezhad, 2016). This is not always that simple, though, because the effect can be blurred, and some studies even show a very uncertain result on general economic development (Sukharev & Voronchikhina, 2022). Both Iran and Russia have taken anti-sanction moves via economic relations' diversification and enhancement of local production (Khominich & Alikhani, 2021; Likhacheva, 2021). These sanctions confronted the economies but simultaneously resulted in qualitative work to reduce dependence on the US dollar and alternative partnerships (Smorodinskaya & Katukov, 2023). Curiously, some studies find that Russian firms were prepared for these recent geopolitical events, and this increased exporting to China helped them offset the negative effects on firm performance (Huynh et al., 2023). These studies targeted a each single country; hence, their results might be peculiar and should not be generalizable to other nations.

Recent studies have indeed investigated the complex link between economic sanctions and GDP growth in target countries. Although economic sanctions generally make the economy of the targeted country worse by stultifying economic growth (Kwon et al., 2020; Gutmann et al., 2023; Neuenkirch & Neumeier, 2015), effects do vary with specific sanction type, sender identity, and target country characteristics (Alhassan et al., 2023; Kwon et al., 2020). On average, UN sanctions are found to be more harmful than US sanctions (Neuenkirch & Neumeier, 2015). Among various types of sanctions, financial and trade sanctions are the most growth-reducing (Gutmann et al., 2023), although smart sanctions may have a positive effect on long-run growth (Kwon et al.,

2020). Indirectly, sanctions can stimulate informal economic activity and cause currency crises (Peksen & Son, 2015), hence affecting growth (Early & Peksen, 2019). Some research, however, finds little effect of sanctions on growth as in Iran (Ezzati, 2016), which again is indicative of the complex nature of the relationship.

Economic sanctions can be imposed unilaterally or multilaterally, with mixed results (Kaempfer & Lowenberg, 2007). The tools of sanctions are also varied, ranging from asset freezes to travel bans to trade embargoes (Happold & Eden, 2016; Caldwell, 2022). Because broad-based sanctions proved very contentious in recent years due to their humanitarian consequences, the trend has been to employ "smart" or focused sanctions against individual citizens or groups (Gordon, 2011). Success partly depends on such factors as a political regime of the target state and the relative influence of interest groups in both the sanctioning and the target countries (Kaempfer & Lowenberg, 2007; Morgan & Bapat, 2003). Recent trends are towards individual responsibility in the application of sanctions (Juma, 2023).

Economic sanctions seen as an important tool of international politics, although overall effectiveness is debated (Kaempfer & Lowenberg, 2007). Studies evidence the fact that the sanctions can reduce GDP growth for target countries, and an additional sanction decreases real GDP per capita by 0.39% (Kwon et al., 2022). Their impact does, however vary with sanction type, target country development level, and sender identity (Alhassan et al., 2023). For example, the trade sanctions have stronger negative effects on growth compared to smart sanctions that may promote the long-term growth (Kwon et al., 2020). Sanctions can have significant impacts on economic growth, particularly when they are prolonged or target critical sectors of an economy (Rodrik, 1998).

Sanctions often lead to a significant decline in economic growth for the targeted country, as they disrupt trade flows and investment, which are crucial for development. (Krugman, 1999). Further, sanctions may influence income inequality because of the prevailing economic conditions in the target country (Jeong, 2020). The general aspect is that controlling for sanction heterogeneity and target country characteristics is central regarding sanctions' effectiveness. The fact that poorer nations depend highly on the richer nations, the sanctions will most likely hurt the economies of the poor nations more than it would hurt the rich countries (Alhassan et al., 2023).

Researches indicate that the success of sanctions varies significantly with the political institutions of the target state: democracies are more susceptible to popular pressures generated by economic deprivation than authoritarian regimes (Allen, 2008; Lektzian & Souva, 2007). Even this latter relationship, however, varies across authoritarian regime types: personalist regimes are more vulnerable than single-party and military regimes (Peksen, 2019). The larger the number of veto players in the target state, the more likely sanctions will succeed (Jeong & Peksen, 2019). Democracy-specific sanctions in particular, although rare, have achieved some successes in the target countries' democratic development in the post-Cold War era (Von Soest & Wahman, 2013). In addition, high costs imposed on the target state and participation by international institutions are the factors identified throughout the literature as repeatedly associated with sanctions success (Bapat et al., 2013). Additionally, democratic senders tend to impose sanctions more frequently but prefer targeting non-democracies (Lektzian & Souva, 2007), highlighting the complex interplay between domestic institutions and sanctions effectiveness.

The critical contribution this study has made to the literature of sanctions-economic growth is threefold: it could depict countries' heterogeneity on a cross-section of countries all over the world by taking into consideration sender identity and both target and sender countries' income levels; it considered the diversity of sanctions and assessed its specific effects on economic growth. Thirdly, it considered the role played by institutions in molding the impact that different episodes of sanctions would have on growth. This study contributes to the literature that is developing by estimating the impact of political and economic sanctions on economic growth and even calibrating the heterogeneity of such sanctions and their impacts by the income classification of the targeted countries. It also conditions this paper for the variables of economic and political institutions to consider the association between sanctions and economic growth.

The limitations of this paper lie in its failure to include the problem of regional heterogeneity of countries because it excludes the different regional contexts where the issuance of sanctions is made and their various successes or failures. Also, the institutional quality was not decomposed into its diverse components that may involve different effects on the nexus between sanctions and economic growth. The study observes that many countries take a similar stand on geopolitical issues as their regional partners and differences in institutional frameworks have a big say in the outcomes of sanctions.

The purpose was to analyze how these different types of economic and political sanctions influence economic growth in targeted states. This research will try to capture, in particular, how such differences in sanctions-the extensiveness, type of action-along with the level of development in target countries, affects the effectiveness

of sanctions. It also tends to explain the heterogeneity of the sanctions, taking into perspective the target and sender income levels, the sender of the sanction, and then the functions of the political and economic institutions. Thus, various attributes of sanctions and various characteristics of the target country would definitely contribute substantially, through the process, to knowledge on economic consequences that have policy implications for how to use sanctions effectively.

The second part of this study includes a detailed literature review that will shed light on the subject. The third part includes the data and methodology used to achieve the aim of the study. The fourth part of the study includes empirical findings. The final part of the study includes conclusions and policy recommendations.

Chapter 2

LITERATURE REVIEW

2.1 History of Economic Sanctions

Sanctions are one of the oldest functions of economic statecraft. One of the earliest recorded actions is the Megarian decree of 432 BC, in which Athens imposed trade restrictions on Megara during the Peloponnesian War (Chan & Drury, 2000; Alexander, 2009; Thouvenin, 2019). Sanctions have been resorted to since time immemorial for several reasons, including as an instrumental tool for economic war into battle situations (Alexander, 2009). Notable examples include the Continental System of Napoleon in 1806 and the U.S. Embargo Act of 1807 against Great Britain (Ahn, 2019). The effectiveness of the sanctions has been debated; some historical examples have been more harmful to the country imposing them than to the country against which they were applied (Ahn, 2019; Hoffmann, 1967). During the 20th century, sanctions came into still more frequent and formal use, especially after World War I, following their mention in the League of Nations Covenant (Rodionova, 2024; Wallensteen, 2000). Over the last several decades, economic sanctions have emerged to become one of the most widely used instruments within international relations. Hundreds of sanctions programs were issued by the United States and by the United Nations (Ahn, 2019).

Economic sanctions have often formed a part of foreign policy throughout history; more precisely, they usually formed a subordinate instrument of military policy in

times of war. Sanctions have indeed served a number of historical purposes-to influence foreign policy, to placate domestic pressures, and as an instrument of military policy (Alexander, 2009). In the 20th century, their use grew, with debates during the 1930s, 1960s, and 1990s (Wallenstein, 2000). The United States has been the most frequent user of sanctions, participating in 68 out of 103 documented cases since World War I (Hufbauer & Schott, 1985). To some, sanctions embody a sophisticated foreign policy tool; to others, they are ineffective and risk being used too often (Ahn, 2019). Sanctions have been debated on issues of effectiveness: historical examples show mixed results with possible negative impacts on both target and sanctioning economies (Ahn, 2019; Askari, 2003).

Economic sanction has emerged as a major foreign policy tool, yet the effectiveness of economic sanctions is highly debated along with their ethical consequence (Drezner, 2022; Ahn, 2019). While economic sanctions have sometimes contributed to political change, in many other cases, they have failed to do so, and often take severe unintended turns (Naylor, 2001; Albright, 2000). Sanctions often hurt innocent civilians-especially the most vulnerable populations-by reducing life expectancy, increasing child mortality, and limiting access to food and medical supplies (Choonara et al., 2021; Gordon, 1999). Examples include the devastating effect on the Iraqi civilian population during the 1990-2003 embargo (Whitty et al., 2006) and the present effect on the healthcare system of Cuba (Choonara et al., 2021). Some scholars believe that these sanctions are also unethical and breach just war doctrine and human rights (Gordon, 1999). Since they cause widespread destruction, some researchers conclude that economic sanctions are, in actual sense "weapons of mass destruction" and should be banned (Mueller & Mueller, 1999; Choonara et al., 2021).

Sanctions have been one of the key tools in international relations in general, and especially in U.S. foreign policy and geopolitics, throughout 2018 to 2024 vis-à-vis countries like Russia, China, Iran, and Venezuela. In 2018, the United States had reimposed sanctions against Iran after its pullout from JCPOA which is Joint Comprehensive Plan of Action, seriously affecting the oil export-based economy (Borszik, 2020). The U.S., meanwhile, has been piling on the sanctions against Venezuela's Maduro regime, placing measures on its oil industry as a means of forcing democratic reforms (Rodríguez, 2020). Tensions with China also rose with the placement of sanctions on Chinese technology companies-including Huawei-over national security concerns (Kastner, 2021). Most of the major sanctions, however, have been those imposed against Russia following the invasion of Ukraine in 2022. Western countries, led by the United States and the European Union, had targeted broad sectors of the Russian economy: energy exportation, financial institutions, and key individuals. That is, significant costs to the economy (Smeets & Zwart, 2023). This was meant to weaken Russia's ability to finance the war and put pressure on it to stop the aggression. During this period, the sanction has emerged as a key instrument of economic statecraft targeted against a wide range of issues, extending from nuclear proliferation to human rights and cyber security (Drezner, 2019).

2.2 Types of Economic Sanctions

Economic sanctions are restrictive measures imposed on countries to attain political objectives; they run the gamut from personal restrictions to comprehensive trade bans (Tău & Antoci, 2021). They might be either unilateral or multilateral, depending on whether cooperation between nations is called for (Whitty et al., 2006). Sanctions come in many forms: trade, investment, financial, and also the so-called targeted or "smart" sanctions (Filipenko et al., 2020). Though there is debate over their

effectiveness, sanctions have been a popular foreign policy tool of late (Ahn, 2019). Some say that foreign aid sanctions start off effectively but wear off as time progresses (Jeong, 2019). Some look at the regime type, issue type, and domestic opposition support in both sender and target states for the level of success of sanctions (Onder, 2019). Many times, economic sanctions involve painful costs among all concerned and, often, there are unintended consequences wherein target countries may start looking for new sources of trade relationships. Yet, despite these limitations, sanctions remain one of the preferred options compared to military intervention (Smeets, 2018).

Trade sanctions have been much studied in their effects on the economy and politics. Most often applied as instruments of policy, sanctions are usually ineffective in producing compliance or deterrence but serve symbolic functions (Lindsay, 1986). Their impact depends on conditions such as endowment, distance, and network connectivity (Joshi et al., 2023). Broad-based sanctions can result in a decline in bilateral trade, ranging from 44% in mining (Larch et al., 2022) to total economic devastation-as in the case of Iraq (van Rooyen & Nath, 2020). However, limited sanctions have small effects or sometimes even increase trade with other nations (Caruso, 2003; Yang et al., 2004). The sanctions can have negative impacts on the economies of both senders and targets in terms of aggregate supply, terms of trade, and financial flows (Murshed, 2020). Their success rate is mixed, influenced by the costs imposed, target response, and global economic impacts (Davis & Engerman, 2003).

The role of financial sanctions has turned into a major tool in international diplomacy, laying constraints on targets-country, business, and individual-through the limitation of different kinds of accesses to their financial assets and services (Cipriani et al., 2023; Carter & Farha, 2013). Financial sanctions might be pretty powerful because

their effective tracing techniques enable them to impede trade by restricting financial transactions (Carter & Farha, 2013). While able to create significant economic costs for target countries, the financial sanctions themselves may have limited effects on the economy of the sender country (Besedeš et al., 2018). They do, however, raise concerns over humanitarian consequences, possible learning by both targets and senders, and potential blowback against US financial dominance (Drezner, 2015). The efficiency of financial sanctions is debated, with some claims that they lack appropriate legal frameworks and exploit monetary sovereignty (Steinbach, 2023). Their use has implications for the US dollar reserve currency status, sovereign debt crises, and global capital flow fragmentation (Bianchi & Sosa-Padilla, 2023).

Different cases of economic sanctions have one way or the other relocated the direction of FDI. For instance, U.S. investors usually divest from target countries before the actual punishment, though normally temporary (Biglaiser & Lektzian, 2011). Sanctions may have a dampening effect on total FDI inflows and their components, and military and trade sanctions especially affect cross-border mergers and acquisitions (Nguyen & Ahmed, 2023). On the other hand, however, international investment law may weaken the effectiveness of sanctions insofar as investors may attempt to invoke the legal protections against injurious consequences (Robert-Cuendet, 2021; Ghodoosi, 2014). Sanctions even result in increased FDI in third-party states that hold a position that can avail indirect access to the economies under sanctions (Barry & Kleinberg, 2015). The interaction between sanctions and investment law brings along complex legal questions on the legality of EU sanctions under international investment agreements (Olmedo, 2023). Generally speaking,

sanctions do help mainly in terms of investment patterns across the world and pose challenges for both investors and policymakers.

Foreign policy tools of economic sanctions that can involve import and export restrictions, financial measures, and even travel bans (Eland, 2018; Caldwell, 2022). While export controls are generally preferred over import restrictions (Kaemfer & Lowenberg, 1989), there is some evidence that the imposition of combined import and export sanctions is relatively more effective than export sanctions alone (Joshi et al., 2023). In general, sanctions always have a short-run negative impact on trade—for example, U.S. sanctions cut imports and exports by about 30-40% (Kohl, 2021). However, their long-term effectiveness is still debated (Țău & Antoci, 2021). Financial sanctions have grown in prominence as the techniques for tracing have improved and can seriously disrupt trade by making financial transactions more restricted (Carter & Farha, 2013). The United States is one of the most significant users of both multilateral and unilateral sanctions (Caldwell, 2022; Carter, 2008). While it is true that the rationale for sanctions is to change behavior in the target countries, the costs to the sender country are not negligible, and they often do not work (Joshi et al., 2023).

Asset freezes are targeted financial sanctions that may be applied against individuals, entities, or nations by governments and international bodies as a means of leverage (Gordon, 2019; Stephan, 2022). Viewed as taken by many as a strong but yet effective and targeted measure, asset freezes have large ethical concerns and may result in unwanted effects within the economic sphere (Gordon, 2019). They may affect key economic institutions and may even cause a chilling effect on international business (Gordon, 2019; Brewer, 2016). There is worry about due process, judicial review, and the fundamental rights that asset freezes raise (Godinho, 2009; Van den Broek et al.,

2011). Such recessions and currency crises can be sharp for open economies (Song & Wang, 2023). European Union actorness has seen development for asset freezes, while this is less so for travel bans (Urbanski, 2020). Asset freezes are central in many regimes, although exemptions often feature in order to ensure proportionality (Brewer, 2016). The role of monetary policy in cushioning the effects of asset-freezing sanctions has its limits (Song & Wang, 2023).

Tourism flows and economies around the world have been increasingly affected by the growing trend in travel sanctions and bans as a diplomatic tool. Research has shown that when imposed, travel sanctions reduce tourist arrivals; the effects are much larger between developed countries (Chi et al., 2024). Sanctions impede mobility and carriers directly and impede industry access to equipment and technology indirectly (Hall, 2021). These broadly fall into financial, sectoral, diplomatic, and individual sanctions, each having different implications for tourism at a range of scales (Seyfi & Hall, 2020). For instance, during the COVID-19 pandemic, many countries introduced some forms of travel restrictions, which raises geopolitics of health and tourism (Seyfi et al., 2020). Because of this, tourism destinations and businesses along with destination image can take radical hits that may have long-lasting negative effects (Seyfi & Hall, 2019). However, other destinations successfully adapt by emphasizing domestic tourism or specific international markets that emanate from nonsanctioning countries (Seyfi & Hall, 2020).

The imposition of economic sanctions and embargoes is a foreign policy tool to cut off trade for the purposes of punishing other nations (Czinkota, 2010). Although they may be of potential value in many ways as an alternative to war, sanctions often serve only to alter but not stop objectionable behavior while causing unplanned and miserly

hardships among civilian populations, particularly in health and economic sectors (Garfield et al., 1995; Naylor, 2001). Efficiency of sanctions is under discussion, with The UN sanctions showing more significant influence on the GDP growth rate in comparison with the US one (Neumeier & Neuenkirch, 2015). Sanctions may reinforce corruption and black market economies and, in that way, actually empower the regimes they are meant to undermine (Naylor, 2001). Because of the tendency for sanctions to cause widespread collateral damage, the international community has sought "smart sanctions" that limit unnecessary harm (Cortright & Lopez, 2002). Some organizations, such as CITES, have even devised special compliance mechanisms involving trade embargoes (Sand, 2013). Because of the complex economic and political consequences of the sanctions, they remain a contentious tool (Golliard, 2013).

Sectoral sanctions, especially against the oil and gas industries, have considerable impacts on target economies. Negative impacts continue to crop up, while certain positive ones-such as import substitution and industrial modernization-have taken place in Russia (Andryushkevich, 2020). To this regard, the proportionality of these kinds of sanctions may be questioned, with regard to collateral damages seriously harming the population (Hofer, 2020). Second, economic modeling of EU mirror sanctions against Russia can indeed result in substantial welfare losses, even though efficiency from the EU point of view is mixed (Latipov et al., 2022). Sanctions have affected the development of the oil-and-gas complex of Russia by finding alternative sources of equipment and finance (Nikulina & Kruk, 2016). Sanctions have made Iran experience severe macroeconomic difficulties with limited options of policy to contain the effects of the sanctions (Sashi & Bhavish, 2019). According to the modeling of

gravity equations, sanctions have served to hinder mining trade, including oil and gas, reporting a bilateral trade decline of about 44% under the complete sanctions (Larch et al., 2022).

2.3 Economic Sanctions and Economic Growth

The negative impacts of economic sanctions on the GDP growth in target countries are considerable and vary according to sanction type and sender. For example, UN sanctions decrease growth by between 2.3 and 3.5 percentage points, whereas US sanctions have a much lower effect, with 0.5 to 0.9 percentage points (Neuenkirch & Neumeier, 2015). Among the most harmful types of sanctions are trade sanctions, multilateral sanctions, and those imposed on the business sector (Splinter & Klomp, 2021). Though financial sanctions may have an adverse effect on growth in the short run, their impacts are deemed to be weaker in the long term (Heydarian et al., 2021). Sanctions have varying impacts on growth, given the level of development of the country against which the policy is targeted (Alhassan et al., 2023). Sanctions are capable of initiating sudden collapses in economic growth (Splinter & Klomp, 2021). Sanctions affect various economic components such as consumption, investment, government expenditures, trade, and foreign direct investment (Gutmann et al., 2023). Several studies have put forth that sanctions indirectly influence growth, rather than directly, and thus, as suggested by Ezzati (2016), It can be said that the relationship between sanctions and growth is very complex.

Recent analyses give conflicting evidence on the impact of economic sanctions on growth. Whereas some show that the effect is negative in relation to GDP growth (Splinter & Klomp, 2021; Neumeier & Neuenkirch, 2014; Heydarian et al., 2021; Gutmann et al., 2023), others hint at mixed effects. The overall effect also depends on

the type of sanctions used, the level of development of the targeted country, and periods under consideration (Alhassan et al., 2023; Kwon et al., 2020). Generally, trade sanctions are expected to exert a negative effect more than smart sanctions, which, in fact, boost the volume of growth in the long run (Kwon et al., 2020). Other authors find that the impact of sanctions on growth is indirect via imports and exports (Ezzati, 2016), or that negative effects are mitigated by higher defense expenditures (McDonald & Reitano, 2016). The success of sanctions also hinges on circumstances such as whether their implementation is multilateral, whether they are sectoral, and whether target sectors have been emphasized; in particular (Splinter & Klomp, 2021; Alhassan et al., 2023), this complexity within sanction-growth relationships underlines an appreciation.

2.4 Economic Sanctions and Investment

There are many important factors that can have a big effect on the FDI flows, and economic sanctions are one of them. Economic sanctions always have adverse impacts on total inflows of FDI and its components. Nonetheless, there are differential impacts on greenfield investments and cross-border mergers and acquisitions (Nguyen & Ahmed, 2023). US investors normally divest from targeted countries before the actual imposition of sanctions (Biglaiser & Lektzian, 2011). Curiously enough, as a result of sanctions, FDI in third-party states may increase, giving access to the economy indirectly in the subject state (Barry & Kleinberg, 2015). Protection against negative effects due to sanctions may be accorded by international investment agreements (Robert-Cuendet, 2021), which undermines the effectiveness of sanctions by investment law (Ghodoosi, 2013). The effectiveness of sanctions is determined by conflict expectations and commitment level (Kaempfer & Lowenberg, 2007). For

countries like these, both foreign debt and direct foreign investment have a potential to redress problems of underinvestment (Dalmazzo & Marini, 2000).

2.5 Economic Sanctions and Government Consumption

Economic sanctions have been known to make big changes in government spending patterns in countries where the target country has been imposed on. According to studies, budgetary adjustments normally characterized by sanctions reduce spending in low-priority areas of spending, which includes disaster preparedness (McLean & Whang, 2019). However, the substitution of domestic debt for aid can be a mitigant in the case of some economies (Dom & Roger, 2020). Regarding health expenditure, sanctions have unequal impacts across countries, though all have been shown to express maintenance of expenditure or significant declines in others (Al Mustanyir, 2024). All of the above-mentioned types of authoritarian regimes react to sanctions, but they all respond in very different ways. Single-party and military regimes tend to increase spending on core support groups, while personalist regimes tend to slash overall spending and then increase repression (Escribà-Folch, 2009; Cho, 2019). Sanctions can indeed constrain military spending, especially if they are multilateral (Dizaji & Farzanegan, 2019). Improvement in democratic institutions can result in relatively reduced military spending and increased education spending in the short term (Dizaji & Farzanegan, 2014).

2.6 Economic Sanctions and Human Capital Development

Sanctions could have overwhelming negative consequences for human capital development and living conditions in the target economies. Many studies conclude that, at one and the same time, sanctions reduce economic growth, increase inequality, and worsen poverty (González, 2022; Rodríguez, 2024). The sanctions can lower children's education attainment as well as households' education spending (Moeeni,

2022). They may also result in underutilization of the existing skills and knowledge due to technological regress (Gimpelson, 2022). The institutional effectiveness of target countries also plays a crucial role in mitigating the impact of sanctions on the population (Burlone, 2002). Whereas some studies find sanctions affect various human rights negatively (Looney, 1992), others find no significant adverse effects on either economic or basic human rights once accounting for endogeneity (Gutmann et al., 2017). Sanctions long-term effects on future generations could be substantial and might highly underestimate their total economic cost (Moeeni, 2022; Rodríguez, 2023).

2.7 Economic Sanctions and Trade Openness

Economic sanctions represent a very popular tool in foreign policy that can rather profoundly hit at the patterns of international trade. According to estimates, comprehensive sanctions reduce bilateral trade between sanctioning and targeted countries (Caruso, 2003; Yang et al., 2004), whereas limited sanctions tend to have negligible effects (Caruso, 2003). Sanctions may disrupt traditional trade routes and economic relationships (Bove et al., 2023) between the target and other nations, possibly increasing trade with neighbors as a way to circumvent the restrictions (Bove et al., 2023). In this respect, the effectiveness of sanctions may depend on the trade openness and factor endowments of the target country (Lektzian & Patterson, 2015). Sanctions can also have effects that are unintended, such as impacts on the freedom of press in target countries (Peksen, 2010) and creating an obstacle to free trade (Rarick, 2016). The design of sanctions as trade restrictions can be optimized so as to maximize their economic impact on the target country with least cost to the sanctioner (Becko, 2024). Overall, sanctions can drastically disrupt global trade dynamics and hamper the integration of a target country into the global economy (Doornich & Raspotnik, 2020).

2.8 Economic Sanctions and Economical & Political Institutions

Economic sanctions are a political-institutional interaction problem as a foreign policy tool. Democracies use sanctions more frequently but do so against nondemocracies (Lektzian & Souva, 2003). Sanctions can work only to the extent that political costs are imposed on the target regime's winning coalition; democracies will be more vulnerable to such pressure than autocracies (Lektzian & Souva, 2007; Allen, 2008). International institutions can facilitate cooperation among sanction senders. Their influence, however, may vary greatly in domestic politics and power distribution (Mansfield, 1995). They primarily react by creating new market-controlling institutions to maintain political loyalty (Rowe, 2001). High-cost sanctions and international institutions emerge with credible commitments, which in turn develop cooperation (Martin, 1993). Sanction duration is influenced greatly by changes of leadership within non-democratic states and little in democracies (McGillivray & Stam, 2004). Democratic institutions also deliver speedier return to pre-sanctions trade level once the sanctions are over (Lektzian & Souva, 2001).

Chapter 3

MECHANISMS OF GLOBAL SANCTIONS

3.1 Introduction

Sanctions have become a key instrument in the toolkit of the international community in dealing with situations that pose a threat to peace, security, and the rule of law. They are measures taken to alter the behavior of states, entities, or individuals who are seen as breaching international norms. Whether imposed by the European Union (EU), the United States through the Office of Foreign Assets Control (OFAC), the United Kingdom, or global bodies like the United Nations (UN) and the Financial Action Task Force (FATF), sanctions play a significant role in diplomacy and enforcement.

The scope and complexity of sanctions have grown over time, reflecting the increasingly complex nature of global threats, including nuclear proliferation, terrorism, and grave human rights abuses. This chapter examines the mechanisms and objectives of different sanctions regimes, their impact, and challenges, with special focus on the cases of Russia and Iran to illustrate their economic and geopolitical consequences.

3.2 EU Sanctions Regime

Sanctions in the EU are an instrument of the Common Foreign and Security Policy.

The EU can adopt unilateral sanctions, as compared to the UN, underpinning the will of its members. The sanctions are imposed by the European Council and carried out by all members.

3.2.1 Objectives of EU Sanctions

Promoting international peace, democracy, and human rights. And combat terrorism and organized crime. And respond to violations of international law

3.2.2 Mechanisms

Restrictive Measures: Asset freezes, travel bans, trade restrictions on goods, such as arms, technology, or energy. Sectoral Sanctions: Targeting specific industries, such as oil and gas.

Diplomatic Sanctions: Suspending diplomatic relations or cooperation agreements.

3.2.3 Scope and Purpose

The EU list of sanctions includes countries like Afghanistan, Belarus, and Russia, each for different reasons that reflect various challenges to international norms. The measures aim at limiting the ability of targeted entities to engage in harmful activities and pressuring them into compliance with international laws.(European Council, 2023)

3.2.4 Case Study 1: Russia and EU Sanctions

The EU imposed significant sanctions on Russia following its annexation of Crimea in 2014 and its role in the conflict in eastern Ukraine. These measures were further expanded after Russia's invasion of Ukraine in February 2022. Key sanctions include:

Financial Measures: Restrictions on major Russian banks, removal from the SWIFT payment system, and freezing of Central Bank assets (Reuters, 2023).

Trade Sanctions: These include bans on exports of high-technology goods, luxury items, and major industrial components to Russia. (Financial Times, 2023).

Energy Sanctions: These are gradual embargoes on Russian oil imports, with restrictions on natural gas transactions. (The Guardian, 2023). The Russian economy has shrunk significantly in 2022, as evidenced by the 2.1% decline in GDP (World Bank, 2023).

Inflation also reached double-digit levels owing to supply chain disruptions and currency volatility. (Bloomberg, 2023). The ruble did initially weaken, but capital controls brought temporary stability (Economist Intelligence Unit, 2023).

Other long-term effects include less foreign investment and technological isolation, since Western companies have exited the Russian market (OECD, 2023). Notwithstanding these, Russia utilized its energy exports to non Western states such as China and India to dampen its losses, proving how resilient resource-rich economies are to sanctions (Al Jazeera, 2023).

3.2.5 Case Study 2: Belarus

Following the 2020 presidential elections in Belarus, the EU imposed sanctions on President Alexander Lukashenko and his associates for allegedly committing electoral fraud and violating human rights. The sanctions reached the following targets:

High-ranking officials and their assets in the EU. And major sectors, such as the potassium exports and finance in Belarus. European Commission (2021)

3.3 US Sanctions Framework: OFAC

US sanctions are primarily issued by the Office of Foreign Assets Control under the Department of the Treasury. These sanctions follow the foreign policy goals and national security concerns of the country.

3.3.1 Objectives of US Sanctions

Counter the threats of terrorism and weapons proliferation, and Respond to violations of human rights and corruption, and Thwarting threats to international peace and US interests

3.3.2 Mechanisms

Comprehensive Sanctions: Comprehensive embargoes against whole countries or governments, such as Cuba, North Korea, and Iran. Targeted Sanctions: Directed against individuals, organizations, or sectors-for example, Russian oligarchs or Iran's Revolutionary Guard Corps. Secondary Sanctions: Punishing foreign entities that interact with the targeted individual or country. These many sanctions usually have international spillover effects due to the high liquidity of the U.S. dollar in worldwide trade (U.S. Department of the Treasury, 2023).

3.3.3 Main Characteristics

The sanctions are unilateral in nature, though having extraterritorial effects. The list includes the highest-end global actors: Iran, North Korea; penalties on entities violating such sanctions remain significant (Congressional Research Service, 2023).

3.3.4 Case Study: Iran and U.S. Sanctions

Extensive U.S. sanctions on Iran have existed since the time of the 1979 Islamic Revolution, growing worse through the 2000s due to the country's nuclear program. Among the main measures implemented are the oil embargo, which banned Iranian oil exports and closed off a major source of income (CRS, 2024); financial sanctions, including exclusion from the SWIFT network and the freezing of overseas assets (SWIFT, 2023); and secondary sanctions, which punish foreign individuals conducting transactions with Iran (CFR, 2023). The economic impact on Iran has been profound: its GDP contracted by about 6% in both 2019 and 2020 following the U.S. withdrawal from the JCPOA in 2018, as noted by the IMF, and between 2018 and 2021, the Iranian rial lost more than 80% of its value, causing inflation to skyrocket (World Bank, 2023). Additionally, the sanctions exacerbated unemployment and poverty, with youth unemployment reaching over 25% (Amnesty International, 2023). In response, Iran

shifted to a "resistance economy," focusing on self-reliance, trade with regional allies, and the use of cryptocurrencies to bypass the sanctions (AI Monitor, 2023). Despite these significant economic challenges, the sanctions have not succeeded in compelling Iran to abandon its nuclear ambitions, thereby highlighting the limitations of such measures when not coupled with diplomatic engagement (Chatham House, 2023).

3.4 UK Sanctions Policy

The UK implements sanctions through its Sanctions and Anti-Money Laundering Act 2018 (SAML). Since Brexit, the UK has established an autonomous regime for sanctions, in line with its foreign and security policy.

3.4.1 Objectives of UK Sanctions

- Combat terrorism and organized crime
- Respond to international law violations
- Human rights and democracy promotion

3.4.2 Mechanisms

- Asset freezes: No access to the financial assets in UK jurisdictions
- Travel Bans: prohibition of entry into the UK for a person that has been subject to sanction.
- Trade Restrictions: This can involve restrictions on the importation or exportation of goods and services to or from listed entities or countries.

3.4.3 Key Areas of Focus

The UK designates entities and individuals engaged in terrorism, corruption, and violations of human rights. The recent sanctions against Russia and Myanmar further demonstrate its commitment to global security and good governance. UK Government, 2023.

3.4.4 Case Study: Myanmar

The UK imposed sanctions on Myanmar's military leadership following the 2021 coup. The measures included freezing assets and banning trade with military-linked entities. These sanctions, taken together with those of the EU and the U.S., aimed to restore democracy, protect human rights, according to Human Rights Watch in 2023 (Asian Development Bank, 2023).

3.5 United Nations Sanctions

The UNSC puts into place sanctions among its mandates to maintain international peace and security. These often have a multilateral character in that they are binding on all the UN member states (The United Nations, 2023)

3.5.1 Key Features of UN Sanctions

The United Nations imposes sanctions under its mandate to maintain international peace and security under the authority of the UN Charter, particularly Articles 39-42. Sanctions are decided by the UNSC, requiring a majority vote with no vetoes from the five permanent members.

3.5.2 Objectives of UN Sanctions

- Preventing armed conflict.
- Combating terrorism and proliferation of weapons of mass destruction.
- Addressing violations of human rights and humanitarian laws.

3.5.3 Mechanisms

Arms Embargoes: Restrictions on the supply, sale, or transfer of weapons and military equipment.

Travel Bans: Restrictions on the travel of individuals deemed a threat to international peace.

Asset Freezes: Blocking access to financial resources and property owned by the individuals or entities under sanction. Sectoral Sanctions: Targeting specific economic sectors, such as oil, mining, or finance. UN sanctions target a wide range of issues, including nuclear proliferation, terrorism, and conflict-related human rights abuses. Sanctions are designed to:

- Restrict the ability of targeted entities to fund or engage in harmful activities.
- Press for compliance with international agreements.
- Facilitate conflict resolution and peacebuilding (United Nations, 2023).

Countries under UN sanctions include the Democratic People's Republic of Korea (DPRK), Iran, and Somalia. Measures typically involve arms embargoes, travel bans, and financial restrictions.

3.5.4 Case Study 1: Democratic People's Republic of Korea (DPRK)

The Democratic People's Republic of Korea, popularly known as North Korea, is one of the most heavily sanctioned countries due to its nuclear weapons program. Key sanctions include:

- Arms Embargo: The prohibition of weapons and related materials' export to North Korea. (United Nations, 2023).
- Financial Restrictions: Freezing of assets that are linked to North Korea's nuclear program.
- Trade Sanctions: Ban on imports of coal, iron, and seafood, which are significant revenue sources for North Korea.
- Impact on North Korea:
 - North Korea has faced significant economic isolation, with GDP stagnating due to the loss of foreign trade opportunities (World Bank, 2023).

- However, illicit trade networks and alliances with nations like China have mitigated the full impact of sanctions (Al Jazeera, 2023).

- **Challenges in Enforcement:**

UN sanctions usually have enforcement challenges because of a lack of uniform compliance by member states. For instance, while most nations respect the sanctions imposed on DPRK, other countries evade the restrictions based on their economic or strategic interests (United Nations 2023).

3.5.5 Case Study 2: Eritrea

In 2009, the UN imposed an arms embargo on Eritrea, along with other sanctions, due to its alleged support for armed groups in Somalia. The sanctions were lifted in 2018, but it had long-lasting effects on Eritrea's international trade and military capacity. (UN Security Council, 2018).

3.5.6 Case Study 3: Venezuela

The UNSC has debated but not formally imposed sanctions on Venezuela. However, UN-linked entities have pointed out the humanitarian consequences of other international sanctions that further worsen the economic crisis in Venezuela. The U.S. and EU sanctions on Venezuela's oil exports and financial institutions have: Decreased government revenues, which have contributed to hyperinflation. Decreased access to foreign investment and access to the global financial systems (World Bank, 2023).

3.6 FATF Lists and Financial Integrity

The FATF is a critical agency in the maintenance of the integrity of the global financial system, with its Grey List and Blacklist identifying countries that have deficiencies in countering money laundering and terrorist financing. Countries on the Grey List, such as Myanmar, are subject to enhanced due diligence measures intended to push for

reforms and ensure compliance with international financial standards, while the FATF Black List is reserved for high-risk jurisdictions like Iran and North Korea, which face severe restrictions that effectively isolate them from the global financial system. Turkey's placement on the FATF Grey List in 2021, for instance, reflected concerns over its AML measures this designation raised borrowing costs, restricted FDI inflows, and put pressure on the country to introduce reforms to avoid further restrictions during 2022 (FATF, 2022). Similarly, North Korea's designation on the FATF Black List further isolates it by reducing access to international finance networks, and in addition, UN sanctions have severely restrained its economic growth and driven the regime into illicit activities such as cybercrimes and arms smuggling (Al Jazeera, 2023).

3.7 Comparison of Sanctioning Bodies

Sanctions are potent but not straightforward instruments. In the cases of Russia and Iran, they have proven equally capable of effectively leveraging economic pressure and of the limits in eliciting changes in behavior. The involvement of allies, alternative trade networks, and domestic adaptability impact their effectiveness. Meanwhile, sanctions on smaller nations like Myanmar often result in disproportionate effects on civilian populations.

3.8 Conclusion

Sanctions continue to be an indispensable ingredient of international diplomacy, as international security and human rights concerns have increasingly become pressing. Yet, their effectiveness depends on the multilateral cooperation and mechanisms for enforcement. The nuances of understanding sanctions, through examples like Russia, Iran, Venezuela, and Myanmar, draw a picture of transformation for economies and governance structures. Going ahead, balancing enforcement with humanitarian

considerations will be critical for maximizing their benefits while minimizing unintended consequences.

Chapter 4

GROWTH MODEL

Economic growth models have undergone significant evolution, reflecting the change in economic thought as well as empirical realities. These models attempt to answer how economies expand over time and why there exists such variation in growth rates across countries.

4.1 Classical Growth Models

The roots of growth theory go back to Adam Smith and David Ricardo, whose classical models rested on labor, capital, and land as decisive inputs into production. While the ideas of Smith showed the way to productivity improvement through specialization and division of labor (Smith, 1776), Ricardo's model focused more on diminishing returns and limits to growth imposed by a fixed supply of resources (Ricardo, 1945). These early models laid the foundation for understanding the long-term dynamics of growth in economies reliant on agriculture and basic manufacturing.

4.2 The Harrod-Domar Model (1930s–1940s)

This model emerged during the interwar and postwar period, focusing on the relationship between savings, investment, and economic growth. While it underlined the need for capital accumulation, this model also had a very important defect: It predicted unstable growth trajectories—just exponential growth or complete stagnation in the absence of interference (Harrod, 1939; Domar, 1946).

4.3 Neoclassical Growth Model (1956)

Building on the Harrod-Domar model, Robert Solow and Trevor Swan developed the Solow-Swan Growth Model, introducing technological progress as an exogenous factor. It introduced diminishing returns to capital, which ensured that economies would converge to a steady-state growth rate determined by technological progress and population growth. The model provided a powerful explanation of long-term growth and underlined the importance of technology as the driver of per capita income increases (Solow, 1956; Swan, 1956).

4.3.1 Solow Growth Models

The Solow Growth Model, also called the Solow-Swan Model (after Robert Solow and Trevor Swan), is a neoclassical model of macroeconomics with a view to Long-Term Economy Growth (Solow, 1956; Swan, 1956). In this least sophisticated framework only output and per capita income of a given stock of capital, population and a technology are given by 80. Production is assumed to occur in this model according to a production function, that does involve capital and labor as the two main inputs. One of the assumptions made in the Solow Model is diminishing returns to capital, which means that as the stock of capital grows, the return to capital diminishes in per unit terms. This implies, along with the assumption of the exogeneity of technological progress, that the economy results in a steady state over the long run in which growth rate of output per capita depends only on the technological progress. Example: Numeraire is just a way to measure, without define the specific technology, but just an economic fact: Equilibrium (without further technologies available) between investment offsetting and capital depreciation (no growth in economy)

4.3.2 Growth Convergence

In economics, the term convergence refers to the fact that less wealthy nations tend to grow more rapidly than wealthier ones, due to their increased growth potential (Barro & Sala-i-Martin, 2004). This potential for growth derives from reasons like diminishing returns to capital and adding an extra unit of capital in a country that is poorer in capital, as in poorer countries, gives a higher return than in richer countries. Moreover, developing countries are capable of growing, relatively faster, by following and adapting the already developed technologies and practices of developed countries, which allows them to evade the high costs of investing in research and development (Romer, 1990). Over time this will close the gap in income between poor and rich countries and this will converge the income per capita levels between all countries. However, convergence can be classified into two broad types: the absolute convergence hypothesis asserts that all poor countries, regardless of their characteristics, will grow faster and eventually converges to the same income level (of which there is little to no evidence), while the conditional convergence hypothesis states that convergence will only occur when a poor country has structural characteristics similar to a wealthy country (such as levels of education, quality of institutions, and economic policies), and each country converges to its own income level determined by these factors (Mankiw, Romer, & Weil, 1992).

Regression models are generally utilized to assess whether or not there is convergence (in the context of economic studies), where economic growth is treated as the dependent variable (the object of our explanation) and variables as independent variables (factors we think determine economic growth.) In these models, a negative coefficient for the initial per capita income variable indicates convergence (Sala-i-

Martin, 1996). This negative coefficient suggests that countries in the group with low initial per capita income had higher economic growth. Besides the sign of the coefficient, its size can also be used to compute the rate of convergence. This measure of convergence reflects how fast the income gap between poor and rich nations is closed and can be used to calculate how many years it would take to reduce this gap in half (Barro, 1991)

Convergence is not about the absolute equality of per capita income, but rather, the decrease in the per capita income gap (Durlauf, Johnson, & Temple, 2005). Second, cross-country growth regressions have many more explanatory variables than that initial per capita income coefficient, and institutional quality, levels of education and health (i.e., human capital), openness to trade with the rest of the world, political stability and many other factors also play a significant role in economic growth. Thus, such effects need to be accounted for in the convergence analyses, and results should be interpreted carefully. Finally, empirical evidence indicates that conditional convergence—i.e. convergence between countries with similar structural characteristics— is more typical in the world than absolute convergence (Islam, 2003).

4.4 ENDOGENOUS Growth Model (1980s–1990s)

In the 1980s, the emergence of endogenous growth models introduced a paradigm shift due to economists such as Paul Romer and Robert Lucas. Such models criticized the Solow model for depending on exogenous technological progress and thus incorporated mechanisms by which innovation, human capital accumulation, and knowledge spillovers drive growth. In this kind of approach, the focus is on policy

intervention, and investments in education and research are the drivers of sustainable economic growth (Romer 1994, Lucas, 1988).

4.5 Unified Growth Theory (2000s)

Thereafter, as economists tried to explain the transition from stagnation to sustained growth, the emergence of Unified Growth Theory occurred. This framework embeds insights from the classical, neoclassical, and endogenous models in understanding how demographic transitions, technological change, and institutional development influence long-term growth trajectories. All this has really enhanced one's understanding of historical and contemporary economic development (Galor, 2011).

4.6 Modern Extensions and Role of Sanctions Models

The focus on geography is replaced with the focus on economic institutions, innovation, technological dynamics, and the role of the state in economic development (Acemoglu, 2012) in modern economic growth models mainly developed by economists such as Daron Acemoglu and Joseph Schumpeter, where Solow Model is also being used in niche. Acemoglu, particularly in his bestselling book *Why Nations Fail*, argues that economic and political institutions are the prime determinants of whether a country grows rich or remains poor. He makes a further distinction between two types of institutions: inclusive institutions, which secure property rights, uphold rule of law, establish competitive markets and encourage transparency and accountability, and extractive institutions, where political and economic power is centralized in the hands of a few people, who are exploiting the rest of society through corruption, rent-seeking and repression. Under Acemoglu's theory, nations with inclusive institutions will face sustained economic growth in the long run, whereas nations with extractive institutions will be fated to stagnation and underdevelopment.

Joseph Schumpeter, by contrast, focused on the role of innovation and creative destruction in economic progress (Schumpeter, 2021). Creative destruction: The process through which new ideas and technologies spur the demise of existing, less efficient companies, goods, and production practices. While this process can create instability and destroy some jobs in the short term, in the longer term, it generates temporal economic growth through raises in productivity and the generation of new opportunities. Schumpeter has called entrepreneurs as the innovators in this process. Entrepreneurship is the process of identifying new opportunities, taking risk, and driving economic change through the creation of new products, services and technologies. Planting seeds for sustainable economic growth trees are inspiration for sustainable economic growth.

While Acemoglu's and Schumpeter's models might seem different at first glance, they are, in fact, complementary. In this context Acemoglu is trained on data through the October 2030s, while Schumpeter show us innovation and creative destruction through that lens as being the engine of economic growth; that's why it matters, but Acemoglu does the other half of the argument in pointing to why these institutions matter as the environment in which to innovate and invest. Stable growth is indeed embedded in pluralist institutions, but only if it is catalyzed by innovation and entrepreneurship. For instance, while the inclusive institutions of South Korea have previously enabled its children to cognize and call the shot for a noun of inclusive institutions meeting an institution devil, North Korea was the -ism part of this syllogism, as its extractive institutions only we're all shall know, they quite extract the negative part, as its support for those full, were all believe in, and subsequently the innovation was suppressed reduced only as an extractive institution. Another example

that highlights the role of large investment in innovation (especially in sectors such as AI, 5G, and electric vehicles) in economic growth is China, although Acemoglu might point out that China's political institutions might still hinder longer-term growth (Acemoglu & Robinson, 2012).

Contemporary models are increasingly addressing growth in the context of globalization, environmental constraints, and policy interventions. Such models now include the roles of trade, institutional quality, inequality, and external shocks, including sanctions. The sanctions model fits into this progression by focusing on how policy interventions affect economic growth. It extends previous models by incorporating variables such as the nature of sanctions, sender and receiver dynamics, and heterogeneity among nations, while focusing on a very specific yet significant area of economic growth research (Alhassan et al., 2023; Heydarian et al., 2021; Neuenkirch & Neumeier, 2015).

Chapter 5

EMPIRICAL SPECIFICATION AND DATA

5.1 Empirical Specifications

The primary objective of our research is to examine the impact of sanctions on economic growth. This is achieved using the growth formula and control variables that influence economic growth. In this context, our dependent variable is economic growth.

$$\begin{aligned} Growth_{it} = & a_i + \phi \ln rgdppc_{it-1} + \gamma_1 Gov_Cons_{it} + \gamma_2 Cap_For_{it} + \\ & \gamma_3 Hum_Cap_{it} + \gamma_4 Trade_Open_{it} + \gamma_5 Polity2_{it} + \gamma_6 Eco_Inst_{it} + \\ & Q_1 Gneral_SAN_{it} + Q_2 Ext_SAN_{it} + Q_3 Multi_SAN_{it} + Q_4 Uni_SAN_{it} + \\ & Q_5 Exp_Rest_{it} + Q_6 Imp_Rest_{it} + Q_7 Fri_Ass_{it} + Q_8 Impose_SAN_{it} + \\ & Q_9 Duration_SAN_{it} + Q_{10} U.S_SAN_{it} + Q_{11} Limited_SAN_{it} + \epsilon_{it} \end{aligned} \quad (1)$$

Where, $Growth_{it} = (GDPPC_t - GDPPC_{t-1}) / GDPPC_{t-1}$ which $Growth_{it}$ presents the growth rate for country i in a given year t and $GDPPC_t$ presents the GDP per capita in year t and $GDPPC_{t-1}$ shows the GDP per capita in the previous year ($t-1$). The independent variables in our study, which include both control variables and sanction variables, are described as follows:

where ϕ denotes the associated parameter of the dependent variable. $\ln rgdppc_{it-1}$ is lag of the natural logarithm of real GDP per capital for country i at time t , Gov_Cons is government consumption and the original unit was billions of US dollars (USD) which converted to a percentage of GDP. Cap_For is gross capital formation and the

original unit was billions of US dollars (USD) which converted to a percentage of GDP.

Hum_Cap presents human capital which based on years of schooling and returns to education its numeric score between 1 to 4, In other words, human capital is an index number extracted from the Penn world table. It ranges from 1 to 4 based on the average years of schooling in each country, the higher years of schooling, show the higher index number. The *Trade_Open* is trade openness and the original unit is billions of US dollars for imports and exports and we added exports and imports together and divided by GDP, then converted to a percentage of GDP. In other words, *Trade_Open* is the percentage of GDP traded.

Polity2 is political instability and its index numeric ranges from -10 (autocracy) to +10 (full democracy). *Eco_Inst* is economic institutions and its numeric value between 0 and 1. The number 1 indicates the existence of high-quality and effective economic institutions, where laws are transparent and enforceable, corruption is low, property rights are well protected, and overall, the economic environment is very favorable for business and investment. and the number 0 indicates their absence. *Gneral_SAN* is general sanctions, *Ext_SAN* presents an extensive sanction, *Multi_SAN* is multilateral sanctions, *Uni_SAN* shows an unilateral sanctions, *U.S_SAN* is impact of U.S. sanctions and it's a dummy variable. *Limited_SAN* is a dummy variable that presents the limited sanctions, *Exp_Rest* is restrictions on export, *Imp_Rest* presents the restrictions on imports and it's a dummy variable, *Fri_Ass* is freezing of the assets of the government, *Impose_SAN* presents the imposition of sanctions. All these mentioned sanctions are dummy variables Except

Duration_SAN that is the sanction duration and indicates the years during which each country was under sanctions.

5.2 Theoretical Expectations

In this section, we attempt to present the expected sign of each explanatory variable in Table 1:

Table 1: Theoretical Expectations of Control Variables and Sanction Variables on Growth

Variable	Expected Sign	Variable	Expected Sign
$\ln rgdppc_{t-1}$	-	Exp_Rest	-
Gov_Cons	+	Imp_Rest	-
Cap_For	+	Fri_Ast	-
Hum_Cap	+	U.S_SAN	-
Trade_Open	+	Duration_SAN	-
Polity2	+	Limited_SAN	-
Econ_Instit	+	Multi_SAN	-
General_SAN	-	Impose_SAN	-
Ext_SAN	-	Uni_SAN	-

In this table, the theoretical expectations regarding the impact of control variables and sanction-related variables on economic growth are presented. For the control variables, it is expected that the variable $\ln rgdppc_{t-1}$ is logarithm lagged of GDP per capita will have a negative sign. This is because of an increase in per capita income in previous periods typically leads to a decrease in economic growth in subsequent periods, a phenomenon consistent with the theory of economic convergence, the lagged form of ln real GDP per capita is a proxy for initial GDP per capita and it is

supposed to capture the effects of convergence. In convergence theory the higher initial GDP per capita the smaller is the growth rate thus initially richer country grows more slowly so that lower income countries catch them up in future, therefore the sign for lagged ln real GDP per capita is expected to be negative. Additionally, it is expected that government consumption, capital formation, human capital, trade openness, political stability will have positive and growth-enhancing effects. This suggests that a rise in these indicators will lead to economic growth. In addition, foreign policy tools like general sanctions and broad sanctions are anticipated to decrease economic growth. This is because the establishment of sanctions tends to limit economic interactions and decreases access to raw materials. For the sanction-related variables, all are theoretically expected to have a negative impact. For example, export and import restrictions, asset freezes, imposed sanctions by the United States, the duration of sanctions, limited sanctions, multilateral sanctions, unilateral sanctions, and the manner in which sanctions are imposed are all expected to negatively affect economic growth.

These factors hinder the free flow of trade and capital transfers. Thus, the greater the intensity and duration of sanctions, the more detrimental their effects on economic growth. These expectations are based on economic growth theories and practical experiences regarding sanction policies, reflecting an approach used in economic analyses to examine the impact of domestic and foreign policies on economic growth.

5.3 Estimation Technique

The most expected econometric challenges of this study are heteroscedasticity and endogeneity. System GMM was considered an appropriate approach since it could handle such panel data problems with a large number of cross-sectional units and fairly

short dimensions of time variation. All models tested overidentifying restrictions by the Sargan and Hansen tests-in the majority, satisfactory p-values confirm the validity of instruments. Arellano-Bond AR(2) test demonstrated error terms were not serially correlated and therefore did not indicate any autocorrelation within the model. The study investigates the nexus of sanctions and economic growth in an augmented Solow growth framework using a panel data model. We know that Real GDP per capita is the most important criterion for measuring a country's economic growth. To this end, the empirical model is specified as follows:

$$Growth_{it} = a_i + \theta SAN_{it} + \gamma CONT_{it} + \epsilon_{it} \quad (2)$$

Given the dynamics intrinsic to growth models, analysis also considers one-period lag of the real GDP per capita that may capture initial income levels and test the convergence hypothesis. Thus, considering lagged dependent variable will enable us to include the impact of previous economic growth on the current path of growth-a process by which convergence among economies may be conditional. (Barro, 2003). One major concern in analyzing panel data is that of endogeneity and unobserved heterogeneity problems, which, if not treated properly, may result in biased estimates. It is with respect to this that the system Generalized Method of Moments variation-a preferential estimator for panel datasets where the cross-sectional dimension is larger than the time dimension-will be adopted for this paper. The system GMM, by the developments of Arellano and Bover (1995), and Blundell et al. (2001), builds instruments both from the level and differenced equations, hence being an effective estimator in the estimation models that have simultaneity, unobserved heterogeneity, and dynamic endogeneity problems. The model used here combines the level and differenced forms to get consistent and efficient estimates of how sanctions affect

economic growth. Concretely, for the latter system GMM estimator, the dynamic model is formulated as :

$$Growth_{it} = a_i + \varphi \ln rgdppc_{it-1} + QSAN_{it} + \gamma CONT_{it} + \epsilon_{it} \quad (3)$$

This transformation helps to eliminate unobserved country-specific effects and considerably reduces potential biases due to omitted variables. The internal instruments, generally lagged levels of the dependent variable and other regressors, enhance the robustness of the GMM estimates. In this model, it is assumed that the error term has the properties of white noise (no autocorrelation, homoscedasticity, and zero mean). The conditions for the validity of the instruments are as follows:

- 1. Relevance of Instruments:** The instruments must have a strong correlation with the endogenous variables to accurately reflect the necessary variations for estimating the model.
- 2. Exclusion Restrictions:** The lagged instruments should affect the dependent variable only through their impact on the endogenous variables and should have no direct effect on the error term.
- 3. Independence Assumption:** The instruments must be independent of the error term, meaning that their variations are solely due to external factors and are not correlated with the model's error.

To ensure the validity of the instruments used in the GMM model and to verify that the fundamental assumptions, such as the absence of correlation between the instruments and the error term and the absence of autocorrelation in the errors—are satisfied, a set of reliable tests has been employed. Below, the Sargan, Hansen, and Arellano-Bond AR(2) tests are explained in detail:

Sargan Test:

This test is used to examine the validity of instruments in GMM models and is based on the principle that the instruments should not be correlated with the error term of the model. The null hypothesis of the Sargan test states that the instruments are valid (i.e., the exclusion restrictions and independence assumption hold). If the null hypothesis is rejected, it indicates a problem with the validity of the instruments, suggesting that the instruments may not have been selected correctly.

Hansen Test:

The Hansen test is used as a heteroskedasticity-robust version of the Sargan test and can be applied in situations where the error structure is not homoscedastic. The null hypothesis of the Hansen test also states that the instruments are valid in terms of no correlation with the error term. The results of this test confirm that the instruments are chosen in such a way that they affect the dependent variable only through the endogenous variables.

Arellano-Bond AR(2) Test:

This test is used to detect the presence of second-order autocorrelation in the first-differenced errors of the model and is of particular importance. The null hypothesis of the Arellano-Bond AR(2) test states that there is no second-order autocorrelation in the model's errors. Failure to reject this hypothesis indicates that the instruments used do not have issues with autocorrelation and that the error structure of the model is correctly specified.

5.4 Data

This study examines the impacts of sanctions on economic growth by analyzing panel data for 168 countries (Appendix 1) ranging from 2000 to 2018. The countries were selected based on data availability, and the period considered captures the sharp rise

both in the number and variety of sanctions applied around the world. The focus of this analysis is on various types of sanctions, economic conditions, and political structures regarding their impact on the economic performance of targeted countries. We have conducted four regression analyses: two on the overall sample of both developing and developed countries, and two on the restricted sample of only developing countries. The overall sample includes 168 countries for 2000-2018, whereas the restricted sample includes data for 75 developing countries for the same period of time.

The data was obtained from threat and imposition of economic sanctions (TIES) dataset. This latter data set is quite all-encompassing, reflecting the type of sanctions, their duration, scope, and sender country or organization. In this analysis, extensive, limited, unilateral, multilateral, and U.S.-only are some of the sanction types involved. Details on the specific duration of sanctions, export restrictions, import restrictions, and asset freezes will be equally useful for further understanding how the various policies of sanctions affect economic outcomes.

Percentage change in real gross domestic product (GDP) per capita used in this study is proxy for economic growth. Some other variables that could potentially affect economic growth include gross capital formation, government consumption, trade openness, and development of human capital. Data on these economic indicators were extracted from the World Bank's world development indicators. They were control variables included based on the literature of the determinants of economic growth, which clearly indicated that such variables were necessary in explaining the variation of GDP growth across nations (Acemoglu, 2012; Lucas Jr, 1988; Morgan et al., 2014).

5.4.1 Control Variables

Control variables are carefully chosen to capture other determinants of economic growth. Investment is one of the most important factors of economic growth. An increase in the amount of investment, such as the purchase of machinery, construction of factories and infrastructure, leads to increased production and increased productivity. The higher the level of investment in the economy, the greater the country's production capacity and the faster the economic growth. A decrease in investment, especially due to sanctions, can lead to a decrease in growth. Gross Capital Formation extracted from World Bank (WDI) and The original unit of gross capital formation was billions of US dollars (USD) which converted to a percentage of GDP because expressing capital formation as a percentage of GDP allows for comparisons across countries with different economic sizes and facilitates interpretation. The level of economic openness of a country to international trade has a direct impact on economic growth. Countries that have free trade usually have more growth and the countries that have more exports and imports have access to new markets, technology and capital. Sanctions usually lead to a decrease in foreign trade and can limit economic growth. Trade openness extracted from World Bank (WDI) and the original unit of trade openness is billions of US dollars for imports and exports and we plus exports and imports together and divided by GDP, then converted to a percentage. Similar to capital formation, expressing trade openness as a percentage of GDP allows for better comparisons and interpretation.

Human capital includes the level of education, skills and health of the workforce, which has a direct impact on productivity and economic growth. Higher human capital means a more skilled and productive workforce that can increase economic growth.

Sanctions may weaken human capital by reducing access to education and medical facilities. Human capital extracted from the Penn world table and is index, based on years of schooling and returns to education its numeric score between 1 to 4 The interpretation of these numbers is as follows: Number 1 indicates a low level of human capital. It typically corresponds to countries with low average years of schooling and poor educational quality. Number 2 represents a lower-middle level of human capital, meaning countries that have more years of schooling compared to less developed nations but still remain at a relatively low level. Number 3 Indicates an upper-middle level of human capital, referring to countries with relatively stronger educational systems but still not at the level of advanced economies. Number 4 represents a high level of human capital, usually associated with developed countries that have high-quality education and higher average years of schooling. This index is a combination of average years of schooling and the return on education in terms of labor productivity, estimated using economic models, and the index is already standardized and no need to transformation.

Governments play a key role in the economy, and the level of government spending can affect economic growth. Increasing government spending in some cases can stimulate economic growth, but in case of government inefficiency, these costs may lead to waste of resources. In developing countries, increasing government spending usually leads to improved infrastructure and economic growth. extracted from World Bank (WDI) and the original unit is billions of US dollars (USD) which converted to a percentage of GDP. Political instability can create an uncertain business environment and deter investment, thereby undermining economic growth. Countries with higher political stability attract more investment and experience more sustained economic

growth. Sanctions often exacerbate political discontent and instability extracted from Polity IV database is a leading database for measuring democracy and political stability. The index ranges from -10 (autocracy) to +10 (full democracy) and the index is already standardized and no need to transformation. Strong economic institutions, including stable legal systems, competitive markets, and transparent financial frameworks, are essential for economic growth. Strong institutions increase investor confidence and economic efficiency. Countries with weak institutions are more vulnerable to the negative impacts of sanctions. Economic institutions extracted from Worldwide Governance Indicators (WGI) - world bank and its numeric value between 0 and 1 (economic quality index), The number 1 indicates the existence of high-quality and effective economic institutions, where laws are transparent and enforceable, corruption is low, property rights are well protected, and overall, the economic environment is very favorable for business and investment. and the number 0 indicates their absence, and no need to transformation.

5.4.2 Sanctions Variables

In this research, to examine the impact of sanctions on economic growth, a diverse range of sanctions data has been utilized. These data have primarily been extracted from the Global Sanctions Database (GSD), along with a limited number of sanctions from the Office of Foreign Assets Control (OFAC), the UN sanctions list, and the European Union (EU Sanctions Database). The details are as follows: General sanctions include a wide range of restrictions and can have broad economic, social, and political impacts on the target country. In this research, using this variable helps to examine whether the impact of general sanctions on economic growth is greater than other types of sanctions. General sanctions usually affect the entire economy of the country and can lead to a decrease in GDP, an increase in unemployment, and

economic instability. The difference between the threat of sanctions and the actual imposition of sanctions can have different effects on the economy. In this research, data on imposed sanctions were examined to determine what effect actual sanctions have on economic growth. Sanctions that are actually implemented usually have more severe economic effects, while the threat of sanctions may only cause temporary changes in economic behavior. Extensive sanctions usually lead to an increase in inflation, a decrease in foreign investment, and a drop in the value of the target country's currency. This research tries to compare the impact of limited sanctions with extensive sanctions. This study examines whether limited sanctions have fewer economic effects or whether they still have a severe impact on the target country's economy in some cases. Limited sanctions can cause a decrease in trade and investment in specific sectors, but they may not cripple the entire economy. This research tries to test whether sanctions imposed by several countries or international organizations have a greater impact than unilateral sanctions. Multilateral sanctions usually put more pressure on the target country, because the possibility of circumventing sanctions through trade with other countries is reduced. It's a dummy variable. This thesis tries to investigate how much unilateral sanctions, which are imposed by only one country, can affect the economic growth of the target country. These sanctions usually have less effect than multilateral sanctions, because the target country can continue to trade through other countries. The United States is one of the largest users of the sanctions tool in foreign policy. The evaluation of the impact of U.S. sanctions on the economic growth of the target country is one of the goals of this study. Since the U.S. dollar is the main currency of world trade and many international transactions are carried out through financial systems under U.S. control, U.S. sanctions can have a severe impact on the target country. Now let's to investigate

whether longer sanctions have a greater negative impact on economic growth, or whether the target country gets used to the sanctions over time and the negative effects decrease. Long-term sanctions usually cause structural changes in the economy of the target country and can lead to a decrease in foreign investment and a change in the trade pattern. It indicates the years during which each country was under sanctions. For investigate how sanctions that restrict the target country's exports affect its economy must use export restriction. Export restrictions cause a decrease in the target country's foreign exchange earnings and a decrease in domestic production. This study tries to investigate whether import restrictions cause a decrease in production and an increase in prices in the target country. Sanctions that restrict the import of essential goods can cause a shortage of goods, increase living costs, and reduce domestic production. This thesis planned to investigate how much the freezing of the assets of the government or key individuals of the target country can affect its economy. This sanction causes a decrease in liquidity and a decrease in the target country's ability to access foreign financial resources.

5.4.3 Descriptive Statistics

A detailed review of the descriptive statistics for Pakistan, Cuba, El Salvador, and Cambodia facilitates a detailed comparison of these countries and an examination of their disparity in relation to key economic factors. This allows for an analysis of the economic progress of each country and the areas of deficiency. These insights facilitate a more informed appreciation of how various elements have affected and shaped the patterns of economic growth in these nations.

Table 2: Descriptive Statistics between 4 Countries

	Mean	Median	Maximum	Minimum	Std. Dev.
Country	Cuba				
<i>Growth</i>	4.8250905	4.7	11.5219	-2.32083	3.5782828
<i>GDPpc</i>	7.2864918	7.298269	7.573382	6.924898	0.2251535
<i>Gov Cons</i>	0.1137008	0.1060606	0.1410256	0.0882353	0.0171067
<i>Cap For</i>	0.1137008	0.1060606	0.1410256	0.0882353	0.0171067
<i>Trade Open</i>	0.3136136	0.313964	0.4758	0.191008	0.0942214
<i>Polity2</i>	-6.883241	-7	-5	-7	0.4589472
Country	Pakistan				
<i>Growth</i>	2.0668806	2.41943	5.22298	-0.601298	1.7496973
<i>GDPpc</i>	6.887482	6.901968	7.087231	6.710836	0.1122769
<i>Gov Cons</i>	0.0973972	0.1	0.124	0.0733333	0.0149348
<i>Cap For</i>	0.1626497	0.16	0.1833333	0.1333333	0.0166365
<i>Trade Open</i>	0.3122855	0.320718	0.356817	0.253062	0.0310826
<i>Polity2</i>	1.8421053	5	7	-6	5.7180334
Country	El Salvador				
<i>Growth</i>	1.4898413	1.7764	3.87475	-2.49559	1.3402369
<i>GDPpc</i>	8.0095041	8.000762	8.163758	7.888215	0.0899892
<i>Gov Cons</i>	0.1558744	0.1555556	0.17	0.1375	0.0084021
<i>Cap For</i>	0.1962943	0.185	0.2333333	0.1611111	0.0241849
<i>Trade Open</i>	0.7350333	0.735373	0.80666	0.658907	0.0508045
<i>Polity2</i>	7.5263158	8	8	7	0.5129892
Country	Cambodia				
<i>Growth</i>	6.0315547	5.40178	11.4849	-1.403	2.597746
<i>GDPpc</i>	6.60909	6.637924	7.094476	6.066576	0.320146
<i>Gov Cons</i>	0.0516184	0.055	0.0645455	0.03	0.0097517
<i>Cap For</i>	0.1800016	0.1818182	0.2222222	0.1319444	0.0290586
<i>Trade Open</i>	1.2484353	1.24899	1.44614	1.05138	0.1041014
<i>Polity2</i>	1.3684211	2	2	-4	1.8918106

Cuba has an average economic growth rate of approximately 4.82% based on the time series data, and a median of about 4.7%. *Growth* has been highly variable, between above 11.5% and below -2.32% with a high standard deviation of around 3.58% for yearly growth. The means of $\ln rgdppc_{it-1}$ is 7.29, ranging from 6.92 to 7.57 with low volatility (sd 0.22), indicating medium income. Government consumption always average to between 0.1137, while capital formation mime similar relatively tied up with economy. The mean of trade openness is found to be 0.3136, indicating moderate

level of international trade activity, however, the value is considered low when compared to other countries. The political index (*Polity2*) averages -6.88, with a median of -7 and a range from -7 to -5, indicating low political stability and potentially authoritarian characteristics.

Where in Pakistan, average economic growth rate is 2.067%, Median is 2.419% and Standard Deviation is 1.75% (Maximum growth rate = 5.22% & Minimum growth rate = -0.60%). The average GDP per capita logarithm is 6.887, with a minimum and maximum of 6.710 and 7.087, respectively, with standard deviation 0.112, indicating a relatively more economically deprived condition. The average allocation of government consumption is 0.0974; capital formation is moderate, at 0.1626. The average of trade openness is 0.3123, which has a small range (maximum 0.3568, minimum 0.2530), indicating moderate trade. The political index (*Polity2*) is a mean of 1.84, but ranges from -6 to 7 with a std of 5.718 suggesting a lot of political ravages on records.

The average economic growth in El Salvador is around 1.49% with a median of 1.776%, which shows that this continues to be relatively low growth with less volatility max of 3.87%, minimum of -2.49%, standard deviation of 1.34%) The average *GDPpc* is 8.0095 in logarithm, it has a range between 7.888 and 8.163, that shows higher income than the countries of this group. Average government consumption is 0.1559 (s.d. = 0.0084) and capital formation is 0.1963 (s.d. = 0.0241), showing relatively large resource allocations to government spending over resource allocations to investment, implying low variability in these measures. The average trade openness is 0.7350, with a low range (0.659 to 0.806), representing a relatively open economy. The political index (*Polity2*) is very high (average of 7.5263, median

of 8), with a very narrow range (7 to 8), indicating strong political stability and a democratic system.

Cambodia's economic growth is high (mean 6.03%) and volatile (median 5.40178%, sd 2.60% max 11.4849%, min -1.403%). The averages for GDP per capita in logarithm are 6.6091 (the lowest value is 6.066 and the highest is 7.094 with a standard deviation of 0.320 indicating a low to moderate income level). Government consumption contributes, on average, 0.0516 to the estimated output, and capital formation contributes 0.1800, suggesting low but critical resource allocations to government spending and government investment more generally (data available up to October 2023). Trade openness measures are also quite high (mean: 1.2484; min: 1.051; max: 1.446), highlighting the dynamic and open economy of the country. The political index (*Polity2*) is 1.3684, since the range is -4 to 2 and the average is somewhat more politically chaotic than El Salvador, or even Pakistan (perhaps indicating multiple periods of turmoil democratization).

Overall, by comparing these four countries, we can say that the advantage belongs to El Salvador when it comes to per capita income and political stability (very high *Polity2* index), while we get a totally different picture in the case of Cuba. Pakistan's GDP per capita, on the other hand, is lower than El Salvador and there are major fluctuations in political parties that can affect the country's growth. Cambodia is another country with high economic growth, high trade openness and very high trade openness, but it scores lower on GDP per capita and all six political indicators compared with the other countries. These disparities underscore the structural and policy factors at play within each country, which ultimately shape their respective economic growth and development pathways.

Chapter 6

ESTIMATION RESULTS

Table 3 summarizes the System Generalized Method of Moments (GMM) estimates for a model that investigates the impact of various factors on real GDP per capita growth.

Table 3: GMM Results All Countries without Sanction (Dependent Variable: Growth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\ln rgdppc_{t-1}$	-11.6547	0.063009	-184.968	0.00
<i>Gov_Cons</i>	12.4206	0.260674	47.6482	0.00
<i>Cap_For</i>	5.03456	0.091824	54.82837	0.00
<i>Trade_Open</i>	2.079119	0.031207	66.62416	0.00
<i>Hum_Cap</i>	0.307894	0.023287	13.22174	0.00
<i>Polity2</i>	0.391837	0.003507	111.7285	0.00
<i>Econ_Instit</i>	3.0113	0.624908	4.818789	0.00
Test	Statistic		p-value	
AR (2)	-1.12		0.265	
Sargan	22.89		0.312	
Hansen	17.74		0.421	

Here Table 3 The results obtained from estimating models based on the " Generalized Method of Moments " (GMM) method for all countries that were not subject to sanctions, from the perspective of the dependent variable "economic growth", indicate the multiple roles of different factors in determining the economic growth trend. The model in this analysis is then represented as $\ln rgdppc_{t-1}$, *Gov_Cons*, *Cap_For*, *Trade_Open*, *Hum_Cap*, *Polity2*, *Econ_Instit*. Results indicate that all these variables are statistically significant, and both the magnitude and direction of their influence on economic growth has been established. The variable $\ln rgdppc_{t-1}$, which represents

the GDP per capita in the previous period, has a negative coefficient (-11.6547), with a p-value equal to 0 which indicates statistical significance. This result suggests that an increase in the level of per capita GDP in the previous period is associated with a decrease in current economic growth. This result is consistent with the convergence hypothesis, suggesting that countries with higher initial economic development levels may have slower growth rates .

The government consumption, *Gov_Cons*, it has a significant positive impact on economic growth. The results point to the fact that the right sort of government spending, if done right, can lead to greater economic growth. In some cases, however, overconsumption by the state can induce inefficiencies and waste resources. Here, the positive effect of government consumption is similar to in the previous model, but indicates that in the case of this particular sample, the allocation and use of these expenditures has likely contributed positively to the growth of the economy. The positive impact on economic growth is driven by gross variable gross capital formation *Cap_For*, as it has a coefficient of 5.03456 and a t-statistic of 54.82837. The higher the rate of growth of physical infrastructure and development; the higher the production capacity and productivity of economy and faster the economic growth. Thus, the countries with high levels of generalized investment and capital structure tend to enjoy higher economic growth. *Trade_Open* coefficient is 2.079119, t-statistic=66.62416; shows a huge positive effect on economic growth. More international trade and more market liberalization produce more economic opportunities, from growing exports and absorbing new technologies to increasing competition, and boost economic growth. It means that trade liberation, particularly in

the context of a more and more integrated global economy can act as an important propellant of economic development.

The critical factors affecting economic growth include *Hum_Cap* coefficient, 0.307894, shows the investment in human capital by means of education and skill formation increases productivity. As a result, a positive shift in economic growth is expected in the countries with improvement of human capital. It highlights the need to invest in education and technical skills in the context of economic development.

The political stability index *Polity2* has a coefficient of 0.391837 and a t-statistic of 111.7285, indicating that political indexes and increased stability and democracy should be considered positively related to economic growth. Steady political environments, where the rule of law is strong, attract those investments for both local businesses and international investors. Therefore, improving political indicators is considered an important enabler to promote economic progress.

Econ_Instit confident is 3.0113, and t statistic is 4.818789 this means that institutional quality is underlining the importance of strong and effective institutions to create enabling frameworks for economic activities. Good institutions make sure that laws are followed, and that property is respected, which creates trustworthy places for investment and economy. Thus, “better institutions” can be expected to stimulate economic growth as well.

Moreover, the results of statistical tests indicate that autocorrelation and instrument validity issues in the models are sufficiently addressed. The AR(2) test statistic (−1.12) and its p-value (0.265) signal no second-order autocorrelation problems in the

model. Moreover, Sargan test (statistic 22.89, $p=0.312$), Hansen test (statistic 17.74, $p=0.421$) confirms the relevance and sufficiency of the instruments used in the model. These features enhance the statistical validity of the model's results, as the estimated relationships between variables are consistent with causal relationships.

The GMM model analysis overall indicates that each of the examined variables contributes positively and significantly explaining economic growth. In general, on aggregate, higher per capita GDP levels in previous periods correlate with reduced growth today, a possible sign of economic convergence. In contrast, additional government consumption, investment in infrastructure, openness to trade, high-level human capital endowments, stronger political determinants, and increased quality of institutions all assist in raising growth rates. Countries should face more difficulties in realizing growth in situations where these factors are at a low level while improving or enhancing thereof will result in conditions that we hope enable us to speed up economic growth.

These results can be used as an input to policymakers and economic managers when designing national and regional development plans. In countries where per capita GDP is already relatively high, economic policies may need to be revisited, and growth incentives restructured, to encourage more international investment. Moreover, it can be a model of successful sustainable long-term growth through investment in institutional quality and human capital improvement. In the end, what this model shows is that the interplay of several economic and political dimensions, together with targeted policies, is critical for the overall economic growth rates of countries. But improving each of these factors is crucial for achieving sustainable economic development.

Summary of Table3:

In summary, the results of this GMM model show that past economic development, government consumption, investment, trade openness, human capital, democratic political systems, and strong economic institutions are all important factors in determining economic growth. These results confirm that policymakers should pay special attention to these factors to achieve sustainable economic growth.

Table 4: GMM Model- All Countries with Sanction (Dependent Variable: Growth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\ln rgdppc_{t-1}$	-5.12944751	0.463537	-11.0659	0.00
<i>Gov_Cons</i>	25.90301	4.596378	5.635526	0.00
<i>Cap_For</i>	6.66001	1.41386	4.71051	0.00
<i>Trade_Open</i>	7.19290419	0.735488	9.779776	0.00
<i>Hum_Cap</i>	0.94928919	1.792692	0.529533	0.60
<i>Polity2</i>	0.81765828	0.403904	2.024389	0.05
<i>Econ_Instit</i>	0.9613877	2.840463	0.338462	0.74
<i>General_SAN</i>	-12.6901506	7.218968	-1.75789	0.08
<i>Multi_SAN</i>	-14.3443889	5.939307	-2.41516	0.02
<i>Duration_SAN</i>	-0.15688152	0.051042	-3.07359	0.00
<i>Uni_SAN</i>	-11.4047583	8.908605	-1.2802	0.21
<i>Impose_SAN</i>	-2.47837108	8.948774	-0.27695	0.78
<i>U.S_SAN</i>	0.49633536	8.361917	0.059357	0.95
<i>Limited_SAN</i>	3.27260938	2.924072	1.119196	0.27
<i>Imp_Rest</i>	0.02861557	3.14072	0.009111	0.99
<i>Exp_Rest</i>	-5.2820592	1.502458	-3.51561	0.00
<i>Ext_SAN</i>	-10.6394267	1.826826	-5.824	0.00
<i>Fri_Ast</i>	-0.78902956	2.264687	-0.34841	0.73
Test	Statistic		p-value	
AR(2)	-1.75		0.080	
Sargan	21.33		0.095	
Hansen	18.91		0.125	

General and Comprehensive Explanations of Table 4:

Table4 presents results from a Generalized Method of Moments (GMM) model for countries subject to sanctions. This model has as independent variables the economic, political and sanction-related factors to analyze their impact on economic growth,

whose dependent variable is economic growth. This relation is confirmed by the lagged logarithm of real GDP per capita $\ln rgdppc_{t-1}$ with a coefficient of -5.1294 and a t-statistic of -11.0659 , that is, higher initial level of GDP per capita resulted in lower economic growth in that period. This adverse effect can be attributed to the idea of convergence, based on the fact that nations with an elevated economic status in earlier moments of time tend to have diminished growth in the following time periods. If this coefficient were not as negative, or were positive, it could signal that there is a lack of convergence trends (or worse, divergence). The variable *Gov_Cons* has a coefficient of 25.9030 and a t-statistic of 5.6355 , meaning that government consumption has a strong positive effect on economic growth. Higher government expenditures in the context of sanctions can boost domestic demand and deliver public goods, thus fostering economic growth. Nonetheless, it should be noted that excessive government consumption may result in inefficiencies and misallocation of resources. The positive effect of the first variable suggests that government policies contribute significantly in supporting economic growth (in the sample). The impacts of *Cap_For* coefficient is 6.6600 , and t-statistic is 4.7105 to growth were also positive, and significant. More infrastructure and productive capacity lead to increased productivity and economic growth. Thus, with an improvement in this indicator, the growth of the economy in sanctioned countries should also improve. *Trade_Open* coefficient = 7.1929 , t-statistic = 9.7798 , has a highly positive effect on economic growth. Increased trade and market liberalization in sanctioned countries can positively impact economic growth by improving access to new technologies, diversifying export markets, and attracting foreign investment. These policies, in fact, can serve to reduce the costs of sanctions, even in the midst of sanctions. Human capital *Hum_Cap*, with a coefficient of 0.9493 and t-statistic of 0.5295 (0.66 p-value), is positive, but not significant. This

indicates that the size of the human capital endowment of sanctioned countries does not influence economic growth, or that its effect on growth is obscured in the current model. The political index (*Polity2*) is significant at the 5% level (with a coefficient of 0.8177 and t-statistic of 2.0244). This result implies that the better political conditions and more political stability are conducive to a better economic environment in sanctioned countries, as stability leads to trust of domestic and foreign investors. Economic Institution (*Econ_Instit*) coefficient is 0.9614 and t-statistic 0.3385 is not statically significant. This may indicate that the impact of strong and efficient institutions on economic growth is hidden by their negative effects or calculated errors under sanction regimes.

Among the sanction-related variables, the *General_SAN* variable with a coefficient of -12.6902 and t-statistic -2.41516 with p-value of around 0.08 has a relatively strong negative effect on the economic growth. Though this isn't significant at the 5% level, it shows that sanctions presence is generally associated with lower economic growth. Moreover, the *Multi_SAN* coefficient is -14.3444 with the p-value being 0.02, which is statistically significant and means that the sanctions from different countries or international organizations will negatively affect economic growth.

The variable for the duration of sanctions (*Duration_SAN*), which has a coefficient of -0.1569 and t-statistic of -3.0736, is significant and negatively signed; that is, the longer the duration of sanctions, the larger the total impact of negative economic growth. This adverse impact implies that long-lasting sanctions can inflict structural harm on economies. Other variables including *Uni_SAN* with coefficient - 11.4048, and p=0.21, *Impose_SAN* with coefficient -2.4784, and p=0.78 and *U.S_SAN* with coefficient 0.4963, and p=0.95 are not significant statistically. These results show that

there is no detection of an impact on economic growth by either unilateral sanctions, certain characteristics regarding how sanctions are implemented, or US specific sanctions in the current model. Similarly, the coefficient of the *Limited_SAN* variable is 3.2726 has a p-value 0.27 so high that we cannot conclude anything regarding its effect on growth.

Similarly, import restrictions (*Imp_Rest*) with a coefficient of 0.0286 and p-values of 0.99 also have no effect on economic growth. On the other hand, export restrictions (*Exp_Rest*) coefficient -5.2821 gives $t = -3.5156$ highlight that a single point increase in this variable has negative significant effect on economic growth indicating that the economic growth for the sanctioned countries can be reduced severely. The *Ext_SAN* variable with a coefficient of -10.6394 and a t-statistic of -5.824 represents another strong negative impact of extensive sanctions. Lastly, the variable for asset freezes (*Fri_Ast*) with a coefficient value of -0.7890 and p-value of 0.73, does not affect economic growth significantly. The model is also verified through additional statistical tests. An AR(2) test (p-value = 0.080) confirms that the errors are not second-order autocorrelated. Furthermore, both the Sargan (p=0.095) and Hansen (p=0.125) tests provide statistical evidence for the validity of the instruments used in the model.

The results show a general pattern of positive factors such as government consumption, investment and trade openness providing support for economic growth, while the presence of sanctions has a strong and negative impact, especially multilateral, long-term, export restrictions, and extensive sanctions. Moreover, some variables like human capital and institutional quality have less clear-cut impact under these conditions. The results bring out that supportive policies are important policies,

under sanctions because they help country avoid these negative effects of the sanctions by investing more, better managing trade and developing their own domestic array, leading to a growth process. Therefore, the results of this model have some limitations and should be interpreted with caution. As we know that sanctions are often imposed on developing countries, and developed countries have historically lifted sanctions on themselves, and in order to more accurately and realistically calculate the effects of various types of sanctions on countries, I have excluded all developed countries and some developing countries that were not subject to sanctions or had incomplete data. This time, we ran the regression model on the remaining 75 countries, the results of which are shown in tables 5 and 6. I will then proceed to compare and analyze these results.

The results presented in Tables 3 and 4, which include GMM model estimates for the full sample of countries, appear at first glance to be unreasonable, particularly for variables such as $\ln r_{gdppct-1}$ (with a value of -184.97) and $Polity2$ (with a value of 111.73). These extreme values may be due to several factors. One of the primary factors is the over-replication of instruments in the model; in other words, using too many instruments can increase the correlation among the instruments and, as a result, unexpectedly inflate the variance of the estimates. Additionally, the presence of high multicollinearity among the independent variables in a highly diverse sample such as the full set of countries can lead to instability in coefficient estimates and an abnormal increase in t-statistics. Although the Sargan and Hansen tests indicate that the instruments are valid in terms of their strong correlation with the endogenous variables, adherence to exclusion restrictions (i.e., the instruments affect the dependent variable only through the endogenous variables), and the assumption of independence

(no correlation between the instruments and the error term), the combination of data arising from the wide structural diversity in the full sample of countries can lead to these statistical issues.

In addition to the above, challenges related to data quality and the consistency of computational units can also contribute to suspicious results. The data used were collected from various sources, each of which may differ in terms of accuracy, reliability, and synchronization of measurement units; as a result, measurement errors and inconsistencies in defining key units can destabilize the model estimates. Furthermore, differences in data collection methods and the diverse economic conditions of the sampled countries can lead to multicollinearity issues and an unexpected increase in t-statistics. Overall, these factors are not only significant as inherent challenges in macro and international data analysis but also point to the need for improving statistical methods and refining estimation techniques in economic models.

To address the concerns raised and provide a more comprehensive picture of the effects of sanctions on economic growth, supplementary analyses are presented in Tables 5 and 6, focusing on developing countries. In these tables, due to the reduced structural diversity and multicollinearity among variables, the problems arising from instrument proliferation have been significantly mitigated, and the model results are obtained more stably. These supplementary analyses show that although some statistical anomalies are observed in the analysis of the full sample of countries (Tables 3 and 4) due to the characteristics of the variables and data collection issues, the validity of the instruments is confirmed through the Sargan and Hansen tests, and the main assumptions of the model remain valid. Therefore, the inclusion of Tables 3 and 4 as

an essential part of the analysis, alongside the more precise results presented in Tables 5 and 6, provides a comprehensive picture of economic behavior in the face of sanctions and non-sanctions; both sections of the analysis complement each other, ensuring the robustness and accuracy of the overall results of the paper.

Table 5: GMM Model Developing Countries without Sanction (Dependent Variable: Growth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\ln rgdppc_{t-1}$	-30.4692	0.549835	-55.4151	0.00
<i>Gov_Cons</i>	69.9305	1.55464	44.9818	0.00
<i>Cap_For</i>	3.562153	0.672934	5.293469	0.00
<i>Trade_Open</i>	8.973749	0.307548	29.17841	0.00
<i>Hum_Cap</i>	33.40979	1.552543	21.5194	0.00
<i>Polity2</i>	1.785945	0.049559	36.03704	0.00
<i>Econ_Instit</i>	-3.96068	1.023824	-3.86852	0.00
Test	Statistic		p-value	
AR(2)	-0.53		0.596	
Sargan	15.21		0.621	
Hansen	12.87		0.785	

Economic Growth Generalized Method of Moments GMM Model for Developing Countries without Sanctions Model Estimation Results The results of the model estimation, as shown in table 5, indicate that all selected variables are statistically significant and lead to explain variations in economic growth in countries studied. Each variable is now explained and its implications for economic growth are discussed below.

It shows that the variable $\ln rgdppc_{t-1}$, lag of log GDP per capita was found to be negatively related with a coefficient of -30.4692. The negative sign of the coefficient suggests that an increase in the level of GDP per capita in the past period results in lower economic growth in the current period. Statistical evidence: the t-statistic of -55.4151 and a p-value of zero assure us of the significance and robustness of this

relationship. Statistically, this implies that higher previous levels of GDP per capita correlate with lower current economic growth. Such an outcome could highlight the phenomenon of convergence, characterized by lower growth observed in more developed nations contrasted with lower growth rates in less developed nations. The coefficient of *Gov_Cons* in this model is 69.9305 which is very positive. The t-statistic of 44.9818 and p-value zero implies this variable is statistically very significant. Gradual rising of the government consumption, in particular its consumption in the field of education, healthcare, and infrastructure can also create aggregate demand and a productive effect in the economy. Simply put, more government spending on productive activities will lead to much more economic growth. A decline in government consumption may be counterproductive to growth. *Cap_For* coefficient is equal to 3.562153, t-statistic is 5.293469, shows the positive and significant role of investment in economic growth. More investment therefore means stronger infrastructure and productive capacity, thus higher productivity and higher economic growth. So if investment levels are rising, economic growth should improve, while a decline in capital formation should slow growth. *Trade_Open* coefficient is 8.973749 and t-statistic is 29.17841, signifies the elasticity of the economy to openness to trade and shows how strongly trade influences growth. Trade specialization can lead to beneficial trade opportunities, new technology, and foreign investment as countries become more open to trade. Thus, positive movement in the indicator is correlated with positive momentum in economic growth. On the other hand, lack of trade openness can cause economic stagnation.

Human capital (*Hum_Cap*), which is included in the model with an extremely positive coefficient of 33.40979 and t-statistic of 21.5194, points to the major

significance of human capital needed for economic growth. Human capital encompasses the quality and amount of education, as well as skills, and talent of the labor force that leads to increased productivity and innovation in the economy. A rise in human capital results in blooming talents and improves an economy's competitiveness. So, an improvement in this indicator will translate into more rapid economic growth. Similarly, the *Polity2* index 1.785945 and a t-statistic of 36.03704 has a positive coefficient, which reflects the contribution of policies and good practice of governance in stimulating growth. Updating political indicators in developing countries can improve the stability of such countries as a whole, rule of law (increasing the confidence of citizens in the government), the attraction of domestic and foreign investors. Meaning of a *Polity2* value decrease, as a function of political policy quality, negatively affects economic growth, while its increase positively affects economic growth. Lastly, the *Econ_Instit* variable, which has a negative coefficient equal to -3.96068 and t-statistic is -3.86852, indicates that economic institutions matter significantly for economic growth. While strong and efficient institutions are generally presumed to enhance economic performance, in this model an increase in this indicator probably mirrors managerial complexities, tight regulations or administrative hurdles that might even dampen growth. Thus, an increase in this variable is linked to less economic growth. Hence, reformation and simplification of economic institutions could be a quite significant contributor to the enhancement of growth.

Apart from that, more tests of models reinforce the idea that the model is statistically robust and sound. The absence of second-order autocorrelation problem is guaranteed by the AR(2) test with a p-value of 0.596. Moreover, the Sargan ($p=0.621$) and

Hansen (p=0.785) tests indicate that all instruments used to estimate the model are valid.

In conclusion, the scrutiny of the GMM model estimates for non-sanction countries in the context of developing countries suggests a positive and strong impact of higher government consumption, investment, trade openness, human capital, and enhancements in the political indicators upon the acceleration of economic growth. Negative Economic institution issues as a (negative) growth factor conclude that developing countries should design their economic policies to improve their governmental and political institutions and growth.

Table 6: GMM Model Developing Countries with Sanction (Dependent Variable: Growth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>ln rgdppc_{t-1}</i>	-31.7848	1.341176	-23.6992	0.00
<i>Gov_Cons</i>	62.50566	8.406163	7.435694	0.00
<i>Cap_For</i>	5.839164	2.862111	2.04016	0.04
<i>Trade_Open</i>	10.44498	1.556358	6.711169	0.00
<i>Hum_Cap</i>	35.85001	5.205963	6.886336	0.00
<i>Polity2</i>	1.750837	0.200932	8.71359	0.00
<i>Econ_Instit</i>	-1.10453	3.04567	-0.36266	0.72
<i>General_SAN</i>	-7.58058	1.966266	-3.85532	0.00
<i>Duration_SAN</i>	-0.58034	0.119246	-4.86677	0.00
<i>Limited_SAN</i>	2.171163	1.948059	1.114526	0.27
<i>Uni_SAN</i>	-1.33298	1.385332	-0.96221	0.34
<i>Impose_SAN</i>	-1.05935	5.486637	-0.19308	0.85
<i>U.S_SAN</i>	-6.90355	2.799719	-2.4658	0.02
<i>Multi_SAN</i>	-7.60284	2.560352	-2.96945	0.00
<i>Imp_Rest</i>	-2.2265	1.313942	-1.69452	0.09
<i>Exp_Rest</i>	-4.56164	1.584855	-2.87827	0.01
<i>Ext_SAN</i>	-13.4312	5.183696	-2.59105	0.01
<i>Fri_Ast</i>	-12.4601	2.751045	-4.52924	0.00
Test	Statistic		p-value	
AR(2)	-1.30		0.194	
Sargan	19.55		0.241	
Hansen	16.32		0.360	

Detailed Interpretation of Variables and Results in Table6:

In this analysis, the impact of various variables on economic growth is examined. Below, each variable, its estimated coefficient, and its statistical significance are discussed, explaining how changes in the level of each of these factors can influence economic growth. The variable $\ln rgdppc_{t-1}$, representing the logarithm of lagged GDP per capita, has a coefficient of -31.7848 . This negative and highly significant coefficient and p equal to 0.00 indicates that an increase in the level of GDP per capita in the past is associated with a decrease in the current economic growth rate. In other words, if the economic level in the previous period is high, economic growth in the subsequent period is likely to decline. This phenomenon could be a sign of convergence or the diminishing returns on investment. The variable *Gov_Cons* coefficient is 62.50566 and p value is equal to 0.00, indicating that government expenditure contributes positively to economic growth. These implications indicate that higher government consumption may lead to increased aggregate demand and better economic infrastructure if allocated sensibly and productively. In contrast, cuts in government consumption could cause economic decline or destroy developmental potential.

The investment in *Cap_For*, having the coefficient is 5.839164 and the level of significance 4% serves as the strong evidence for positive influence of this indicator to be used for economic development. Increased investment implies enhanced production capacity and improved productivity. Therefore, if investment in the economy rises, economic growth improves, while a decline in investment can negatively affect the development process. The variable *Trade_Open*, with a coefficient of 10.44498 and very high statistical significance and p value is equal 0.00,

highlights the importance of trade openness in accelerating economic growth. Liberation-related positive international trade outcomes include: broader markets and new technologies (for access) leading to greater levels of exports of opportunities and foreign investments. So, when this indicator increases, economic growth surges. *Hum_Cap* coefficient is 35.85001, with a t-statistic of 6.886336 and $p=0.00$. It is statistically highly significant, indicating that an increase in human capital including skills, education, and workforce capabilities can significantly enhance economic growth. Therefore, improving the quality of human resources is a vital investment for sustainable development.

The *Polity2* index, with a coefficient of 1.750837 and high statistical significance ($p=0.00$), reflects the positive impact of political quality and the rule of law on economic growth. In other words, improvements in political indicators and increased political stability foster trust among domestic and foreign investors, thereby supporting economic growth. A decline in this index could lead to political uncertainties and a reduction in growth rates. In contrast, the *Econ_Instit* variable, with a coefficient of -1.10453 and a p-value of 0.72, is not statistically significant. Although its negative coefficient suggests that changes in the quality of economic institutions may have a negative impact on growth, this result cannot be confirmed with certainty due to its lack of statistical significance. In other words, changes in this indicator do not show a significant impact on economic growth in the current model. Among the sanction-related factors, the *General_SAN* variable, with a coefficient of -7.58058 and $p=0.00$, indicates the overall negative impact of sanctions on economic growth. This variable indicates that indeed the mere presence of sanctions, in terms of either type or level, can cause lower growth. So, more sanction pressure means less economic activity.

As shown in the regression, the *Duration_SAN* variable has a coefficient value of -0.58034 and a t-statistic of -4.86677 suggesting a negative correlation between the length of sanctions and growth, affirming that the longer sanctions are implemented, the larger the hindrance to economic growth appears to be. It means that prolonged periods of sanctioning can incur structural and long-term negative impacts upon the economy. *Limited_SAN*, *Uni_SAN*, and *Impose_SAN* have coefficients of 2.171163 , -1.33298 , and -1.05935 , and p-values of 0.27 , 0.34 , and 0.85 , reinforcing that they are not statistically significant. In other words, these types of sanctions do not have a detectable impact on economic growth in the current model. Therefore, changes in these indicators may play a minor role in the growth process, or their effects may be overshadowed by other factors.

The *Uni_SAN* variable, with a coefficient of -6.90355 and a significance level of 2% , shows that sanctions imposed by the United States have a significant negative impact on economic growth. This indicates that U.S.-related sanctions, by creating economic restrictions and reducing access to financial and technical resources, can hinder economic growth. The influence of *Multi_SAN* was also examined, indicating a remarkably negative correlation with the coefficient of -7.60284 and a high statistical significance $p=0.00$. Given their wide-ranging, coordinated nature, such sanctions could significantly undermine economic activity and, therefore, growth rates. The *Imp_Rest* variable, with a coefficient of -2.2265 and a p-value of 0.09 (significant at the 10% level), suggests that import restrictions may have a negative impact on economic growth. These restrictions, by limiting access to imported goods, new technologies, and raw materials, can disrupt production processes and ultimately reduce economic growth. In contrast, *Exp_Rest*, with a coefficient of -4.56164 and

$p=0.01$, shows a significant negative impact of export restrictions. Imposing export restrictions reduces access to foreign markets and limits income-generating opportunities through exports, ultimately hindering economic growth. The *Ext_SAN* variable, with a coefficient of -13.4312 and a significance level of 1%, indicates a very strong negative impact of comprehensive sanctions. These results suggest that imposing extensive and comprehensive sanctions can severely constrain the economic environment and put significant pressure on economic growth. Finally, the *Fri_Ast* variable, with a coefficient of -12.4601 and $p=0.00$, also shows the negative impact of asset freezes on economic growth. In response to your question, we can all observe that when assets are frozen in a country or companies, access to financial resources is limited, investment decreases, so economic growth rates decline.

In addition to the above analysis, the results of supplementary tests also support the validity of the model. The AR(2) Test with a statistic of -1.30 and a p-value of 0.194, it indicates that there is no second-order autocorrelation in the model's errors. The Sargan Test with a statistic of 19.55 and a p-value of 0.241, it supports the validity of the instruments used in the model. The Hansen Test with a statistic of 16.32 and a p-value of 0.360, it also confirms the validity of the instruments and, consequently, the model. These results demonstrate that the model is statistically stable and reliable, and the instruments used to estimate the relationships between the variables have functioned correctly. Therefore, the obtained results can be confidently used for policy formulation and future analyses.

We find that domestic economic performance indicators (e.g., GDP per capita, government expenditure, investment, trade and human capital) positively affect economic growth. On the other hand, various sanctions—particularly general,

multilateral, long-term, export restrictions, extensive sanctions, and asset freezes—have a significant negative impact on economic growth. Therefore, when these negative factors increase, economic growth is expected to decline, while improvements in economic and political indicators will lead to faster growth. These findings can be useful for policymakers and economic managers in designing strategies to mitigate the negative effects of sanctions and improve economic conditions.

Overall Findings of The Table 3 to 6:

By examining table 3, we find that the independent variables effectively explain economic growth. The negative coefficient of the lagged logarithm of GDP per capita, $\ln rgdppc_{t-1}$, with a very low t-statistic, confirms that an increase in past per capita income is associated with a decline in current growth, a phenomenon aligned with the economic convergence hypothesis. Additionally, other variables such as government consumption, capital formation, trade openness, human capital, political index (Polity2), and economic institutional quality have positive signs. These results align with economic theories positing that government spending, investment, trade interactions, education, and political stability positively influence growth. In other words, the direction and signs of the coefficients in this model are consistent with theoretical expectations for economic growth.

When sanction-related variables are introduced (as seen in tables 4 and 6), the regression model provides a more comprehensive explanation of economic growth variations. In sanction-inclusive models, coefficients for variables like general sanctions, multilateral sanctions, sanction duration, export restrictions, extensive sanctions, and asset freezes are significantly negative, indicating that sanctions substantially hinder growth. Notably, the coefficient for $\ln rgdppc_{t-1}$ shifts from -

5.1294 in table 4 to -31.7848 in table 6. This suggests a much stronger and more pronounced economic convergence effect in developing countries under sanctions. The change in coefficient magnitude implies that domestic economic variables still behave as theoretically expected under sanctions, but the negative impacts of sanctions are also clearly identifiable. However, some sanction variables, such as unilateral sanctions or sanction imposition methods, are statistically insignificant, highlighting structural differences in how sanctions affect economies.

The superiority of table 6 over table 4 in result quality stems from refining the sample: reducing the number of countries (from 168 to 75) and excluding those with incomplete data or not classified as "true" developing countries. This refinement improved regression precision and significance. For example, the coefficient for $\ln rgdppc_{t-1}$ in table 6 (-31.7848) reflects a robust economic convergence effect among developing countries. Similarly, sanction variables like multilateral sanctions (-7.60284) and sanction duration (-0.58034) in table 6 illustrates the negative impacts of prolonged and coordinated sanctions on growth, effects less evident in the broader sample (table 4). These findings underscore that focusing on developing countries, more precise insights into growth determinants.

Comparing table 5 (developing countries without sanctions) with table 3, key variables like government consumption (69.9305 vs. 12.4206) and human capital (33.40979 vs. 0.307894) exhibit drastically higher coefficients. This implies that growth-enhancing factors have far greater potency in developing countries, meaning supportive policies here hold higher potential to boost growth. Refining the sample by excluding non-developing or data-deficient countries significantly enhanced result accuracy and significance. Classifications like the Human

Development Index (HDI) and World Bank's "World Development Indicators" As an example, I used the "World Development Index" published by the World Bank, which is a reliable reference in this field. Overall, the GMM model results demonstrate that domestic economic variables—GDP per capita, government consumption, investment, trade openness, human capital, and political indices—all positively and significantly influence growth, with coefficients aligning with theoretical expectations. Introducing sanction variables (tables 4 and 6) paints a clearer picture of sanctions' adverse effects, particularly in developing countries under sanctions, where economic convergence is stark and multilateral/long-term sanctions strongly impede growth. Sample refinement by excluding structurally irrelevant or data-poor countries strengthened statistical reliability. These findings emphasize the critical role of domestic economic indicators and the need for targeted policies to mitigate sanctions' impacts, urging strategic measures to counteract international pressures and foster sustainable development.

As a limitation of this study:

There seems to be a unit conversion problem in the dataset as the estimation results seems exaggerated. For example, in table3 *Gov_Cons* coefficient is 12.4 which means 1% increase in government consumption leads to 12 % increase in economic growth and in table 5 the coefficient of *Gov_Cons* is 69.9 that means that with 1% increase in government consumption lead to 69 % increase in economic growth and this is so exaggerated effect. This seems to be the case for most explanatory variables; therefore, we might have a unit problem in calculation of dependent variable Growth, and due to time limitation, we could not further correct this problem. Nevertheless, most results are statistically significant and of correct sign.

Chapter 7

CONCLUSION

Sanctions move to damage global supply chains, raising production costs and squeezing productivity. This makes multinational corporations try to find new vendors, which increases costs for them. Companies also face reduced access to international markets and lower competitiveness due to financial constraints from sanctions. This problem is especially prevalent in industries like technology, pharmaceuticals, and those dependent on raw materials. Some companies from around the world were forced to withdraw from certain markets due to the burden of sanctions, making these businesses less profitable. The sanctions also have implications for financial markets. Financers consider capital entering potentially undermined markets too risky because of the corresponding uncertainties due to sanctions, which creates volatility in the financial markets. Sanctions also lead to increased transaction costs for companies and individuals, with deleterious effects on economic dynamism. This issue also undermines the creditworthiness of targeted countries in global financial institutions and increases the cost of financing economic projects.

The final four tables display the results of the GMM models, which cumulatively summarize domestic economic and sanctions effects on economic growth. For the model for countries without sanctions (table 3), the increase in economic level in the previous period (as thickness of the logarithm of lagged GDP per capita) showed a

negative relationship with economic growth in the next period. This result suggests a convergence process in which countries with a better economic base have fewer growth opportunities than those whose initial levels are lower. Conversely, growth is positively and significantly influenced by government consumption, capital formation investment, trade openness, human capital, political indicators, and institutional quality, implying that the increase in these factors accelerates economic growth. In the model for countries under sanctions, which includes all countries (table 4), the effects of economic variables remain positive and significant. However, the coefficient of the logarithm of lagged GDP per capita has decreased, and its negative value is smaller than in the model without sanctions.

This deceleration shows how well sanctions can change growth trends. The high coefficients for government consumption and investment suggest that economic policies and government support are crucial to avoid a decline in growth in a sanctions environment. Moreover, sanction variables related to multilateral sanctions, duration of sanctions, and export restrictions tend to negatively impact economic growth in a statistically significant manner. For example, the row for multilateral sanctions with significant negative coefficient indicating that belief for multilateral and international sanctions result in a steep drop in economic growth. Some sanction-related variables exhibit no significant effects however, e.g., unilateral sanctions, or specific U.S. sanctions, either because of structural diversity or selection of samples.

The sample of developing countries without sanctions (table 5) presents different results compared to the full sample. In this model, the coefficient of the logarithm of GDP per capita is highly negative, and the effect of economic convergence is strongly evident. This means that an increase in the economic level in the past is associated

with a significant decline in current economic growth. Government consumption and human capital are also of exceptional importance in this model, with very high coefficients, indicating that increased government spending and investment in education can significantly boost economic growth. Moreover, we observed that political indicators are positive and significant, and the effect of economic institutions is of negative and significance. In other words, in developing nations, institutional frameworks may stifle economic development through complexity and incapacity.

In the sample of developing countries (table 6), a similar pattern with the full sample of countries under sanctions prevails, but the intensity and direction with which variables exert their effects differ. In this model, in addition to strong domestic effects—such as government consumption, investment, trade openness, human capital, and political indicators—sanction-related variables also more clearly demonstrate their negative impact on economic growth. For example, the coefficient of the logarithm of GDP per capita is significantly negative, indicating a strong effect of economic convergence in these countries. On the other hand, general sanctions, multilateral sanctions, export restrictions, extensive sanctions, and asset freezes all have significant negative effects on economic growth. It is worth noting that in this model, the coefficients of some sanction-related variables, such as limited or unilateral sanctions, are not statistically significant. Therefore, it can be concluded that the type and intensity of sanctions are particularly important, and coordinated, long-term sanctions cause the most harm.

Regarding supplementary statistical tests (AR(2) test, Sargan test, and Hansen test), the results across all models indicate the absence of second-order autocorrelation issues, and the validity of the instruments used is confirmed. For example, in table 6,

the AR(2) test with a statistic of -1.30 and $p=0.194$, the Sargan test with a statistic of 19.55 and $p=0.241$, and the Hansen test with a statistic of 16.32 and $p=0.360$ ensure the stability and accuracy of the model's estimation results. It can be concluded from the results of the models presented that the presence of sanctions has a stronger negative impact on economic growth, particularly in the sample of developing countries. However, for the complete set of countries, because it includes developed countries that are immune to sanctions or less affected by them, the effects of sanctions are relatively weak, but in developing countries, the negative impacts of sanctions are clear. That is, in developing countries, where domestic economic variables are strong enough to explain growth well in the observable range, sanctions simply break the regularity and diverge growth, so table 6 does better than table 4 in detecting sanctions effect on economic growth.

Such results indicate that sustaining economic growth is based on densifying indicators such as human capital accumulation, productive government consumption, investment, and international trade. However, the effects of sanctions must be mitigated through foreign policy reforms and the establishment of supportive economic environments. However, in developing countries where sanctions are able to dramatically lower growth, implementing targeted policies that are able to increase trade interactions, increase investment in education, and increase political stability will on the whole alleviate the negative impacts of sanctions.

In conclusion, the results of the GMM models highlight the importance of the multidimensional interaction between economic, political, and sanction-related factors in determining economic growth trends. Policymakers must take serious steps to reduce the negative effects of sanctions while focusing on improving domestic

indicators when formulating national and regional development strategies. Implementing supportive programs to attract domestic and foreign investment, enhancing economic infrastructure, and strengthening educational and political systems are among the measures that can accelerate economic growth and create greater dynamism in economies, especially under sanctions.

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APPENDIX

List of the Countries			
Afghanistan	Ethiopia	Monaco	Timor-Leste
Albania	Fiji	Mongolia	Togo
Algeria	Finland	Montenegro	Tonga
			Trinidad and Tobago
Andorra	France	Morocco	Tunisia
Angola	Gabon	Mozambique	Turkey
Antigua and Barbuda	Georgia	Myanmar	Turkmenistan
Argentina	Ghana	Namibia	Tuvalu
Armenia	Greece	Nauru	Uganda
Australia	Grenada	Nepal	Ukraine
Austria	Guatemala	Netherlands	United Arab Emirates
Azerbaijan	Guinea	New Zealand	
	Guinea-Bissau	Nicaragua	United Kingdom
Bahrain	Bissau	Niger	Uruguay
Bangladesh	Guyana	Nigeria	Uzbekistan
Barbados	Haiti	Norway	Vanuatu
Belarus	Honduras	Oman	Vietnam
Belgium	Hungary	Pakistan	Zambia
Belize	Iceland	Palau	Zimbabwe
Benin	India	Panama	
Bhutan	Indonesia	Papua New Guinea	
Bolivia	Iraq		
Bosnia and Herzegovina	Ireland	Paraguay	
Botswana	Israel	Peru	
Brazil	Italy	Philippines	
Bulgaria	Jamaica	Poland	
Burkina Faso	Japan	Portugal	
Burundi	Jordan	Qatar	
Cabo Verde	Kazakhstan	Romania	
Cambodia	Kenya	Rwanda	
Cameroon	Kiribati	Samoa	
Canada	Kosovo	San Marino	
Central African Republic	Kuwait	Sao Tome and Principe	
Chad	Latvia	Saudi Arabia	
Chile	Lebanon	Senegal	
China	Lesotho	Seychelles	
Colombia	Liberia	Sierra Leone	
Comoros	Libya	Singapore	
Costa Rica	Liechtenstein	Slovenia	

Croatia	Lithuania	Solomon Islands
Cuba	Luxembourg	Somalia
Cyprus	Madagascar	South Africa
Czech Republic	Malawi	South Sudan
Denmark	Malaysia	Spain
Djibouti	Maldives	Sri Lanka
Dominica	Mali	Sudan
Dominican Republic	Malta	Suriname
Ecuador	Marshall Islands	Sweden
El Salvador	Mauritania	Switzerland
Equatorial Guinea	Mauritius	Tajikistan
Eritrea	Mexico	Tanzania
Estonia	Moldova	Thailand