The Political Economy of Sanctions: Regime Response and Trade Integration

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The Political Economy of Sanctions

Regime Response and Trade Integration

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The contents of this publication are the sole responsibility of its author.

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ABSTRACT

Why do some countries targeted by economic sanctions manage to preserve their stability, while others sink into crisis? This research explores the resilience mechanisms of states under international pressure, combining economic and political approaches. Through an empirical analysis covering a sample of countries sanctioned between 2005 and 2023, the thesis examines the impact of two key variables: trade openness and the type of political regime. The results show that countries with high trade openness tend to maintain higher GDP growth in the event of sanctions, although they may face higher inflation. Authoritarian regimes, on the other hand, appear to be more vulnerable in terms of economic growth, despite their political control mechanisms. These observations raise questions about whether economic sanctions are always a strong tool for forcing countries to change their behaviour. To test these relationships, the study uses panel data analysis with a fixed-effects model to control for unobservable country specificities. GDP growth and CPI inflation will be used as dependent variables. Other macroeconomic indicators are used as independent and control variables to assess the real impact of sanctions. This rigorous methodological approach provides a better understanding of how certain internal economic and political structures strengthen the ability of sanctioned states to absorb external shocks. By being able to circumvent restrictions, diversify economic partners and mobilise economic nationalism, the countries targeted by sanctions can limit the expected impact of these measures. By placing resilience at the heart of the analysis of sanctions, this study offers a critical reading of contemporary economic power dynamics and highlights the need to rethink the instruments of coercive diplomacy. In other words, the more resilient and flexible a country shows itself to be in these areas, the more it reduces the negative effect expected from economic sanctions.

Keywords: economic sanctions, resilience, political regime, trade openness, GDP growth, inflation, authoritarianism, international political economy, fixed effects model, panel data analysis

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LIST OF ABBREVIATIONS

Abbreviation	Definition
CIPS	Chartered Institute of Procurement & Supply
CPI	Consumer Price Index
EU	European Union
FDI	Foreign Direct Investment
FE	Fixed Effects
FOREX	Foreign Exchange Market
GDP	Gross Domestic Product
GSDB	Global Sanctions Database
IMF	International Monetary Fund
JCPoA	Joint Commission of the Joint Comprehensive Plan of Action
OFAC	Office of Foreign Assets Control
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PLM	Panel Linear Models
RE	Random Effects
SPFS	System for Transfer of Financial Messages
SWIFT	Society for Worldwide Interbank Financial Telecommunication
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States Dollar
V-Dem	Varieties of Democracy
WB	World Bank
WDI	World Development Index

INTRODUCTION

In the documentary *A La Calle* (2021), directed by Nelson G. Navarrete and Maxx Caicedo, thousands of Venezuelans went to the streets to protest against the humanitarian, economic and political crisis caused by the dictatorial regime[1]. The film shows a country in distress: food shortages, unstoppable inflation, and collapse of public services. The testimonies of dozens of Venezuelans and various life stories shows how the economy has fallen apart and how the imposition of international sanctions made it worse. While Venezuela appears to have been brought to its knees, other countries such as Russia and Iran, also targeted by heavy sanctions, seem to have managed to contain or avoid their effects. This contrast raises a crucial question: *why do some countries maintain economic stability under sanctions while others collapse?*

This thesis revolves around this paradox. Economic sanctions, which have become a central diplomatic tool in the 21st century and even more since the 9/11 attacks (Masters, 2024), aim to constrain a state without military intervention. In 2023, 54 countries were subject to some form of economic sanction imposed by major players such as the United Nations, the European Union, and the United States (Rahman, 2023). However, their effectiveness varies greatly from one country to another. While some sanctions lead to severe economic pressure, others seem, on the contrary, to stimulate mechanisms of resilience.

Research on sanctions has largely focused on their effectiveness from the perspective of the countries imposing them. They are usually analysing how to force a change in behaviour, how to maximize pressure and which sanctions are the most successful. On the other hand, the adaptation and resilience strategies implemented by sanctioned countries remain underexplored in the academic literature, even though they are decisive in understanding the structural limits of this geopolitical tool. Today more than ever, this gap is increasingly important as the emergence of digital tools such as cryptocurrencies, blockchain-based transactions and alternative banking systems opens up new and unexplored ways to bypass sanctions.

From a scientific point of view, this thesis seeks to improve our understanding of the economic resilience mechanisms of sanctioned states, by using quantitative approach. It offers a multidimensional reading of resilience, combining the institutional and political characteristics of states (type of regime, centralization of power) and structural economic

[1] The term “dictatorial regime” refers to the authoritarian drift that began under Nicolás Maduro, particularly from 2017 onwards, marked by the neutralisation of Parliament, the repression of opponents and the end of free elections, as documented by Human Rights Watch (2021) and Freedom House (2022).

variables (degree of trade openness, level of foreign exchange reserves), as well as the intensity and nature of the sanctions suffered. This approach attempts to bridge a theoretical gap by linking classic theories on sanctions such as "Weaponized Interdependence" (Farrell and Newman, 2019) or the theory of the "Rentier State" (Mahdavy, 1970) to the empirical realities of sanctioned countries. It offers a new perspective in international studies by changing the focus from sanctioning countries to target countries. It also makes it possible to test and refine existing and sometimes old theories in the light of updated data covering almost twenty years.

Beyond its academic scope, this research has several implications for important key players. First, policymakers, both in states that impose sanctions and in those where they are implemented, will be able to better understand why certain sanctions fail to achieve their objectives. This will help them to design more efficient policies that prevent problems like making authoritarian governments stronger or worsening the living conditions for civilians. Then, economists and financial experts will gain valuable information about how countries under sanctions adjust their economies. This data will help them understand how these adjustments affect various economic factors such as trade flows, investment, and monetary stability. This will contribute to a better assessment of the risks for businesses, particularly the ones having large access to international markets. Finally, international organizations (such as the United Nations, the International Monetary Fund, or the European Union) will be able to re-think the effectiveness of sanctions as an instrument of international regulation and develop more nuanced strategies to adjust the sanctions on the political and economic contexts of the targeted countries. By studying the dynamics between economic sanctions and resilience, this research aims to enrich the public and institutional debate on the use of sanctions in the long term, by suggesting more ethical and effective ways to use this diplomatic tool.

First, this paper argues that the economic resilience of countries targeted by sanctions depends on specific political and structural factors, such as regime type, level of trade openness, foreign exchange reserves and sanctions' intensity[2]. Contrary to the common belief that sanctions systematically weaken targeted economies, some states manage to circumvent their effects and preserve a degree of macroeconomic and political stability. Therefore, this paper aims to test two main hypotheses, at country level and over the period 2005-2024, using panel data covering a wide range of countries and years. The aim is to assess the differential effects of economic sanctions on two dependent variables. First, the gross domestic product (GDP) for

[2] The intensity of sanctions here corresponds to the cumulative number of active economic sanctions targeting a country at a given time, all categories combined (trade, financial, economic, etc.)

macroeconomic analysis. Then, the inflation measures by consumer price index (CPI) for microeconomic analysis.

Two results are expected. First, authoritarian regimes should be more resilient to economic sanctions. This is based on the idea that regimes that are more centralized and less dependent on public opinion can absorb the economic costs of sanctions without having to give in to international pressure. Then, I believe that countries that are highly integrated into international trade are more vulnerable to economic sanctions, as it can increase dependence on external partners, making sanctions more effective.

To test these hypotheses, the econometric model includes main independent variables, notably an indicator of regime type (4 different levels, from autocracy to democracy) and an index of trade openness, as well as several economic control variables: sanctions intensity, FDI, exchange rate, foreign exchange reserves. To isolate casual effects and reduce endogeneity bias, all explanatory variables are lagged by one year. Additionally, a Fixed Effects Model that controls for unobservable heterogeneity with characteristics specific to each country is used for estimation. This panel data approach is particularly suited to the study of temporal and structural dynamics over a large number of statistical units (countries), by eliminating the influence of certain unobserved fixed factors. To give a preliminary idea of the findings, the quantitative analysis based on panel data for 99 countries (2005-2024) reveals that countries that are more open to trade tend to preserve GDP growth better in the event of sanctions but are more exposed to inflationary shocks. Conversely, authoritarian regimes appear to experience a sharper decline in growth in the event of sanctions, contradicting the conventional expectation of greater resilience. Control variables such as foreign exchange reserves and past GDP dynamics also influence a country's ability to adapt.

In order to answer the research question, the structure of the thesis unfolds as follows: Chapter 1 summarizes existing literature on economic sanctions, resilience mechanisms, and the role of trade openness and regime type. Chapter 2 presents the theoretical framework, through the explanation of the main theories and hypotheses guiding the analysis. Chapter 3 outlines the research design, including the case selection, data sources and econometric strategy. Chapter 4 provides the descriptive and empirical results based on panel data analysis. Chapter 5 discusses the interpretation of the findings and will link them to real country case study and broader theoretical debates. Finally, Chapter 6 concludes by summarizing the main contributions, highlighting limitations, and proposing solutions to improve resilience and ideas for future research.

CHAPTER 1: LITERATURE REVIEW

Economic sanctions are diplomatic tools used to apply pressure[3] on a targeted country, entity or individual in order to force a change in behaviour without resorting to military force. Over the time, sanctions moved from being instruments of diplomacy to instruments of coercion and geopolitical strategy. According to Hufbauer, Schott and Elliott (2009), economic sanctions are defined as "a deliberate, government inspired withdrawal or threat of withdrawal from customary commercial or financial relations". Sanctions can be made in the form of trade embargoes, asset freezes, restrictions on financial transactions, bans on technology exports or others, and are often imposed to solve problems like nuclear proliferation, human rights violations, or territorial aggression. Sanctions are not new: historically, they go back as far as antiquity with the Athenian trade blockade of Megara in 432 B.C. But their modern use became systematized in the twentieth century, with emblematic cases such as the American embargo against Cuba in the 1960s, multilateral sanctions against Iraq in the 1990s, and the European Union's sanctions against Russia from 2014. Nevertheless, as early as the 1960s, researchers such as Galtung (1967) managed to identify the limitations of these instruments: sanctions already tended to affect civilians rather than rulers, with counterproductive impact. More recent works, such as the ones by Portela (2010) or Vines (2012) agree that sanctions can be a powerful mechanism to convey a normative message, but rarely succeed in forcing political change, unless used alongside incentive or diplomatic levers. Sanctions have become more financialized and specialised since the 2000s, especially after the September 11 attacks. "Secondary sanctions," such as the ones imposed by OFAC (Office of Foreign Assets Control) in the United States, threaten to penalize third countries or foreign companies trading with sanctioned entities (Souva, 2016). This creates legal debate on extraterritoriality and economic sovereignty. In response, more or less authoritarian regimes like Iran, North Korea and Russia have developed sophisticated tactics to bypass sanctions, such as triangular trade, alternative currencies, crypto-currencies, and parallel banking networks. In short, economic sanctions have become real geo-economic weapons in the contemporary strategic rivalries. They reveal not only the structural imbalances in the global system, but also the ability of targeted states to adapt. However, their

[3] Economic sanctions can pressure a country in several ways. They can limit trade and financial transactions, freeze assets, and exclude countries from international banking systems. Sanctions can also create political isolation by cutting off diplomatic relationships. Sometimes, these measures can have a social impact by (indirectly) affecting the living conditions of the people.

effectiveness is still debated, and many studies call for a better understanding of the resilience strategies of sanctioned countries.

1.1 Overview of the Existing Research

1.1.1 Sanctions and Macroeconomic Outcomes

The economic literature on international sanctions has developed considerably over the last few decades, focusing mainly on their effect on politics and economics. However, a central question remains: how do the macroeconomic indicator of a country reacts to sanctions? In general, economic sanctions lead to a slowdown in economic growth, a weakening of the local currency, an increase in inflation and a reduction in trade. FDI flows and public finances can also be affected. Hufbauer et al (2009), in their work *Economic Sanctions Reconsidered*, provide a broad database of sanctions imposed since the First World War. They show that in most cases, sanctions lead to a reduction in the target country's GDP, but do not guarantee political success. In particular, their study highlights the fact that the economic impact is greater in the case of multilateral sanctions or when the target country is heavily dependent on international trade.

More recently, Neuenkirch and Neumeier (2015) have shown that US sanctions can significantly increase poverty levels in targeted countries. Their empirical study shows a worsening in overall economic conditions, where incomes are falling and poverty rising. Sanctions also have internal redistributive effects. Debates on "smart sanctions," targeting elites or specific economic sectors, have opened new perspectives especially since sanctions on Russia and its oligarchs have been implemented. However, as Connoly (2018) point out, the real impact of these sanctions remains difficult to measure. He explains that the sanctions imposed on Russia following its annexation of Crimea in 2014 targeted mainly high-ranking elites, such as state officials and associates of President Putin (Connoly, 2018). This strategy aimed to pressure the leadership by targeting those closest to power, showing the role of elites in shaping sanctions' outcomes. Afesorgbor and Mahadevan (2016) have also studied the elite's impact on economic inequality. Their analysis shows that they usually better adapt to sanctions, which increases social disparities in sanctioned countries. However, for sanctions to achieve their objectives, significant economic pain must be inflicted on the target country to influence decision-making or deter any future aggression. Minor disruptions or outcomes that strengthen elite cohesion decreases sanctions' effectiveness and credibility as a tool to force a change in

behaviour. Therefore, a significant economic impact is a necessary, though not sufficient, condition for success.

Regarding trade, Caruso (2003) confirms that sanctions lead to a significant decline in trade between issuing and target countries, sometimes even with unintended consequences on third-party trading partners. Finally, case studies such the one of Petreski and Jovanovic (2013) on Serbia in the 1990s[4] illustrate the severity of the macroeconomic shocks caused by sanctions: declining GDP, hyperinflation, falling investment, and deteriorating current account balances. However, these effects need to be qualified according to the type of sanctions (trade, financial, targeted), the degree of integration of the target economy, and the ability of local authorities to adopt bypass strategies. As Souva (2016) points out, many states find ways to minimize the economic effects of sanctions, which is raising doubts about their overall effectiveness.

Recent study from Morgan, Syropoulos, and Yotov (2023) show that sanctions rarely succeed in bringing major changes in the political regimes of targeted countries, with a success rate between 25 and 33% (Morgan, Syropoulos, and Yotov, 2023, p.16). According to Hufbauer, Schott and Elliott (2009), "the success rate of sanction has even fallen over time, from about 50% (prior to 1970) to about 33% (in the 1990s) for unclear reasons". Despite this low success rate, sanctions continue to be used, probably for hidden goals like satisfying public opinion or symbolism. Some argue that sanctions work under specific conditions, such as when both sender and target countries feel the effects. Even when unsuccessful, sanctions may still be preferable to other measures like military intervention. Success factors include the target's economic stability, political volatility, and whether sanctions are multilateral. They also find out that sanctions are more effective on democracies than autocracies (Morgan, Syropoulos, and Yotov, 2023, p.17). However, the effectiveness of sanctions depends on model design. Indeed, the implementation of sanctions and their nature have also been the subject of analysis. The work of Smeets (2018) focuses on the timeline of sanctions implementation. To him, the effectiveness of sanctions depends on fast and full implementation. There is a "need for a speedy implementation of sanctions and to prevent the target country from organizing its resistance" (Smeets, 2018, p.8). Over time, target countries can adapt by creating reserves, forming new alliances, or shifting their trade strategy, reducing vulnerability. Third-party countries can also exploit loopholes, weakening sanctions' impact, especially if there are

[4] In the 1990s, Serbia (Federal Republic of Yugoslavia) suffered economic sanctions imposed by the UN and several Western countries because of its role in the conflicts in Croatia and Bosnia. According to Hanke & Krus (2012), these sanctions led to a collapse in GDP, a drastic fall in investment and historic hyperinflation. Despite this, the government lasted for many years by depending on illegal market and nationalism.

economically benefiting from it. However, the article shows that implementing sanctions quickly is challenging, especially in multilateral settings like the UN, where consensus is harder to reach.

1.1.2 Resilience Mechanisms in Sanctioned Countries

A state's resilience to economic sanctions refers to its ability to handle the impact of these measures and adjust to them while still pursuing its development objectives. Research highlights that resilience has commercial, financial, and political dimensions, each of which plays a key role for the resistance of the targeted country. When a country faces sanctions, it can implement internal strategies such as import substitution, adjusted fiscal or monetary policies, or targeted redistribution of resources. Iran, for example, has created a "resistance economy" doctrine, based on self-sufficiency, domestic market development and economic diversification, to reduce its dependence on Western-dominated economic circuits (Kalb, 2024).

The political aspect is also important in how countries under sanctions can adapt. Naghavi and Pignataro (2015) explain that authoritarian regimes, especially those based on religious rule or rentier regimes, show some flexibility in the redistribution of resources and economic control. These governments often use strong ideas like religion or nationalism to turn sanctions into a tool for keeping people united. Their research highlights that using the rhetoric of resistance and having a centralized economy can help lessen the impact of sanctions while strengthening the authority of the ruling power. Sanctions can also increase societal divisions in heterogeneous states, fostering a "Rally 'Round the Flag" effect as leaders describe sanctions as external threats, uniting the population against foreign adversaries. Cases such as Cuba, North Korea, and Iraq demonstrate how sanctions often fail to create political change despite economic hardship (Naghavi and Pignataro, 2015, p.10).

In addition, many sanctioned countries have turned to different external partnership to avoid severe economic struggles. Sanctions imposed by the United States and the European Union have indirectly forced countries such as Russia, Iran, and Venezuela to intensify their relations outside the West, especially in trade among developing countries. These countries are trying to free themselves from relying on the dollar or the SWIFT network by using different payment systems or creating their own, such as the Chinese CIPS. Furthermore, Russia has for example continued to export its oil using a "shadow fleet" of tankers to bypass international sanctions. Farrell and Newman (2019) talk about how new financial systems and

cryptocurrencies are being created. These allow people who are affected by sanctions to regain some control over their money by taking advantage of gaps in the international system. However, these resilience strategies have some limits. Even if they can help ease some short-term economic problems, they can also strengthen authoritarian behaviours. McLean and Whang (2021) point out that prolonged sanctions can lead to stronger control by leaders, reduced transparency, and greater reliance on illicit networks. Additionally, working with new economic partners does not always lead to the same benefits as working with Western markets. This is especially true when it comes to investment sharing technology or getting access to international funding.

In short, a country's resilience to economic sanctions relates to how well it can adjust its economy and political system when facing international pressure. From a trade perspective, this means seeking alternative markets and having more control over the economy. In financial terms, it involves using plans to avoid routes controlled by the sanctioning country and to make their own money systems stronger. Finally, in political terms, it means how strong a government is and how well it can gather support from its people when facing challenges. This could involve uniting the population around a sense of national pride or changing its own rules and beliefs either by repressing the people or promoting certain ideas to stay in power. Each of the academic sources cited points out an aspect of resilience. They all agree that a well-prepared state (meaning economically diversified, financially autonomous, and politically cohesive) can better withstand international sanctions. Both classic references (Galtung, 1967; Pape, 1997, etc.) and more recent work (Early, 2015; Farrell & Newman, 2019; Naghavi & Pignataro, 2015, etc.) agree that the success or failure of sanctions depends mostly on how well the targeted country can adapt to them. The more a country can bounce back and show flexibility in these three areas, the less impact economic sanctions will have on it.

1.1.3 Role of Trade Openness

Trade openness plays a key role in understanding how economic sanctions impact countries. Countries that are connected to global supply chains face a greater risk of being affected by external problems such as sanctions. This is illustrated by the theory of complex interdependence developed by Keohane and Nye (1977), according to which the interconnection of modern economies makes countries sensitive to decisions made outside their borders, especially when it comes to economic pressure. Research by Afesorgbor (2019) and Demena and Afesorgbor (2020) shows that sanctions often lead to a big drop in trade between

the country that imposes the sanctions and the country that is targeted. These authors also point out an interesting contradiction: sometimes, just the threat of penalties can actually lead to a short-term rise in trade, especially in exports. This is explained by the willingness of economic agents to prepare for future restrictions by gathering supplies ahead of time. This highlights how important it is to time the implementation of sanctions carefully. If there is a delay between a threat and taking action, the targets can prepare defences which might reduce the effectiveness of the response. Their research also reveals that the impact of sanctions depends on what type they are: broad embargoes cause more serious effects than specific asset freezes on elites.

The level of trade openness in a country affects how strong and what type of impact sanctions will have. Countries that rely a lot on international trade, especially those that depend on selling natural resources or manufactured products to certain partners, usually feel the impact of multilateral sanctions more strongly. On the other hand, states that are less exposed to risks or have a variety of trade partners can better manage their losses (Escribà-Folch, 2010; Bapat et al., 2013). Additionally, being open to trade can also lead to ways to bypass rules. Biersteker et al (2016) explain that some multinational companies decide to comply with sanctions even when they are not directly impacted, for fear of secondary sanctions or damaging their reputation. This increases the economic impact on the country being targeted. However, some companies, especially in countries that are not aligned with any major powers, are using these sanctions to create alternative trade routes. For example, trade between Russia and the European Union is still happening through intermediary countries like Tajikistan or Armenia.

Finally, the current literature does not help us clearly decide if trade openness makes things worse or helps countries which are targeted to bounce back. While some open states, like Iran and Russia, have suffered from sanctions while implementing import substitution policies, others, such as Venezuela, have seen their economies fallen apart because of the lack of diversification. The effect of sanctions therefore appears to depend on the interaction between the level of trade openness, the internal economic structure and how well the institutions can respond to challenges.

1.2. Regime Type and Vulnerability to Sanctions

1.2.1 Political Institutions and Economic Policy Response

Research has shown over the years that political institutions greatly affect how a country responds to economic sanctions. In authoritarian governments, the concentration of power allows for quick changes and adjustments. Leaders can implement capital controls, change how

they spend the budget or even put in place certain spending cuts without needing approval from other institutions or facing elections. Escribà-Folch and Wright (2010) explain that this political structure helps authoritarian governments resist external pressures for a longer time. They do this by silencing their opponents and shifting resources to maintain the power of the elite. These governments can also set up their own exchange networks and partnerships as seen in Russia and Iran. On the other hand, in democracies, governments must handle more open information and the public opinion that often question their actions. These limitations make it harder to implement unpopular policies even when they are necessary for economic survival. Studies like Marinov's (2005) indicate that sanctions work better in democracies. This is not because they lead to faster economic collapse but because they put electoral pressure on rulers. This also means that the economic response is less centralized and therefore potentially less effective.

Another factor often observed is the "Rally 'Round the Flag" effect. This happens when governments that are facing sanctions use them to encourage their citizens to come together and show patriotism. Nephew (2017) describes how this effect was particularly powerful in Iran. There, leaders portrayed the sanctions as an assault on the country's independence. By shifting the conversation to a common external threat, those in power strengthen social connections and make it easier to justify controlling their own people. This strategy is also documented by Bapat and Morgan (2009), who explain that authoritarian governments can use nationalist language to lessen the political impact of sanctions. The more authoritarian a regime is, the better it can take advantage of this type of rhetoric.

Finally, the work of Peksen (2019) and Wood (2008) show that the impact of sanctions is often unclear. They not only find it hard to reach their political goals in closed governments, but they also often make life worse for people by harming health and education. This decline can strengthen authoritarian behaviour as governments take advantage of the crisis to gain more power and restrict liberties. Hafner-Burton and Montgomery (2006) explain that when governments use sanctions, it can make them even more controlling over their people. This is why the type of government plays a key role in how likely a country is to be affected by sanctions or how well it can handle them. On one hand, democracies have systems in place to hold leaders accountable which can make them less powerful. On the other hand, authoritarian governments, even though they are less transparent, often know how to use sanctions to benefit themselves.

1.2.2 Empirical Evidence on Regime Type and Sanction Outcomes

Research shows that the impact of economic sanctions varies based on the type of government in charge. Often, authoritarian governments appear to bypass international sanctions better than other types of political systems. Research by Peksen (2009) and Escribà-Folch (2010) shows that authoritarian governments usually have tools and strategies to reduce the economic effects of sanctions. Using their extensive quantitative methods and data collected over time, they found that authoritarian governments can better control capital flows, strengthen state propaganda and limit personal freedoms to prevent internal contestation. To be more precise, the work by Escribà-Folch (2010) shows that dictatorships generally survive sanctions longer than democracies. This is because dictatorships rely less on public support and have better control over the country's resources. Furthermore, these regimes adjust by finding ways around economic restrictions, like creating underground markets or forming partnerships with countries that are not aligned with them. For instance, "grey" trade networks[5] in Russia have allowed the government to keep exporting important goods even with restrictions in place.

However, there are significant counterexamples. Qualitative case studies found that countries like Zimbabwe and North Korea, which are controlled by strict governments, have faced serious economic problems due to sanctions. In these cases, relying on only a few trading partners or important resources along with weak economic management made the problems even worse. The sanctions placed on North Korea had a major impact on its economy causing frequent food shortages, sometimes leading to horrific famines, and a growing reliance on help from other specific countries (Haggard & Noland 2017). In addition, several quantitative studies show the perverse effects of sanctions. Peksen (2019) illustrates through a cross-national panel data that rather than encouraging democracy, sanctions can result in more repression, corruption, and authoritarian rule. Targeted leaders often use sanctions as an excuse to tighten their control over power. They also support the informal economy and smuggling networks which harm the middle and working classes without always reaching the targeted élites despite sanctions being implemented against them. Sanctions can lead to other problems that people often ignore like increasing poverty, exclusion from global banks and long-term diplomatic isolation. In a qualitative analysis, Drezner (2015) explains through comparative case studies that the effectiveness of sanctions largely depends on how connected the target country is to the rest of the world. A state that is already cut off from others will have fewer things to lose, which means that economic actions may not work or could even make things worse.

[5] Semi-legal trade networks which are overlooked or accepted by authorities. This allows people to partially avoid penalties linked to sanctions.

1.3. Theoretical Contributions and Research Gaps

1.3.1 Gaps in the Literature

Although there has been a lot of research on economic sanctions lately, some limitations still exist. Firstly, many studies look at the effects of sanctions in isolation, without considering other crucial factors like the type of political regime or how open the economy is in the targeted country. For example, research by Hufbauer et al (2009) or Caruso (2003) looks at the overall effects on the economy, without pointing out the differences between democratic and authoritarian regimes.

Secondly, there are only a few dynamic empirical models that use panel data. These models help us see how the effects of sanctions change over time and in different countries. Many studies remain static or focus only on particular examples like Iran or Russia. This limits the generalizability of results. However, as Smeets (2018) highlighted, temporality plays an essential role: a country can change and grow over the years, which is something that strict models do not take into account.

Finally, experts do not agree on how sanctions affect different political or economic situations. Some studies find that authoritarian regimes stronger and can withstand challenges (Escribà-Folch, 2010), while others show that some collapse under pressure (Zimbabwe, North Korea). In addition, factors such as dependence on foreign trade, the influence of elites, or having natural resources to extract also greatly influence outcomes but are often less integrated into current models (Afesorgbor, 2019; Farrell & Newman, 2019). This shows that we need to develop more integrated and comparative approaches that cross different political systems, trade policies, local economies, and long-term data. This will help us understand how strong or weak countries are when facing sanctions.

1.3.2 Contribution of This Research

This research seeks to address some gaps found in existing studies by suggesting a new way to gather and analyse data. It is based on a multi-country panel analysis: it observes a set of countries over several years, allowing us to have a better understanding of the effects of sanctions in a variety of economic and political contexts. Using fixed effects models allows us to consider structural differences between countries, such as level of development, political stability, or institutions. If we do not account for these differences, they could unfairly influence the results. Furthermore, our data comes from trustworthy and official sources, including the International Monetary Fund (IMF), the World Bank and the United Nations Conference on

Trade and Development (UNCTAD). This ensures that the macroeconomic indicators being studied, like GDP, inflation, and foreign trade, are strong and can be compared effectively.

One particular aspect of this work is the use of lagged variables, which are variables that are measured with a one-year delay. This makes the cause-and-effect analysis stronger, helping to ensure that the economic effects observed are not mixed up with changes happening at the same time or external shocks. By measuring economic indicators one year after the imposition of sanctions, I can better isolate their true impact. Finally, this research also helps the discussion about how effective sanctions are by looking at how they affect several types of political systems (like authoritarian or democratic) and how open a country is to trade. This study is valuable because it combines political and economic methods which is not commonly seen in research. This makes it important for both theory and real-world applications.

CHAPTER 2: THEORETICAL FRAMEWORK

2.1 Theoretical Background on Sanctions and State Behaviour

Economic sanctions are foreign policy tools used to change the behaviour or policies of a specific country without using military force. They come in several types, such as: trade embargoes, asset freezes, financial restrictions, or technological sanctions. These measures can be imposed unilaterally or multilaterally. For a long time, researchers have doubted how effective sanctions really are. Several authors and papers agree that sanctions have a political success rate of around 33%, which means that they fail in most situations. To dive deeper into the analysis, Hufbauer, Schott et Elliott (2009) comprehensive database shows that sanctions are most effective when they are multilateral, focus on specific goals and affect countries that are already struggling economically. Their study shows that the impact of sanctions is never the same: it depends on the political and economic context of the targeted country.

Drezner (2015) goes further by discussing how important it is for a targeted country to be connected to the global economy. He states that a country that is already isolated or less connected to international markets is less affected by sanctions, since it has less to lose. On the other hand, a country that relies a lot on the global financial and trade system will be more vulnerable. Drezner also points out that sanctions can have unexpected and harmful effects. They might weaken civil society, reinforce the power of the elites in place, or push targeted states to create parallel and illegal circuits to bypass restrictions.

From this perspective, sanctions should not be seen as a one-size-fits-all tool, but as a lever whose effects depend on certain factors within a country: type of regime, degree of trade openness, natural resource wealth, or institutional stability. This is why many recent studies highlight the importance of understanding how countries facing sanctions adapt and cope with these challenges (Peksen, 2009; Escribà-Folch, 2010; Rezaei, 2017). This theoretical framework encourages us to go beyond a binary reading of sanctions and have a more nuanced approach. We should think more about the interaction between external constraints and internal capacities. This is the rationale behind this thesis, which looks at how sanctions affect countries differently based on their type of government and how open they are to trade.

2.2 Key Theories Mobilized

2.2.1 State Resilience Theory

The idea of state resilience comes from the study of international relations. It was developed in the 2000s to understand how some countries, especially during times of conflict or economic trouble, manage to resist external pressures without falling apart. The concept was further developed by Carlson et al. (2012) in their study of the resilience of authoritarian regimes.

This theory helps us understand why some countries that face economic sanctions can still keep a basic level of economic and political stability. This is called economic resilience. It refers to the ability to protect important sectors of the economy like energy and food. It also involves changing financial policies and finding different trading partners. For example, Iran and Russia have tried to create new ways of making business like trading with China or using cryptocurrencies to avoid Western sanctions. But resilience is also about politics. Authoritarian regimes, in particular, have centralized power that helps them to make faster decisions. They can control resources, distribute money to specific groups that support them and reduce any rebellion to their authority. According to Carlson et al (2012), these governments can use sanctions as a propaganda tool, claiming that foreign countries are interfering. This brings the country together around its leaders and makes strict rules seem acceptable, helping to keep things stable inside the country, even when there are economic problems.

This theory explains why sanctions do not always lead to a change in government. Strong authoritarian governments use both economic tools and ideas to manage the direct and indirect impacts of sanctions.

2.2.2 Rally ‘Round the Flag Theory

The “Rally ‘Round the Flag” theory is another concept from political science. It was first formulated in the 1970s by John E. Mueller (1970) to explain why populations tend to support more their government in times of external crisis, such as war. The theory says that when a country faces economic sanctions, its leaders might describe these actions as attacks from other countries, especially from Western nations. This storytelling helps boost national pride and brings people together to support their leaders by identifying a shared outside enemy.

Researchers like Frye (2017) have found that this situation is especially applicable in authoritarian or theocratic states. Their governments use ideological or religious messages to rally support from the people. For example, in Iran, the government often describes US

sanctions as an assault on Islam and the country's independence. After 2014, Russia took advantage of Western sanctions to promote Russian identity, support stricter government control and claim that there was a "Western plot" against the nation.

This approach lowers the chances of protests within the country and makes harsh or unpopular policies seem more acceptable. The government can shift the blame for the negative effects of sanctions (like rising prices job losses and poverty) by pointing fingers at external enemies. This way of using nationalism ideas helps the government stay strong even when the economy struggles.

2.2.3 Rentier State Theory

Rentier State Theory describes how some countries, rich in natural resources like oil and gas, can keep their power by redistributing the revenues collected from it. This theory was developed in the 1970s, notably by Mahdavy (1970), and later popularized by Beblawi and Luciani. A rentier state is a country whose income is majorly dependent from external rents, such as oil exports, without its population being actively involved in the production of this wealth.

This theory is especially relatable in this context for economic sanctions. Rentier regimes such as Iran and Russia use oil and gas revenues to buy social peace. They do this by providing financial help, creating public jobs, or offering free services to stop people from protesting. Even when these countries face sanctions, they can still sell their resources through alternative ways, such as Russia's "shadow fleet"[6] or Iran's oil deals with China. This helps them keep some level of economic stability. However, rentier regimes are particularly at risk because they rely on a single product. If oil prices drop or if there are sanctions aimed at their energy sector, they could quickly get into trouble. Rezaei (2017) notes that this dependence helps these states to stay resilient in the short term, thanks to their resources. However, in the long run, they become weak especially if sanctions last a long time or if they lose their export markets.

In short, the rentier regime theory explains why some sanctioned countries can reduce the immediate economic impacts even though they still have structural weaknesses. Rents are a resilient force, but also a weakness if the economy is not diversified enough.

[6] A shadow fleet is made of tankers that work quietly without using tracking devices and flags from different countries. These tankers carry resources that is under sanctions, like oil from Russia, and avoid official routes.

2.2.4 Interdependence and Vulnerability Theory

The theory of complex interdependence was first developed by Robert Keohane and Joseph Nye in 1977). It helps us understand why some countries are more affected by economic sanctions than others. This theory suggests that when a country is more involved in global trade and finance, it becomes more vulnerable to external shocks. This is because it relies a lot on other countries for exports, imports or attracting investments, etc.

When countries impose sanctions, their connections with each other can be used as a way to apply pressure. In other more concrete terms, this would mean that a sanctioning organisation is stopping a targeted country from accessing the international financial system or prevent it from exporting goods, which can quickly lead to serious economic problems. For example, the Western sanctions against Russia in 2022 targeted its banks, energy companies and access to international markets. These actions would not have mattered if Russia's economy had not been connected to the global (and especially the Western) markets. However, interdependence does not necessarily mean powerlessness. Some countries that are very open to international trade have invented ways to get around the restrictions. Iran and Russia, for example, have created alternative banking systems (such as the Russian SPFS or the Chinese CIPS). They also use cryptocurrencies or work through third countries to keep trading. In addition, partnerships between countries in the Global South like those with China, Türkiye or India, lessen reliance on channels controlled by the West.

In summary, the theory of Keohane and Nye explains that being open to trade is a source of wealth, but also a point of vulnerability. Sanctioned countries can stay resilient depending on how connected they are with the rest of the world and how well they can find new trade partners or financial instruments.

2.2.5 Chokepoint and Weaponized Interdependence

A newer way to think about sanctions is through the weaponized interdependence. This idea was introduced by Farrell and Newman in 2019. These authors explain that in a world where economies are closely connected, some critical parts, like the global financial system or technology supply chains, can be used as tools of coercion. This is what they call chokepoints: infrastructures controlled by a powerful nation (often the US) that can be used to apply specific pressure on other countries.

For example, the US can ban access to the SWIFT system or limit the use of the dollar to certain countries, which heavily penalizes countries under sanctions such as we saw with

Iran and Russia. Another example of a chokepoint lies in technology supply chains, where specific processes like making semiconductors or critical component manufacturing, happen only in a few countries. This ability to prevent access to important resources gives a strong advantage. According to Farrell and Newman (2019, p. 43), this power comes from the central position specific countries in global economic networks holds. In response to these challenges, countries like Russia have created alternative systems such as SPFS to replace SWIFT. They are also using cryptocurrencies to avoid being monitored and to get around bank sanctions (Wronka, 2022). These strategies show an effort to lessen weaknesses at critical points and avoid Western control over global economic flows.

In summary, this theory suggests that the best economic sanctions are the ones that focus on interconnections between countries. It helps to understand why some highly integrated states are more sensitive to sanctions, while others, less connected or better prepared, can develop alternatives.

2.3 Limitations of Existing Approaches

Even though many studies have looked into economic sanctions, there are still some limits in how we understand their effects. Most studies look at just one factor like the type of government or how open a country is to trade. However, they usually do not examine both of these aspects together in one analysis. Yet, the studies by Peksen (2009) and Escribà-Folch (2010) demonstrate that response to sanctions depends on the type of government in place. Similarly, research on trade vulnerability (Keohane & Nye 1977) indicates that economic integration plays a key role. It is surprising that not many studies look closely at both of these elements at the same time to evaluate resilience.

Secondly, the empirical methods used are often static, relying on one-time studies or detailed examinations of a few important examples. However, the impact of sanctions evolves as time goes on. Few studies use dynamic panel data models with fixed effects. These models help track the specific features of each country while considering changes over several years. Morgan Syropoulos and Yotov (2023) highlight that there is a need for a long-term study to truly grasp the economic and political impacts of sanctions. This is important because some countries' adjustments happen slowly over time (known as "lag" effects).

Another key limitation is the neglection of indirect or secondary effects of sanctions. For instance, sanctions can cause a trade diversion to other countries, boost parallel markets, or encourage political oppression (Peksen, 2019). These dimensions are often overlooked in traditional models, which mainly concentrate on direct macroeconomic indicators such as GDP

or inflation. Finally, Drezner (2015) also points to the risk of excessive generalization when conclusions drawn from a small number of cases (such as Iran, Russia, or Cuba) are applied to all countries under sanctions. This could distort the interpretation of results for non-Western countries.

2.4 Integrated Analytical Framework

Based on the theories which were discussed above, this research suggests a way to analyse how a country's unique political and economic features affect its ability to handle economic sanctions. The model relies on two main factors: the type of political system which ranges from 0 for closed autocracy to 3 for liberal democracy, and the degree of trade openness measured as a percentage of GDP. If the previous theories are true, these two factors should influence how the target countries react politically and economically.

First, as we saw through the literature review and theoretical framework, the type of regime should affect how a country can use its resources to deal with an external crisis. An authoritarian regime usually holds power in one main place, has more freedom with its budget and exercises stronger control over the media and other organizations. These factors help the regime to organize a rapid response, to redirect resources in a targeted way (often towards the elites or key groups), and use ideas like nationalism religion or anti-western views to justify his actions. These abilities help countries to stay strong against political pressures and economically resilient to sanctions.

Second, our earlier study has shown that a country's trade openness affects how vulnerable it is to sanctions. A country that is highly connected to global trade will face bigger risks if its main trading partners impose economic sanctions. However, being more open to trade can also mean wider access to alternative partners. Thus, it would be easier to find new ways to get around the restrictions, such as through South-South alliances, the use of cryptocurrencies or the use of alternative banking channels.

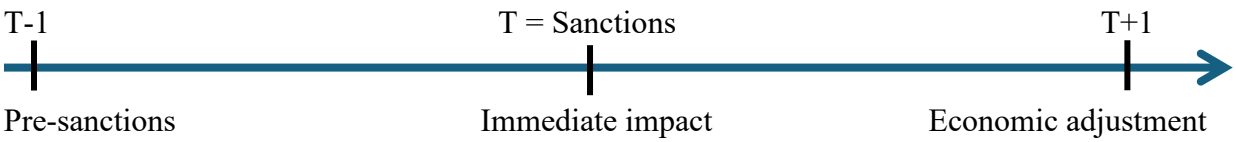
These two factors affect the economic performance of the sanctioned country, measured here through indicators such as GDP growth and CPI inflation. To capture these effects in a rigorous manner, the model will include control variables such as:

- Exchange Rate
- FDI Inflows
- FOREX Reserves
- Sanctions Intensity

Table 1
Interaction between Regime Type and Trade Openness under Sanctions

	Closed Economy	**Open Economy**
Autocracy	• Resilience with self-sufficiency • Strong state control • Use of reserves and restricted capital flows to manage shocks	• High exposure but strong capacity to act • Bypass strategies via parallel markets • Use of FOREX reserves and political tools to absorb shocks
Democracy	• Lower exposure to global flows • Limited direct impact of sanctions • Protection via diversified economy	• Highly vulnerable to trade disruptions • Political constraints limit rapid response • Decline in FDI and reserves increase fragility

The analysis uses a panel model with fixed effects. This helps to analyse the differences between countries and highlights the specific effects of each variable. In concrete terms, it allows us to see changes in the economy over a long time and to examine multiple countries at the same time. It also includes a time dimension that is important for spotting trends before and after the sanctions are put in place. This method controls for country-specific characteristics such as political regime. By including time-fixed effects, I can ignore the effects of worldwide events like financial crises. This helps us analyse the outcomes of sanctions more accurately (Longhi & Nandi, 2017). At the same time, the event study is used to look at the effects of economic sanctions after they are put in place. This method involves looking at a specific time period related to the event we are examining. In this case, thanks to the lagged variables, we focus on the effects one year before and after the sanctions were put in place. This allows us to look at economic trends before and after the sanction to see how it directly caused changes.



2.5 Hypotheses and Theoretical Expectations

This research aims to test two hypotheses regarding the economic resilience of countries targeted by sanctions. These hypotheses are created on the basis of previously discussed theories and will be tested using a panel data model with fixed effects, including time-lagged variables (lagged t-1) to better capture the causal relationship between variables.

Hypothesis H1 - Type of political regime

Authoritarian regimes can better resist economic sanctions compared to democratic ones. This is because they can concentrate power, manage resources carefully and restrict internal rebellion. This idea is based on the research done by Carlson et al. (2012) on the resilience of authoritarian regimes as well as Frye in 2017 and the "Rally 'Round the Flag" theory. These theories explain how these governments take advantage of sanctions to strengthen their own authority and gain support from the people. Peksen (2009) and Escribà-Folch (2010) show through their research that authoritarian governments can last longer when faced with sanctions. This is because they use specific institutional and ideological tools that promote their political stability.

Hypothesis H2 - Trade openness

Countries that are more open to international trade are more vulnerable to the negative economic effects of sanctions. This is due to their high dependence on foreign trade. Inspired by the theory of interdependence developed by Keohane & Nye (1977), this hypothesis is reinforced by the empirical results of Afesorgbor (2019), who shows that sanctions significantly reduce bilateral trade. Farrell and Newman (2019) further explain that networks of interdependence can be used strategically to strengthen the impact of sanctions by focusing on key areas like SWIFT or the U.S. dollar.

The effects of independent variables will be assessed with a time lag of one year (t-1) to better identify any delayed effects and avoid simultaneity bias. The econometric model used will be a panel analysis with fixed effects. This approach helps us account for the different structures of each country such as the size of their economy, their level of development and their institutions. Economic control variables (exchange rate, foreign investment, foreign exchange reserves) will also be included to isolate the specific impact of the two main variables.

Table 2

Theoretical Expectations for Key Variables under Sanctions

Variable	Theoretical Expectation
GDP Growth *(DV)*	A decline in GDP growth post-sanctions indicates economic damage while stable growth suggests resilience.
Inflation (CPI) *(DV)*	Higher inflation following sanctions may reveal shortages or monetary instability. Stable inflation means effective resilience policies.

Variable	Theoretical Expectation
Regime Type *(IV)*	The more authoritarian the regime, the more flexible it may be in economic control, potentially increasing resilience to sanctions.
Trade Openness *(IV)*	The more open a country is to international trade, the more exposed it is to external shocks, thus increasing its economic vulnerability.
Sanctions Intensity *(Control)*	The higher the number of active sanctions, the more likely they are to disrupt macroeconomic performance and reduce economic growth.
Exchange Rate *(Control)*	Sharp depreciations can indicate financial instability post-sanctions, stable rates may reflect successful government intervention.
FDI Inflows *(Control)*	A decrease in FDI may show lower investor confidence under sanctions. Sustained FDI could suggest resilience thanks to strategic partnerships.
FOREX Reserves *(Control)*	Higher reserves allow greater capacity to absorb economic shocks and finance imports, thus acting as a buffer against sanctions' effects.

2.6 Central Argument

This research suggests that the economic effects of sanctions mostly rely on two main factors: the type of government and how open a country is to trade. Authoritarian governments are stronger because they can make decisions quickly, reallocate resources to groups that support them and silence any opposition. On the other hand, democracies have rules and election processes that make it harder for them to handle quickly economic problems. Furthermore, being open to trade can make a country more vulnerable to sanctions because open economies are more affected by problems in trade finance and investment. Some countries respond by creating new partnerships, domestic production or creating different financial systems. This study analyses how two separate factors influence the economic performance, specifically GDP growth and inflation in countries that face sanctions. It uses a panel dataset that includes fixed effects and lagged variables to understand the cause-and-effect relationships and the differences between countries.

CHAPTER 3: RESEARCH DESIGN

3.1 Case Selection

3.1.1 Scope of the Study

This research uses a quantitative approach with "large-N" panel data, which includes many countries that have faced sanctions between 2005 and 2023. This approach allows us to see how resilience change over time and how different countries react. It helps us to carefully examine how the type of government and openness to trade affect how well countries can handle sanctions. Roger (2020) explains that this kind of analysis is very used and helpful in the field of international relations. It allows us to spot overall trends and better understand the mechanisms at work in complex contexts. The goal is to get significant results while taking into account the different structures of each country. The years 2005 to 2023 were selected for several reasons. First, in the past twenty years, there has been a significant increase in the use of international sanctions, especially targeted ones like financial penalties and travel bans. For example, the number of economic sanctions imposed by the United States has increase over ninefold between 2000 and 2021 (Drezner, 2024). This shows how much this foreign policy tool has grown in the 21st century. Furthermore, the information and data available during this time frame is completer and more trustworthy. This includes both the sanctions thanks to new databases, and the economic indicators from reliable sources like the IMF and World Bank. This ensures that we can make fair comparisons over time and between different countries, which is important for external and internal validity, and overall, carefully studying the economic impacts of sanctions.

3.1.2 Selection Criteria

Based on these criteria, the study sample only includes countries that have faced at least one economic sanction from a major international player during the period under consideration. This means that the sample includes countries sanctioned by the US, the EU, or the UN, given the dominant role of these issuers in implementing global sanctions. The selection of these sanctioned countries comes from reliable and detailed data sources. One important source is the Global Sanctions Data Base which keeps track of all economic sanctions around the world from 1950 to 2023 (Syropoulos et al., 2023). One of its major strengths is its detailed classification of sanctions. It sorts them into different types, including trade sanctions, arms embargoes, financial restrictions, and travel bans. Furthermore, the GSDB groups sanctions based on their purpose, separating those that are imposed for security reasons. Some topics focus on security

issues like war and terrorism, while others deal with ethical matters such as human rights. The GSDB also separates unilateral sanctions from multilateral sanctions. This helps the study consider the differences in how wide-ranging and strong the enforcement of various sanctions can be. Having this level of detail is important for creating a strong quantitative model and helps us better understand the economic impacts of sanctions. Another factor in choosing data is whether the necessary economic and institutional information is available for the analysis. Only countries that have enough data on important factors like GDP growth and inflation, along with key factors that might affect how sanctions work are included. These factors include the type of government in place, how open the economy is to trade, and the amount of FDI coming in. This two-part requirement is meant to make sure that the numerical comparisons are strong and reliable. The final sample for the econometric analysis consists of 99 countries. This includes both authoritarian and democratic governments along with economies that are very open to trade and those that are more restricted. This variety of backgrounds in the sample is beneficial for the study. It allows us to compare how sanctions affect different political and economic situations and will strengthen the overall final findings.

3.2 Methodological Approach

3.2.1 Quantitative Strategy

This research uses a quantitative approach relying on panel data analysis. It looks at information collected over several years and from different countries. This helps researchers to see how economic sanctions affect various countries in different political and economic contexts. The use of panel data makes it possible to track the evolution of economic indicators (GDP, inflation, etc.) in each country before and after the imposition of sanctions. The model being used is a fixed effects model. This type of model is well-suited for comparing different countries and looking at data over a long period. This method addresses hidden differences between countries, like their political, history or geography, which could affect the results if they are not considered (Wooldridge 2010). By focusing on variation within each country, this model identifies the effects of independent variables (regime type, trade openness) while reducing biases linked to country-specific characteristics.

3.2.2 Causal Inference Strategy

To prevent simultaneity bias[7], the variables will be used with a lag of one year (lagged variables t-1). Wilkins (2017) points out that using past values of dependent variables helps us understand changes over time more precisely and lowers the chance of bias in our results. This method is especially useful for panel models because it makes the results more reliable when past values might influence present outcomes. The analysis looks at how each country changes over time instead of simply comparing different countries. This approach helps us understand how economic resilience works. This method is strong, but it does have some drawbacks. It cannot completely fix issues with endogeneity (for example, if a country is being sanctioned because it is facing an economic crisis) or account for unmeasured omitted variables. To reduce these biases, I include economic control factors like the exchange rate, FDI and foreign exchange reserves.

3.3 Operationalization of Variables

3.3.1 Dependent Variables

This paper uses dependent variables to show how economic sanctions directly affect the economic performance of the countries that are targeted. They help us see how economies change over time and between different countries, especially when sanctions are applied.

- **GDP Growth (annual %)** - World Bank

The growth rate of GDP is a key measure of economic performance. GDP growth is measured as the annual percentage increase (or decrease) in the total amount of goods and services produced in an economy, adjusted for inflation to keep prices consistent. The World Bank gathers this data in the World Development Indicators (WDI) database. Data are supplied by national statistical institutes, then harmonized according to System of National Accounts standards (SNA 2008). A decline in GDP after sanctions are imposed may show that the economy is weakening. On the other hand, if GDP stays steady or increase, it can indicate that the economy is showing strength. Hufbauer Schott Elliott and Oegg (2009) show that one of the most common outcomes of sanctions is a decrease in the GDP of the countries they target, particularly when the sanctions are multilateral and last for a longer period of time. As a

[7] Sanctions and economic performance can influence each other at the same time.

dependent variable, GDP growth helps us understand how factors like trade openness or the type of government affect the economy of a country facing sanctions.

- **Inflation Rate (CPI)** - IMF

The inflation Consumer Price Index (CPI) tracks how the average prices of goods and services that families buy change over time. The IMF collects this data from official national bank statistics. Prices for products and services are gathered in big cities and capitals. Every country decides what items are in its typical consumer basket, but it usually includes food, housing, transportation, healthcare and more. Then, the data is adjusted so that it can be compared internationally. The CPI is shown as a yearly rate of change. High inflation after sanctions might show either a shortage of imported goods, currency devaluation or that prices are rising within the country. Inflation is an important sign of how well people are doing financially. It looks at how sanctions affect not just the overall economy but also how they influence what people buy in their daily lives. Peksen (2019) noted that one of the quickest results of sanctions is an increase in inflation. This happens because supply chains are disrupted, and the value of the currency goes down. Inflation measured by the CPI helps us understand how much sanctions affect the economy and the lives of people in the countries being targeted.

3.3.2 Independent Variables

- **Trade Openness** - World Bank

The degree of trade openness is a key variable in understanding a country's vulnerability to economic sanctions. It shows how much an economy relies on trade with other countries to grow. A country that is more open to trade and interacts with others is also more vulnerable to external problems like trade bans. This information comes from the World Bank's WDI database. The calculation is done using the usual formula:

$$\text{(Exports + Imports) / GDP}$$
expressed as a percentage

Each year data is gathered from the national accounts of every country and adjusted to be compared internationally. In this thesis, this data is treated as an independent variable because it shows a condition that might affect how economic sanctions work. The interdependence theory (Keohane & Nye, 1977) suggests that countries that engage heavily in global trade can be more at risk. This is because they rely more on their international partners for their economic growth and resources. A ban on an important partner can quickly affect the economy. However,

we need to consider limitation to the calculation above. Though the trade openness ratio is widely used, it may exaggerate actual openness for nations with a strong single export commodity like oil. Here, high export values might not accurately reflect economic interdependence or vulnerability to sanctions (Vespignani et al., 2019). Despite this, this measure is still appropriate for the broader analysis in this thesis.

- **Regime Type** - V-Dem

The regime type of a country is another main explanatory factor in the analysis of resilience to sanctions. This variable helps us understand whether a government's authoritarian or democratic style affects its ability to handle external economic challenges, especially regarding how it manages its institutions and join support for its ideas. This information comes from the V-Dem (Varieties of Democracy) database, a project created by the University of Gothenburg in Sweden. It offers detailed measures of how well democratic institutions are working in more than 180 countries (Nord et al., 2025). The final ranking is determined by important factors, including whether there are competitive elections, how powers are separated, the presence of civil liberties and press freedom, and the variety of political parties. In this research, we classify the type of government using the V-Dem scale. This scale has categories that go from 0, which represents a closed autocracy, to 3, which stands for a liberal democracy. This variable is used as an independent variable because studies (Peksen, 2009; Escribà-Folch, 2010) show that authoritarian regimes usually have more tools to maintain control and resist sanctions, as they can easily control information and create legitimisation for their actions. On the other hand, democracies face more social and voting pressures, which makes it harder for them to induce changes to quickly adapt to the restrictions.

3.3.3 Control Variables

- **Sanctions Intensity** - GSDB

Sanctions' intensity is measured using the GSDB, which I have already described in section 3.1.2. In this paper, I measure the intensity of sanctions by counting the total number of active sanctions on a specific country for each year. If a country faced two trade sanctions and one financial sanction in 2016, the total count for that year would be "3". This approach allows us to create an easy-to-understand index that can be compared between different countries, showing the pressure used by the international community. This choice is justified by its readability and its frequent use in macroeconomic studies (Felbermayr et al., 2020). The GSDB

is designed in a way that allows us to easily collect this data each year. This variable acts as a control because it helps to distinguish the specific effects of trade openness and government type on economic performance, while considering the actual intensity of sanctions. In simpler terms, even if two countries are equally open or have similar governments, their economic success can vary based on how much pressure is applied through sanctions.

- **Exchange Rate Volatility** - World Bank

Exchange rate indicates how many units of the local currency are needed to buy 1 US dollar (USD). The World Bank collects this data from central banks and foreign exchange markets. They monitor two types of exchange rate:

- Official rate (set by the government in some economies)
- Market rate (determined by supply and demand)

High volatility indicates economic instability and can amplify the impact of sanctions, which creates more uncertainty for investors, importers, and consumers. In this study, I calculate the continuous variable using the official annual exchange rate provided by the World Bank. When sanctions impact trade or foreign money reserves, they can cause the currency to lose value or become unstable. This variable serves as a control factor because the exchange rate is an indirect channel through which sanctions can affect a country's economic performance. For example, a loss of foreign exchange reserves or an increased trade deficit due to sanctions can lead to currency depreciation. This drop in currency value can increase inflation or slow down economic growth. Therefore, this variable helps manage the indirect impact of sanctions on the overall economy's stability (Neuenkirch & Neumeier, 2015; Dreger et al., 2016).

- **FDI Inflows** - World Bank

FDI measures investment flows from abroad in the form of company start-ups, mergers, acquisitions, or business expansions in the target country. These flows are important for boosting economic growth and increasing the production of goods and services. The World Bank's WDI also collects this data, which comes from the balance of payments records provided by central banks. To make it easier to compare, they are shown as a percentage of GDP. A strong amount of FDI, even with sanctions, might show that the country still has the trust of foreign investors. On the other hand, a decrease might show how sanctions discourage people from investing. This variable helps us to identify an important factor that contributes to economic weakness from external sources. By controlling this variable, I aim to prevent linking

the effects of trade opening or the type of government to the country's real ability to attract foreign investment. This helps us better isolate the main cause-and-effect relationship examined in the thesis. This reasoning matches the findings of Busse and Hefeker (2007) and Afesorgbor (2019), who showed that FDI is essential for helping economies stay strong during times of uncertainty.

- **Foreign Exchange Reserves** - World Bank

Foreign exchange reserves are the financial assets held by central banks in the form of foreign currencies, gold, and government securities. They are used to help stabilize the economy, especially during unexpected events. The World Bank, in collaboration with the IMF, publishes data once a year. They usually adjust these numbers to account for purchasing power parity (PPP)[8] so that they can be easily compared between countries. Having large foreign exchange reserves helps a country under sanctions lessen the negative impact on its economy. This allows the country to keep its currency stable, keep importing essential goods, and limiting capital flight. This variable expressed in billions of dollars is important for understanding how financially strong countries under sanctions are. It serves as a control variable because it represents an important part of financial strength that is not affected either by the type of government or trade openness. A country that has a lot of foreign exchange reserves can protect itself from the effects of sanctions without it being linked to its government or trade relationships. Including this factor in the model makes sure that I do not wrongly blame changes in economic performance on other independent factors when they might actually be the result of a country's financial health. According to Kirshner (1995) and Drezner (2015), foreign exchange reserves are very important for a country to keep its economy stable during external shocks. Finally, it is important to note that the trustworthiness of this data can differ. This is especially true in authoritarian countries where there is less transparency and where leaders might hide some economic information for strategic or political reasons.

Table 3
Summary of Variables, Types, Sources and Definitions

Variable	Category	Type	Source	Description
GDP Growth	Dependent	Continuous	World Bank	Annual % change in economic output

[8] In simple terms, PPP is the "exchange rate at which the currency of one country would be converted into that of another country to buy the same quantities of a large group of products" (Callen, 2018).

Inflation (CPI)	Dependent	Continuous	IMF / World Bank	Annual % change in consumer price index
Trade Openness	Independent	Continuous	World Bank	(Exports + Imports) / GDP, % of GDP
Regime Type	Independent	Ordinal	V-Dem	Scale from 0 (Autocracy) to 3 (Liberal Democracy)
Sanctions Intensity	Control	Discrete	GSDB	Number of active sanctions per country-year
Exchange Rate	Control	Continuous	World Bank	Local currency per USD; annual average
FDI Inflows	Control	Continuous	World Bank	Foreign investments, % of GDP
FOREX Reserves	Control	Continuous	World Bank	Reserves held by central banks in USD

3.4 Model Specification and Estimation

Before estimating the econometric models, a descriptive exploration was carried out on the data from the GSDB. This helped us understand the distribution, nature, and objectives of sanctions over the period studied. This step shows the main trends and patterns that are important for the research. The analysis was done using R software. It was structured and cleaned up with the help of tools like tidyverse, readr, ggplot2 and lubridate. (Wickham et al, 2019; Wickham, 2016; Wickham & Bryan, 2025 and Grolemund & Wickham, 2011).

The econometric research uses a quantitative approach based on a panel model with fixed effects (FE), estimated using the R language and the "Panel Linear Models" plm package (Croissant & Millo, 2008). The choice of a fixed-effects model is justified by the need to control for unobserved heterogeneities between countries, such as institutional or cultural characteristics that are stable over time. The estimated basic equation is:

$$Y_{it}=\beta_0+\beta_1 Openness_{it-1}+\beta_2 Regime_{it-1}+\beta_3 Sanctions_{it-1}+\beta_4 ExchangeRate_{it-1}+\beta_5 FDI_{it-1}+\beta_6 FOREX_{it-1}+\alpha_i+\varepsilon_{it}$$

- Y_{it}: Dependent variable (either GDP growth or inflation) for country i in year t
- $Openness_{it-1}$: Trade openness, lagged by one year
- $Regime_{it-1}$: Type of political regime, lagged by one year

- $Sanctions_{it-1}$, $ExchangeRate_{it-1}$, FDI_{it-1}, $FOREX_{it-1}$: Control variables (all lagged one year to avoid simultaneity)
- α_i: Country-specific fixed effects (unobservable but constant over time)
- ε_{it}: Random error

First, a Hausman test was conducted to compare the fixed-effects model with a random-effects model. The results show that the FE model is better defined, and this confirm that there is a connection between individual effects and explanatory variables. As a result, the FE model is preferred, as it provides stronger estimates when analysing macroeconomic data over time. (Wooldridge, 2010). To ensure reliable results, clustered standard errors were used to fix possible issues with uneven data. I also tested different models like pooled OLS and random-effects regressions. Pooled OLS is a basic type of linear regression that does not consider the unique characteristics of the data over time. In contrast, the random-effects model recognizes that there are differences between the countries and assumes that these differences are random and do not relate to the factors being studied. I used the packages tidyverse, plm, and dplyr to process data and create variables. The dataset was organized as a panel that included variables for each country and year. Variables were transformed to include lagged values and interactions were introduced between sanctions and regime type or between trade openness and inflation, but this will be discussed later in this paper. All variables were normalized in a version of the model to test the robustness of the coefficients.

To ensure the reliability of the results, I adjusted the standard errors for intra-country dependence in the panel data. This fixes any uneven spread of errors or patterns in the errors and makes the confidence intervals more accurate (Cameron & Miller, 2015). These tests are designed to make sure that the estimated effects remain strong and reliable, no matter which model or database is used. They check if the results remain consistent even when the model is changed in some ways.

3.5 Limitations of Research Design

Like any study that uses panel data, this research has several important limitations in its methods. First, data quality and availability were a significant challenge. Some countries that face strict sanctions like Venezuela and North Korea do not share many trustworthy economic statistics. Furthermore, the information they do have is often not available in the international databases used such as those from the World Bank or the IMF. These absences limit the size of

the final sample and might cause a selection bias. This means that the most unusual or extreme cases could be left out, which reduces the range of conclusions that can be made. The study tries to make up for this lack by using secondary data from academic articles. However, this approach does not enable a consistent integration into the quantitative model.

Secondly, even though the sources are considered trustworthy, they often rely on Western standards. This is especially true for democratic measures like V-Dem, as well as some economic assessments of sanctions. This bias can change how we understand the impact of sanctions. It can lead people to think that sanctions are more effective in reaching political goals than they really are. Even so, the strong methods for collecting and organizing data used by these organizations ensure that their findings are still very reliable.

Thirdly, the question of causality remains complex. Using lagged variables (t-1) can reduce the chance of simultaneity, but there could still be other hidden factors like internal reforms conflicts or fluctuations in commodity prices, that impact both the chance of facing sanctions and economic performance. Using control variables like FDI flows, foreign exchange reserves or exchange rate helps us focus on the direct effects of sanctions. However, it does not completely remove the chances of endogeneity issues. The use of an exogenous instrument (IV) could be considered in future research to improve causal precision.

Fourthly, the analysis mainly looks at the short-term results, which happen usually between one and two years after the sanctions were put in place. This decision is based on the lack of recent data, especially regarding sanctions after 2023. However, several studies (Peksen, 2019; Drezner et al., 2021) show that sanctions sometimes also produce their effects during a longer time period. This delay happens because the targeted country often finds quick ways to adapt. They might change their trade practices, use cryptocurrencies, or form new alliances. A follow-up study that looks at a longer time period like 5 to 10 years could help us better understand how sanctions change the economy over time.

In summary, these limitations do not make the model's results wrong, but they do suggest that we should be careful when interpreting the conclusions. It is important to consider empirical constraints and potential biases linked to the field of observation selected.

CHAPTER 4: RESULTS

4.1 Descriptive Analysis

4.1.1 Distribution of Sanctions around the World

Before presenting the econometric results, this section will give a general overview of the GSDB data used in this study. This descriptive step is important for understanding the size, spread and features of economic sanctions that the United States, the European Union, or the United Nations have imposed between 2005 and 2023. It also helps to justify my modelling decisions and predict the main dynamics that the econometric analysis will try to capture. From 2005 to 2023, there were 474 different economic sanctions imposed on 115 countries as shown in the data. These sanctions differ a lot in their duration, their target and what they aim to achieve. A sanction usually lasts for an average of 5.44 years, but some can last less than a year while others can go on for several decades, with one even lasting up to 61 years for Cuba. A handful of countries are responsible for most of the sanctions that have been placed during this time. According to the table below, Iran received the most sanctions from 2005 to 2023, with a total of 23 times. Myanmar, North Korea, and Russia each faced 16 sanctions during the same period. These countries are usually targeted for reasons related to politics, safety, or human rights. More information about this will be provided in the following sections. Furthermore, these countries have more or less accessible economic data, which is why I only analyse 99 and not 115 countries for the econometric analysis.

Table 4
Distribution and Duration of Economic Sanctions by Country (2005-2023)

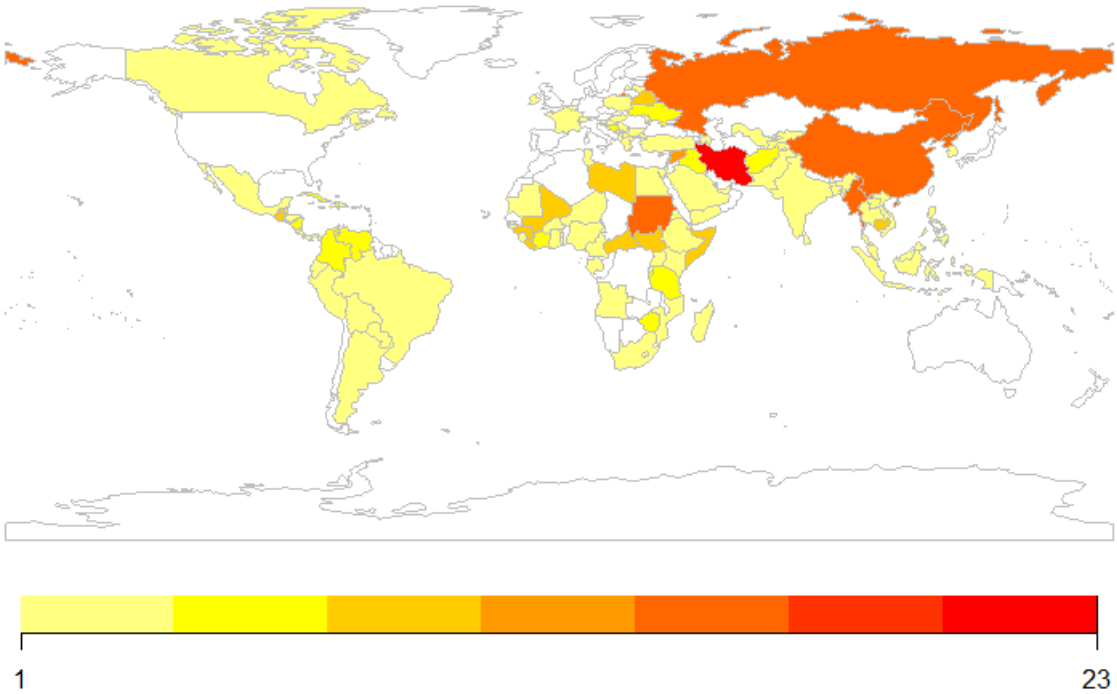
Sanctioned State	Total number of sanctions	Average duration (y)	Minimum duration (y)	Maximum duration (y)
Iran	23	6,3	0	32
Myanmar	16	9,88	0	28
North Korea	16	10,69	1	53
Russia	16	2,94	0	9
China	14	2	0	6
Sudan	14	14,71	0	34
Syria	11	6,45	0	19
[…]	[…]	[…]	[…]	[…]
Total	474	5,44	0	61

The map below displays the number of economic sanctions imposed on each country around the world from 2005 to 2023. The countries shown in darker colours experienced more sanctions during this time. Iran is the most sanctioned country with 23 different cases registered in the GSDB. This reflects ongoing conflicts about its nuclear program, its alliances with terrorist groups in the region and its tumultuous position in relation to Western countries. Russia, North Korea, Syria, and Venezuela are also countries that face many sanctions. Sanctions focus on specific areas around the world including Eastern Europe, Central Asia, the Middle East, Sub-Saharan Africa, and some countries in Latin America. This distribution is not random. It shows the main areas of political conflict around the world in the past twenty years and what the major sanctioning powers that impose sanctions (UN, US, EU) consider important.

This map shows the variety of economic and political characteristics among the group being examined. Some countries like North Korea have strict governments and are commercially closed, while others like South Africa are democratic and more open. The high exposure of specific countries like Iran, Russia and Syria will be useful in contextualising the empirical results in the following chapters, particularly when we look at whether the political regime or trade openness influences their resilience.

Figure 1

Global Distribution of Economic Sanctions (2005-2023)

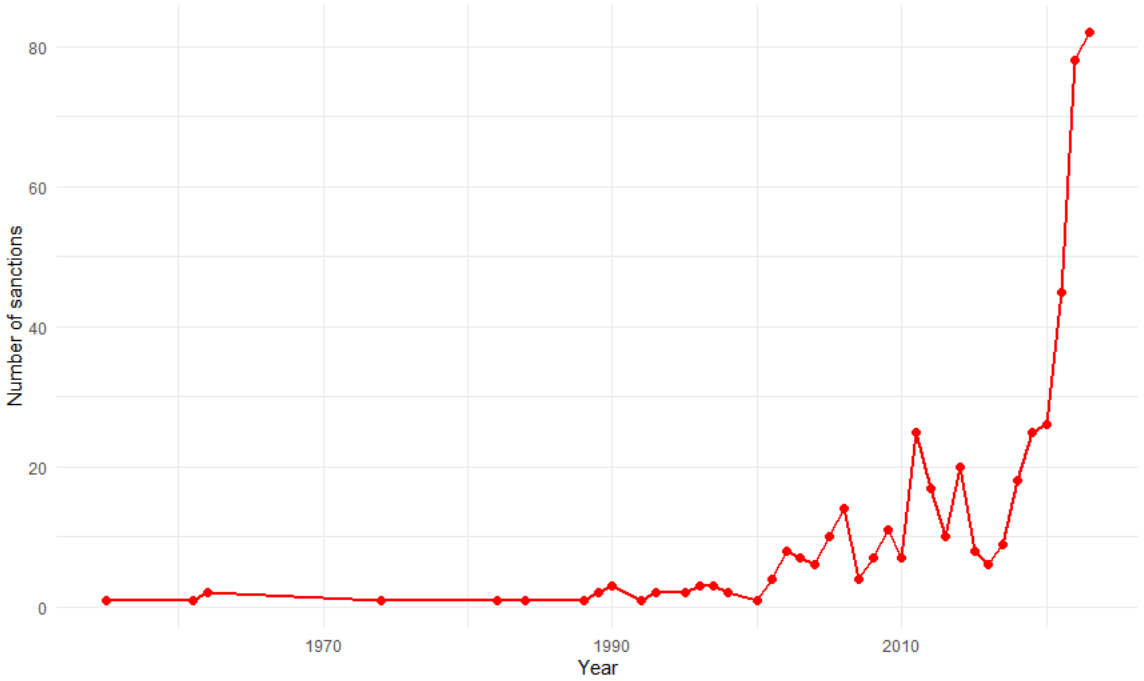


4.1.2 Distribution of Sanctions over time

The data analysis shows that the use of economic sanctions has been regularly increasing since 2010, with a significant rise in the last years. There are two significant peaks. In 2014, the Ukrainian crisis and Russia's takeover of Crimea caused the US, the EU, and other Western countries to work together and impose a series of sanctions. Starting in 2020, the use of economic sanctions increased significantly reaching the highest level ever in 2023. This rise is mainly due to the war in Ukraine, which began in February 2022, and the strong sanctions imposed on Russia. These dynamics illustrate a transformation in contemporary diplomacy, in which economic sanctions are increasingly used as a central strategic tool by the major powers to apply pressure without using military force (which is more expensive and takes longer to set up). As Drezner (2024) explains, the use of sanctions as a primary foreign policy tool has increased in the post-COVID geopolitical context, especially financial and technological networks, with a shift to financial and targeted sanctions. Even before the invasion of Ukraine in 2022, tensions between the great powers intensified, such as with the US and China trade war, through the imposition of more than 9 restrictions on Huawei, TikTok, and other Chinese companies. Another example would be the increased sanctions against Iran after the withdrawal of the United States from the nuclear agreement (JCPOA) in 2018, reinforced in 2020 under Trump. Finally, there is a global strengthening of the sanction's regime against several countries in response to the increased repression of several regimes (Myanmar, Venezuela, etc.).

Figure 2

Number of imposed economic sanctions per year

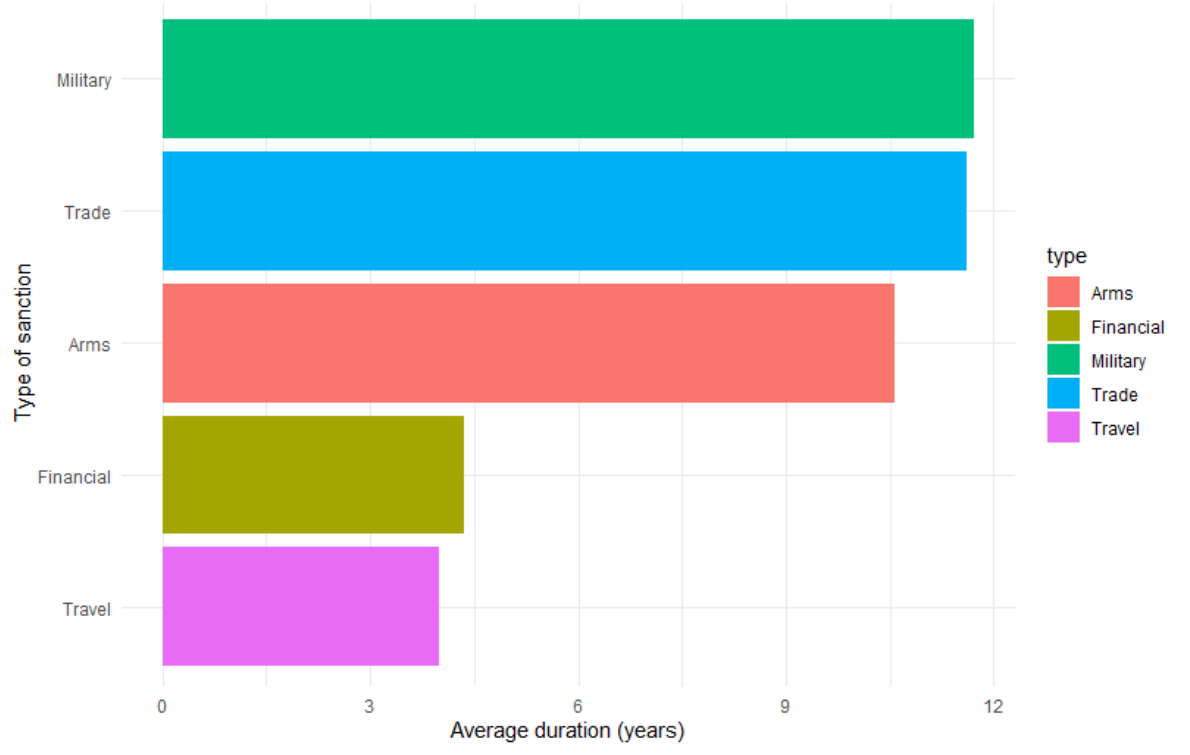


4.1.3 Types of Sanctions

The graph below shows the average duration (in years) of economic sanctions by type, according to the GSDB. It indicates important differences between the types of sanctions, in terms of duration. Although the research focuses on trade and financial sanctions, the graph reveals that these measures are not really used on their own. Most sanctions actually combine several types of measure simultaneously (e.g. trade embargo accompanied by asset freezes or visa ban). This setup increases the multidimensional pressure on the targeted country. Military sanctions have the highest average duration, close to 11 years. Trade sanctions and arms embargoes follow closely behind. On the other hand, financial sanctions and travel bans usually last for a shorter time averaging less than 4 years. This graph indicates that sanctions related to specific sectors like military trade or arms usually stay in effect for a longer time. This often happens because they are linked to ongoing conflicts or long-term pressure strategies. These measures are aimed at permanently reduce the targeted country's strategic abilities. In contrast, financial sanctions (e. g. freezing of assets, banking restrictions) and travel restrictions are often reactive and more flexible with objectives targeted at individuals or political elites. They are implemented more quickly (as we saw with EU's sanctions on Russia in 2022, where the first group of sanctions got implemented the day after the invasion), and their withdrawal may depend on short-term political or diplomatic developments.

Figure 3

Average Duration of Economic Sanctions by Type

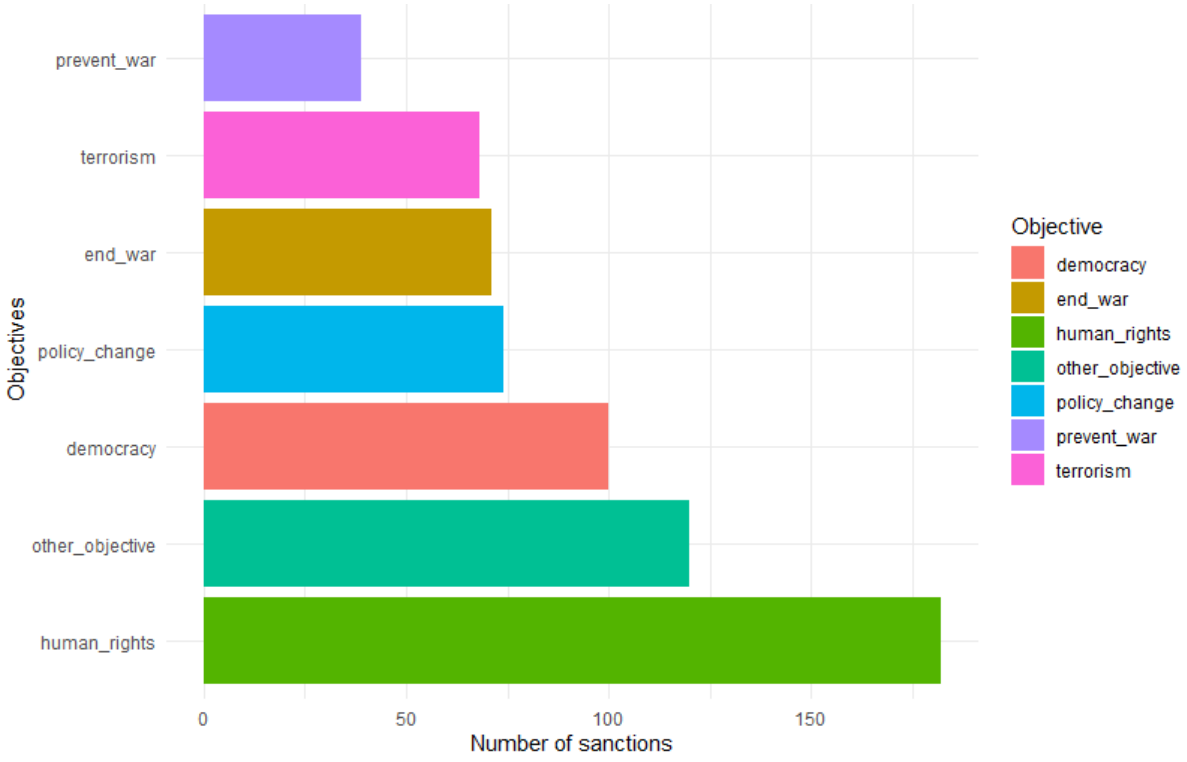


4.1.4 Objectives and Declared Effectiveness

This section analyses the stated political aims of economic sanctions and their degree of success as indicated in the GSDB. The first graph shows the distribution of sanctions according to their declared objectives. The most frequent reasons why an economic sanction is imposed is for the defence of human rights (nearly 180 cases), the promotion of democracy, and the various objectives grouped under "other objective". Security objectives such as the fight against terrorism, the prevention of armed conflict or the end of war are less numerous, but still strategically important.

Figure 4

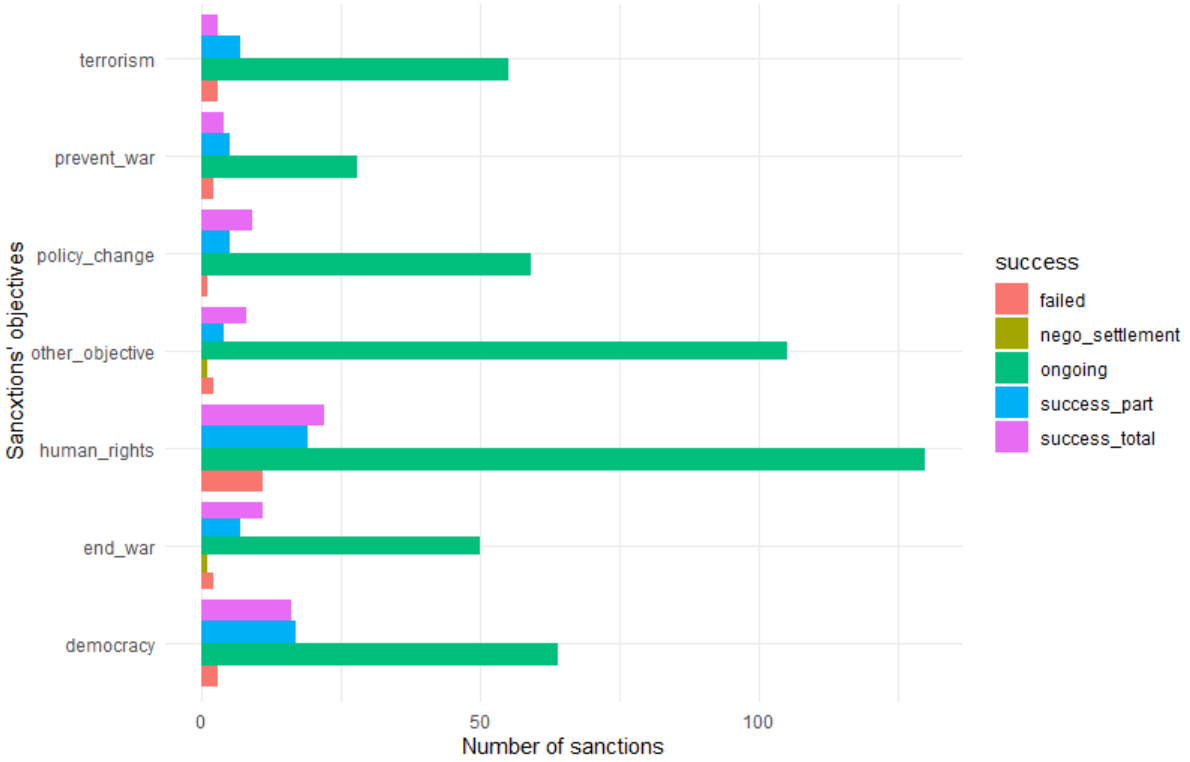
Distribution of Economic Sanctions by Declared Objective



The second graph compares the objectives of sanctions with their success rate (total success, partial success, failure, etc.). We can see that most sanctions do not have much impact, especially those meant to protect human rights or support democracy. This usually leads to complete failure or a situation that is still "ongoing" with only a few examples of complete success.

Figure 5

Relationship Between Sanctions' Objectives and Their Success Rates



On the other hand, sanctions that are put in place for security reasons like preventing terrorism or war seem to have a higher success rate. They lead to more cases of partial successes or successful talks. This finding supports Peksen's (2019) criticism that so-called "moral sanctions"[9] usually have a smaller success rate. This is because they do not fundamentally influence the strategic interests or ideology of the governments they target. The difference between what we hope to achieve with sanctions and what actually happens makes us question about how they are used. Their success relies not just on what we want to accomplish, but also on the political situation in the country being targeted. This includes factors like the type of government, how open its economy is and how much it is dependent on other countries.

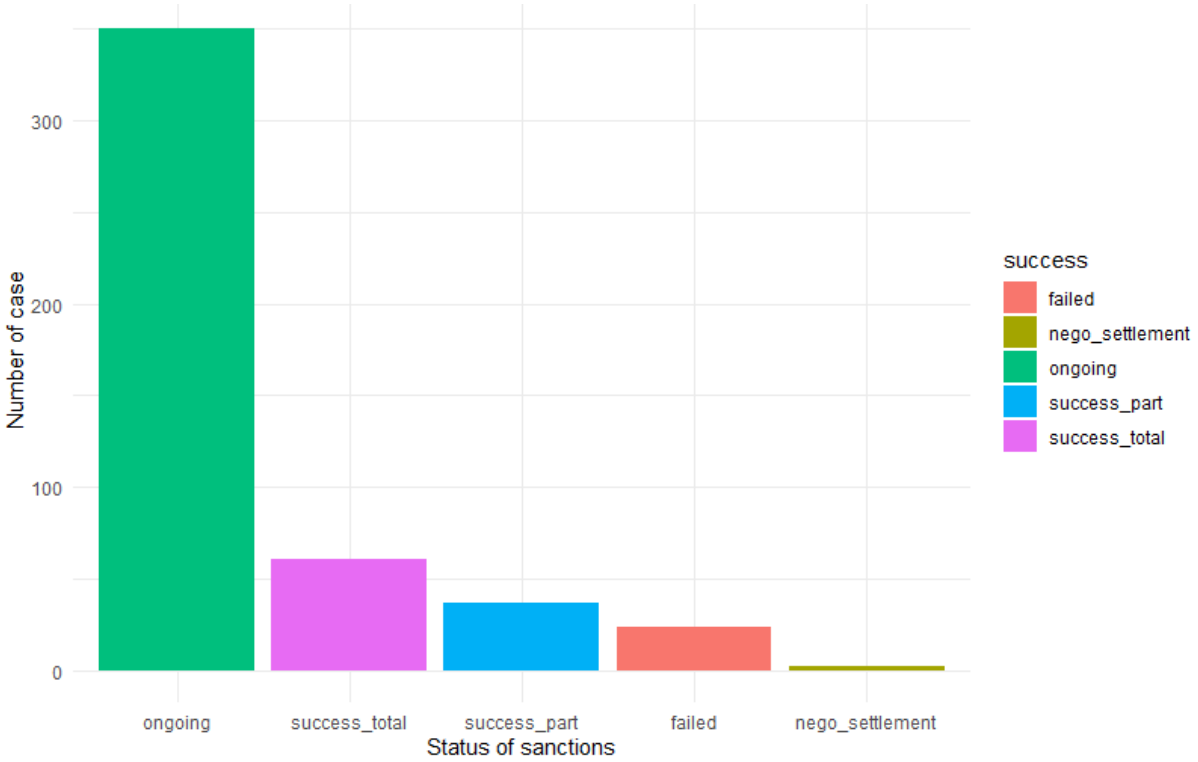
[9] Sanctions that are imposed for ethical reasons such as protecting human rights.

4.1.5 Conclusion of the Exploratory Section

The first graph indicates how the results of the sanctions are spread out. Most of the sanctions are still ongoing, showing that these measures can take a long time to be completed and that their results are often uncertain. Out of all the sanctions that have been completed, only a small number are totally successful (about 15%). Many of them either failed or had only partial success. In the end, only a small number of sanctions lead to an official negotiation or settlement. This shows that the ability of sanctions to discourage or encourage actions remains very limited in practice.

Figure 6

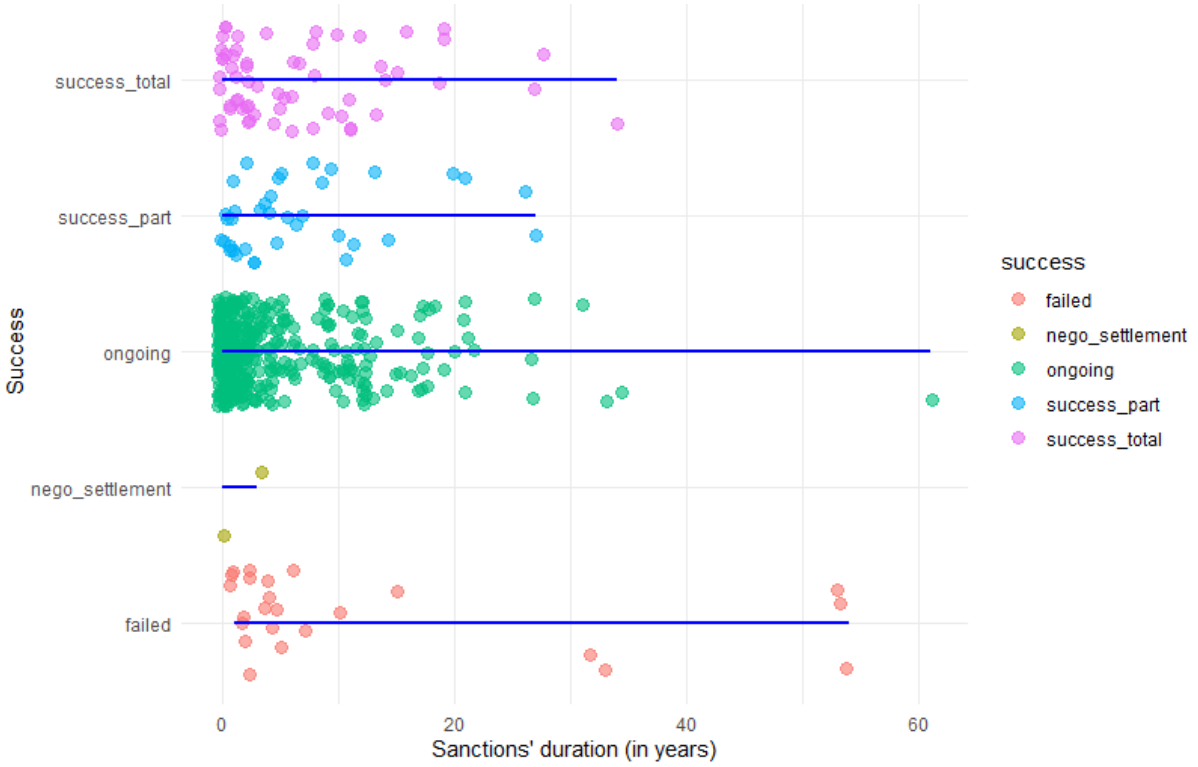
Distribution of Economic Sanctions Outcomes



The second graph illustrates the relationship between the duration of sanctions and their outcome. Sanctions that achieve some level of success usually last for a medium amount of time, typically between 5 and 15 years. In contrast, sanctions that fail often happen either very quickly, in less than 5 years, or take a very long time. This long duration might indicate that the strategy is not working but it is still kept in place for symbolic or diplomatic reasons.

Figure 7

Relationship Between Sanction Duration and Outcome



The durations of the sanctions that are still in place vary a lot, which makes it hard to make broad statements about them. These data show that sanctions usually do not have a quick impact, and their success appears to depend on how long they are in place. These graphs show that in most cases, sanctions do not completely reach their goals or take a long time to have an effect. This supports the points made by Drezner (2015) and Peksen (2019) about how economic sanctions are often slow to work and not very effective.

Using this research setup, I will now apply fixed-effects panel models to see if some factors specific to the targeted countries, like the political system in place or the degree of trade openness affect their ability to stay strong politically and economically when facing sanctions. These tests will help confirm or reject the theories proposed in section 2.

4.2 Empirical Analysis

Before presenting the analysis' results, I will explain more about the Hausman test which was conducted to find the most suitable model for the study. This test looks at the estimates from a Fixed Effects model and compares them to those from a Random Effects model. The results highly significant in both situations: $\chi^2 = 776.42$; $p < 0.001$ for GDP growth and $\chi^2 = 47.99$; $p < 0.001$ for inflation. These values show a strong connection between the country-specific individual effects and the variables being studied. Therefore, this makes the assumptions of the random-effects model not valid. Along with the fixed-effects model, I also calculated Pooled OLS regressions to make comparisons. These models do not account for effects that are unique to each country which reduces how well they can explain a country's factors of resilience. However, they act as a helpful robustness check.

Therefore, the fixed-effects model is kept for analysis because it controls for time-constant unobserved heterogeneities within each country. This approach is especially useful in comparative political economy research, where structural differences between countries can bias the results (Wooldridge 2012). Furthermore, adding a time delay (t-1) for the variables helps show the delayed impact of sanctions more accurately. This approach also lowers the chance of simultaneity bias as suggested by Wilkins (2017) and Beck & Katz (2011).

4.2.1 Main Results: GDP growth

Table 5

Fixed Effects Regression Results on GDP Growth

Fixed Effects Regression - GDP Growth

	Dependent variable:
	GDP growth
lag_gdp	-0.174*** (0.027)
lag_sanctions	0.593* (0.358)
lag_inflation	0.330 (0.445)
lag_trade	1.920*** (0.622)
lag_exchange_rate	-0.523 (0.691)
lag_fdi	1.507 (1.279)
lag_forex	-0.766 (0.575)
lag_regime	0.676 (0.412)
interaction_sanctions_regime	-0.803** (0.330)
interaction_trade_inflation	-0.621 (0.424)
interaction_trade_forex	-0.545 (0.590)
interaction_regime_forex	0.190 (0.343)

interaction_regime_fdi	-1.569 (1.276)
Observations	1,566
R^2	0.042
Adjusted R^2	-0.032
F Statistic	4.923^{***} (df = 13; 1453)
Note:	***p < 0.01, **p < 0.05, *p < 0.1

4.2.2 Effects of Trade Openness

The results indicate that trade openness has a strong and positive impact on GDP growth (1.92, $p < 0.01$). This result appears to go against the idea that being more open makes a country more vulnerable to the harmful impacts of sanctions. This can be understood through the idea of economic resilience. Countries that are more open to trade usually have different trading partners. This diversity allows them to change where they export their goods if they face specific trade restrictions. Some countries facing Western sanctions have boosted their trade with countries that are not aligned with the West, like China and Türkiye. This finding shows that being open does not always mean being vulnerable. Instead, it can also help people adapt, especially in a multipolar context. This supports the ideas of Afesorgbor (2019) and Farrell & Newman (2019), who highlight the mixed effects of countries relying on each other economically.

4.2.3 Effects of Regime Type

The coefficient for the regime type is positive but not statistically significant (0.676, $p > 0.1$). Without sanctions, authoritarian governments might experience slightly better growth. As explained, this could be due to their centralized decision-making or short-term policy agility. However, this effect is not strong enough to make clear conclusions. Nevertheless, the relationship between the regime type and the sanctions' intensity is significant and has a negative effect (-0.80, $p < 0.05$). This shows that when more sanctions are imposed, authoritarian governments see a bigger drop in GDP growth than democratic ones. In simpler terms, authoritarian governments react more strongly to severe penalties. This questions the belief that these types of governments are structurally stronger. It also hints that their weaknesses, like depending on a limited range of exports or having weaker institutions, might be more significant than their ability to control politics. These findings challenge the earlier claims made by Peksen (2009) and Escribà-Folch (2010) who highlighted how strong

authoritarian governments can survive tough situations. They did not fully consider how different levels of economic impact can change when sanctions become stricter.

4.2.4 The Role of Control Variables

Among the control variables, only two stand out for their statistical significance:

- FOREX show a slight negative and almost significant effect (-0.76, $p \approx 0.19$). Even though not highly significant, this trend indicates that large reserves might mean the economy is in trouble. Governments might be saving or using these reserves to protect themselves during tough times which can be linked to slower growth.
- Past GDP growth has a highly significant negative effect (-0.17, $p < 0.001$), indicating a mean-reverting trend. This means that times of quick growth are usually followed by slower periods. This matches what happens in economic cycles[10].
- Other variables such as FDI flows, past inflation or the exchange rate have no direct significant effect in this model. It is possible that their effects can be obersavble in the longer term or are absorbed by the interactions between variables.

Finally, the fixed effects model explains a small share of the variance in GDP growth, around 4%, with a small R^2 of 0.042 and a negative adjusted R^2 ($\approx$ -0.032). This outcome is typical in studies that compare the economies of different countries. Many unseen factors, such as context or structure, greatly affect how each country's economy develops. Despite this limited R^2, the overall F-test of the model is highly significant ($p < 0.001$), indicating that all the factors included play an important role in explaining the changes seen in GDP growth. In simpler terms, even if the model explains only a small part of the overall differences, it still finds important connections between the variables that influence economic growth and the growth itself. This model shows that being open to trade affects how resilient the countries are. However, it also highlights that authoritarian governments can still be resilient even when facing sanctions, while also considering economic stability factors such as reserves and capital flows.

[10] The economic cycle helps us understand how the economy evolves over time. It is predicting when the economy will grow or slow down, and guide leaders to make better economic policy decisions based on the phase the economy is in (Bormotov, 2009).

4.3 Main Results: Inflation

Table 6
Fixed Effects Regression Results on CPI Inflation

Fixed Effects Regression - CPI Inflation

	Dependent variable:
	CPI inflation
lag_gdp	0.010 (0.073)
lag_sanctions	1.793* (0.969)
lag_inflation	-14.717*** (1.205)
lag_trade	-5.836*** (1.683)
lag_regime	-0.349 (1.114)
lag_exchange_rate	-0.646 (1.869)
lag_fdi	-1.878 (3.460)
lag_forex	-1.397 (1.556)
interaction_sanctions_regime	0.222 (0.893)
interaction_trade_inflation	13.117*** (1.148)
interaction_trade_forex	0.859 (1.597)
interaction_regime_forex	0.155 (0.929)
interaction_regime_fdi	2.008 (3.452)
Observations	1,566
R^2	0.103
Adjusted R^2	0.034
F Statistic	12.839*** (df = 13; 1453)
Note:	***p < 0.01, **p < 0.05, *p < 0.1

4.3.1 Effects of Trade Openness

The findings support the idea that being open to trade makes countries more vulnerable to sanctions, especially in terms of price stability. The coefficient linked to trade openness is clearly negative (-5.84, $p < 0.001$). This indicates that greater dependence on international trade is associated with an increase in inflation under sanctions. This finding aligns with the idea of complex interdependence developed by Keohane and Nye in 1977. They suggest that being part of global markets can bring at the same time wealth and vulnerability. The analysis also shows a significant and very strong interaction between trade openness and past inflation (13.12, $p < 0.001$). This suggests that an economy that already has high inflation and is very open can see significant increase of its imbalances when an external shock occurs. This dynamic is illustrated

by the recent cases of countries such as Argentina and Lebanon, where inflation accelerated following sanctions, combined with high trade (and especially import) dependency.

4.3.2 Effects of Regime Type

Contrary to initial theoretical expectations, the type of political regime has no significant direct effect on the evolution of inflation in the context of sanctions. The coefficient of the "regime type" variable is small (-0.35) and statistically insignificant ($p = 0.75$). Similarly, the interaction between regime type and sanctions is not strong enough to be significant. Additionally, the interaction between regime and sanctions is also insignificant (0.22, $p = 0.80$). However, this still suggests that the regime type does not systematically affect the inflationary impact of sanctions. These findings support the research of Peksen (2009) and Escribà-Folch (2010), who highlighted that authoritarian governments are often more resilient. It is possible that in the specific case of inflation, monetary and fiscal policies play a more decisive role than the institutional characteristics of the regime. In other words, a state's ability to be flexible and manage prices relies more on its economic rules and external conditions than on its political system. This means that we should separate the ideas of political strength and economic stability in authoritarian governments.

4.3.3 The Role of Control Variables

Few of the control variables play an important role in explaining inflation. FOREX, FDI and the nominal exchange rate have no significant direct impact. This result can be explained by the fact that the effect of these variables is mainly in the medium or long term, whereas the current analysis concentrates on annual effects in the short term (t-1). On the other hand, the sanctions' intensity variable as such is marginally significant (1.79, $p \approx 0.07$), suggesting that the number of imposed sanctions does contribute to an increase in inflation, although this effect is moderate. This finding matches what Peksen (2019) noticed about how sanctions can disrupt money flow, especially through trade and investor trust. Finally, there is a strong negative autocorrelation observed on the past inflation variable (-14.72, $p < 0.001$). This means that monetary policies play an important role in how governments respond to economic challenges. After a period of high inflation, governments usually take steps to limit spending and stabilize prices at least for a while.

The model designed to explain inflation performs better than the model for GDP growth. The R^2 is 0.103, and the adjusted R^2 is 0.034, which indicates that the model manages to explain

around 10% of the change in inflation between countries and over time, while also considering the fixed effects specific to each country. Even though this is still a small percentage, it is significant in the context of a macroeconomic study where many factors are interconnected and complex to model. The overall F-test is highly significant ($p < 0.001$), which statistically validates the specification of the model: the variables included do help to explain inflation fluctuations in the panel studied. In summary, this model emphasizes how important the internal factors of inflation are, known as the inertia effect[11]. It also points out the surprising impact of trade openness, which can sometimes help keep inflation low but can also make it worse when it is combined with previous shocks.

4.4 Robustness of the Results

In order to guarantee the robustness of the empirical conclusions, several robustness tests were carried out on the estimated models.

4.4.1 Alternative Models: Pooled OLS and Random Effects

In addition to the fixed effects (FE) model, two alternative models were estimated: the random effects (RE) model and the pooled ignored cross-section regression (pooled OLS) model. These models allow us to check if the fixed effects effectively control for significant unobserved heterogeneities between countries. The results from the RE and pooled models are a bit different regarding the size and importance of the coefficients. However, the main impacts of trade openness and sanctions usually remain the same. The Hausman test was done for each dependent variable and showed that the fixed-effects model is the better choice. This means there is a strong connection between the individual effects and the explanatory variables, and this supports the chosen method.

4.4.2 Interactions and Combined Effects

The model incorporates different interaction terms to test the conditional effects of the independent variables. In particular:

- The interaction between the regime type and the intensity of sanctions. It tests whether the intensity of sanctions varies depending on the regime type, as autocracies can theoretically be more or less resilient depending on their structure.

[11] The inertia effect indicates that inflation usually lasts for a longer time. This is because of automatic changes such as updates in wages or changes in prices (Afonasova & Ryzhkova, 2017).

- The interaction between the trade openness and the CPI inflation rate. It assesses whether countries that are open to trade are more vulnerable to inflation because of their increased exposure to world prices.
- The interaction between the trade openness and the amount of foreign exchange reserves. It analyses whether FOREX helps protect the economy from the possible negative impacts of being more open to trade.
- The interaction between the regime type and the amount of foreign exchange reserves. It tests whether authoritarian regimes use their reserves more effectively to stabilise the economy in times of crisis.
- The interaction between the trade openness and the amount of FDI entering the country. It examines how the different regime types influence the way foreign investments affect a country's growth or stability, especially when there are sanctions in place.

Adding these interactions makes it harder to understand the individual coefficients directly, but it helps us see the combined effects in certain situations more clearly. Even though some interactions may not have strong statistical importance, including them adds value to the analysis. This helps in testing more complex theories, especially those related to weaponized interdependence and authoritarian resilience.

4.4.3 Standardisation of Variables

All the explanatory variables were standardized (scaled) before estimation to make it simpler to compare the coefficients and to prevent biases caused by different units of measurement. This change brings all the variables to a similar scale where the average is 0 and the standard deviation is 1. This is especially helpful in models that look at interactions or deal with very different variables like GDP, FDI flows or foreign exchange reserves (Wooldridge, 2012). Robustness tests show that the signs and sizes of the coefficients remain consistent which strengthens the trustworthiness of the results.

4.4.4 Extreme Data and Non-Treatment of Outliers

The model did not systematically remove extreme values (also known as outliers). This decision comes from the need to keep all the observations I have on a panel that already has limited data, especially for countries that face strict sanctions. However, I recognise that certain

atypical values could influence the coefficients and the final results. One way to improve the analysis is to leave out the extreme cases or to try using modified versions of the variables.

CHAPTER 5: DISCUSSION

The results from both models clearly show that countries respond economically differently to sanctions. For example, trade openness is positively associated with GDP growth (1.92, $p < 0.01$), but negatively related to price stability (-5.84, $p < 0.001$). This means that being heavily engaged in global trade can lead to opportunities to redirect trade flows for temporary economic stability. It also makes the economy more exposed to inflation risks due to challenges like getting imports, accessing foreign money or problems with supply chains. The findings about the regime type are also nuanced. In the growth model, the interaction between authoritarian regime and sanctions is negative and significant (-0.80, $p < 0.05$), which contradicts classical theories on authoritarian resilience. In comparison, this interaction has no significant effect in the inflation model. This means that authoritarian governments do not manage price increases any better than democracies when it comes to sanctions. This difference in dynamics might indicate an ability in centralizing resources, but it does not mean they can effectively handle large economic issues related to supply and currency.

Table 7
Summary of Hypotheses, Empirical Findings, and Interpretations

Hypothesis	Theoretical expectation	Empirical result	Validation	Interpretation
H1 Authoritarian regimes are more resilient	Authoritarian regimes absorb better sanctions thanks to political control	Authoritarian regime harm GDP growth and have a weak non-significant positive link to inflation	Hypothesis rejected	Authoritarian regimes face greater economic shocks despite stable politics
H2 Open countries are more vulnerable	Highly trade-integrated countries are more vulnerable to shocks	Trade openness has a positive effect on GDP and negative effect on inflation	Hypothesis partially rejected	Open countries are more resilient due to diversification

As we can see on the Table 7, H1 is rejected. Although authoritarian regimes have tools for political control, their economies, which are often dependent on specific exports (e. g. hydrocarbons), seem to be more sensitive to sanctions. Political strength does not ensure

economic stability, particularly in a globalised and multipolar world. This discovery is in link with earlier studies (Peksen, 2009; Escribà-Folch, 2010). Then, H2 is also partially rejected. Surprisingly, countries that are more open seem to handle economic sanctions better, as the GDP growth is maintained, despite a higher inflation. They can easily redirect trade flows to rely on partnerships with countries like China and Türkiye and find new ways to earn income. Trade openness seems to be a way to adapt instead of being vulnerable. It supports the idea that being strong and flexible comes from having a variety of trade options (Afesorgbor, 2019; Farrell & Newman, 2019). In both cases, the null hypothesis (H0), which suggests no effect nor relationship between the variables, is also rejected.

Although the R^2 of the models remains modest (≈ 4% for growth, ≈ 10% for inflation), these levels are acceptable in multi-country macroeconomic studies, since there is a large number of unobserved contextual factors. The overall F-tests are highly significant, showing that the variables I included help to explain the observed variations. The relationships between different factors, especially between sanctions' intensity and the type of regime, or between trade openness and inflation, show complicated patterns that we must pay attention to.

To enhance the discussion, it is interesting to apply our research to real cases of countries facing economic sanctions. Some countries are known for their unusual characteristics, especially semi-authoritarian economies that are very open to trade. For example, Türkiye and the United Arab Emirates appear to handle challenges better than anticipated. On the other hand, extreme cases like North Korea, which is not included in the panel because of the lack of reliable information, are gaps in the method. However, if these cases were included, they could accentuate the expected results (with a more severe deterioration).

- The first case I will look at is Türkiye. Türkiye has faced many Western sanctions since 2016 mainly due to tensions with the US and the EU as well as a coup attempt. Despite these challenges, Türkiye is still showing stable growth. According to the World Bank, the average GDP growth rate from 2015 to 2024 is about 4.8%, which is quite high. This contradiction can be partly understood by looking at its two economic ties. It is linked to the West but also has strong connections to the business and financial networks in Eurasia and the Middle East. The country is gaining advantages by shifting its focus to the East, showing its ability to be flexible and adapt by diversifying its political and economic partnerships.
- Then, it is important to analyse the ambivalent example of Russia. It brings together the theories we looked at earlier, by focusing on characteristics of strong control like centralization and repression, along with weaknesses in energy supply. Since the

sanctions in 2014 (Crimea) and 2022 (Ukraine), the country has tried new strategies, like using cryptocurrencies and exporting to China. However, it should still face high inflation and slower GDP growth in the coming years. According to the World Bank, the average GDP growth rate from 2015 to 2024 is about 1.4%, which is relatively low. This situation shows that strict actions can lessen political impacts, but they cannot completely stop them as President Putin is still in power and is increasing the repression.

- Lastly, an additional relevant country to analyse would be Iran. For many years, Iran has faced strict restrictions. Yet, it shows a strong and long-term resilience, even though this comes with significant economic challenges. Finding ways to survive economically, through informal economy alternative methods like selling oil to China and weakening its currency, has helped people survive. However, this situation has led to ongoing inflation and a lack of stable jobs. The World Bank says that the GDP growth rate from 2015 to 2024 was about 2.6%, which is quite average. This case highlights the wear-and-tear effects of prolonged sanctions on authoritarian rentier regimes.

These findings support the ideas of Keohane and Nye (1977) about complex interdependence. When countries trade a lot with each other, they establish channels for the diffusion of constraint, like through the SWIFT banking system or the use of the dollar. However, this also allows countries to create alternative methods, such as forming alliances with other developing countries or using cryptocurrencies. Additionally, the strong hold of authoritarian governments mentioned by Carlson et al. in 2012 appears to focus more on politics than on the economy. Even though these governments have internal control levers, it does not mean they can stop major economic problems from happening.

In summary, combining the two models shows that resilience varies and is only partly effective depending on the type of shock involved. On one hand, trade openness can have mixed effects. It can help the economy grow and become stronger in terms of GDP, but it can also lead to price instability, which means higher inflation. Being involved in trade can have various impacts depending on the current state of the economy. On the other hand, the type of regime interacts differently depending on the dependent variable. It seems that authoritarian regimes slow down growth, but they do not have a noticeable impact on price stability in the model. These results show that having a strict government does not guarantee strong economic performance in the short term.

It is important to understand these results while considering the limits of the research methods used in this study. First, the fixed-effects model improves the accuracy of results by

adjusting for unique features of each country. This helps to lessen the bias that can come from missing variables. However, this approach to statistics has a downside. The ability to apply the results to other situations depends on how good and accessible the data is. Indeed, the institutions that I relied on to collect economic data (World Bank, IMF, V-Dem) are based on Western definitions and standards, which can lead to a perspective bias into the analysis of the effects of sanctions. Therefore, the impact of political or economic factors might be judged too high or too low based on the standards used by the organization assessing them. In addition, it is difficult to clearly show how sanctions directly affect the overall economy. The model uses past data and control variables to reduce simultaneity effects. However, external factors like changes in commodity prices or internal reforms can still affect the results. Additionally, some economies that face sanctions are already too weak in their structure which makes it hard to identify the exact impact of the sanctions.

Another challenge is the absence of trustworthy information for countries that face strong sanctions like North Korea and Venezuela. These extreme cases are important for understanding the maximum impact sanctions can have, but they cannot be easily included in numerical studies. This could skew the results by making the strongest effects seem weaker than they really are.

Finally, choosing a short time frame with the variables lagged by one year allows us to see quick effects right away. However, this approach makes it hard for the model to detect longer-term changes, like how the population can circumvent sanctions using cryptocurrencies or how trade routes are changed. This limitation is due to the lack of data for 2025. However, future research could address this issue by looking at older events over a longer period.

In the end, while sanctions aim to punish certain countries, they can also lead to serious economic and political problems for the countries that impose those sanctions. The energy crisis that happened after the implementation of sanctions on Russia in 2022 clearly shows how these actions can lead to unexpected results. After Russian oil and gas were banned from Western markets, energy prices in Europe and the United States went up sharply. This increase has caused inflation, slowed down economic growth, and made social tensions worse. For example, in June 2022, the yearly energy inflation rate went over 40%. Later, in February 2023, energy inflation went to a lower rate (16.6%) compared to the same time in the previous year (28.7%). However, many Europeans were still struggling with the unstable cost of energy (Yanatma 2023). In the United States, the energy industry gained some advantages from rising prices, but overall inflation increased quickly reaching heights not seen in many years. This rise in prices

led the Federal Reserve to raise interest rates sharply, which made borrowing more expensive and slowed down economic growth (Federal Reserve Board, 2022).

These events highlight the idea of weaponized interdependence as explained by Farrell and Newman (2019). When countries rely heavily on each other, that interdependence can become a weakness. This weakness affects not just the countries that are being targeted, but also the ones that impose the sanctions. The “boomerang effect” of sanctions shows that using economic pressure has its limits in a connected world economy. Sometimes, the political challenges of public pushback can weaken the unity of the country that imposes sanctions. This is evident in the discussions within the European Union about shared energy support systems. In conclusion, although sanctions are a strong way for countries to apply pressure, we need to think about the unexpected economic effects they can have on the countries imposing them. Future actions might need a more careful calibration of enforcement mechanism, along with efforts to strengthen our own weaknesses before starting large-scale economic restriction campaigns.

CHAPTER 6: CONCLUSION, LIMITATIONS, FUTURE RESEARCH

One final question remains: who suffers most? This research shows that authoritarian governments that do not engage much in international trade experience the most severe economic impacts from sanctions. Unlike traditional beliefs about how resilient authoritarian governments can be, these regimes actually experience a more significant drop in growth when faced with external restrictions. This decline is made worse by their limited variety in trade. This weakness is not just caused by how open a country is or what kind of government it has. Other factors, like the amount of foreign exchange reserves or past GDP dynamics also influence how effective sanctions are. On the other hand, countries that are more open to trade, even though they might face higher risks of inflation, usually do better in keeping their economy growing by adjusting their trade practices. In summary, when a country has a strict government, limited trade with other nations, and weak economy characteristics, it becomes very vulnerable to international economic penalties.

If sanctions are likely to impose significant economic costs, a country's ability to absorb, adapt and overcome external shocks becomes crucial. This research shows that there are several ways to help economies become stronger when they face sanctions. First, diversifying trading partners is an important strategy. Countries should work to increase their export markets and find new sources for imports to lessen their reliance on just a few partners. Engaging with rising or non-aligned economies like China, India or Türkiye provides good options if there is a situation of isolation. Strengthening domestic production by investing in strategic sectors such as agriculture, manufacturing, and technology, and promoting import substitution reduce vulnerability. Financial independence is another key part of being resilient. Raising foreign exchange reserves, setting up new payment systems or using cryptocurrencies are all methods to get around financial networks controlled by countries that impose sanctions. The flexibility of economic policies is another key factor. Being able to rapidly change money policies and manage currency exchange rates can help reduce inflation and support the economy when it faces challenges. In the end, the ability of political and institutional systems to adjust is especially important. Changes aimed at better governance, lowering corruption and making administration more efficient can boost trust and strengthen communities even in authoritarian context. On the other hand, political rigidity often makes economic problems worse.

In summary, dealing with sanctions is not just an economic problem: it also involves structures and strategies. It relies on a country's skill to predict changes, adjust quickly and

gather resources from both inside and outside the country. Although this study highlights key dynamics of resilience under sanctions, several further explorations can be done.

The long-term effects are still not studied enough. To understand how economies under sanctions change over five to ten years, we need better methods to study these changes over time. This could help us see how these economies slowly adjust or weaken. This study also examined major global economic trends, shaping how sanctions affect states. Indeed, sanctions such as trade bans or freezing assets affect various parts of society and industries in different ways. Looking at the analysis by different economic sectors or social groups would help us see the patterns of inequality in the country more clearly. Furthermore, researching how non-state actors and informal economies help people bypass sanctions is also important. These parallel networks are often essential for the economic survival of countries facing sanctions, but they have not been studied in a detailed way. Additionally, not all authoritarian governments respond to sanctions in the same way. Examining several types of authoritarian governments such as personalistic, military, or one-party systems can help us understand how they maintain their power both politically and economically. It is also important to analyse the harmful effects that sanctions have on the countries that enforce them. Sanctions affect Western economies in an important and sometimes unexpected way, especially as the world becomes more multi-polar. This situation is key to understanding how global economic rules will change in the future.

In summary, when dealing with sanctions, a country's true strength comes not only from its economy, but also from how well its institutions, leaders and citizens can adjust stand firm and change. John Stuart Mill, a prominent English philosopher, economist, and politician, stated that "*the worth of a state in the long run is the worth of the individuals composing it*." It is therefore in the human, political and moral quality of a society that the source of its resilience ultimately lies.

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APPENDIX

Appendix A: Hausman Tests Results

```
> # ================================
> # 9. Hausman Tests
> # ================================
> hausman_test_GDP <- phtest(model_gdp, model_random_GDP)
> print(hausman_test_GDP)

        Hausman Test

data:  gdp ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_exchange_rate +  ...
chisq = 1945.9, df = 13, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent

> hausman_test_inflation <- phtest(model_inflation, model_random_inflation)
> print(hausman_test_inflation)

        Hausman Test

data:  inflation ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade +  ...
chisq = 2023.8, df = 13, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent
```

Appendix B: GDP Model Pooled Results

Model pooled

	Dependent variable:
	gdp
lag_gdp	-0.043* (0.026)
lag_sanctions	-0.006 (0.271)
lag_inflation	0.450 (0.365)
lag_trade	-0.159 (0.166)
lag_regime	-0.365** (0.159)
lag_exchange_rate	0.470*** (0.140)
lag_fdi	0.206 (0.144)
lag_forex	0.179 (0.143)
interaction_sanctions_regime	-0.399 (0.265)
interaction_trade_inflation	-0.471 (0.367)
Constant	3.748*** (0.165)
Observations	1,566
R^2	0.024
Adjusted R^2	0.017
F Statistic	3.784*** (df = 10; 1555)
Note:	***p < 0.01, **p < 0.05, *p < 0.1

Appendix C: Inflation Model Pooled Results

Model pooled

	Dependent variable:
	inflation
lag_gdp	0.117 (0.083)
lag_sanctions	1.269 (0.877)
lag_inflation	2.696** (1.183)
lag_trade	-2.131*** (0.539)
lag_regime	-0.580 (0.514)
lag_exchange_rate	-0.300 (0.453)
lag_fdi	0.141 (0.467)
lag_forex	-0.604 (0.462)
interaction_sanctions_regime	0.131 (0.857)
interaction_trade_inflation	6.052*** (1.187)
Constant	6.540*** (0.535)
Observations	1,566
R^2	0.212
Adjusted R^2	0.207
F Statistic	41.737*** (df = 10; 1555)
Note:	***p < 0.01, **p < 0.05, *p < 0.1

Appendix D: GDP Model Random Results

Model random

	Dependent variable:
	gdp
lag_gdp	-0.043* (0.026)
lag_sanctions	-0.006 (0.271)
lag_inflation	0.450 (0.365)
lag_trade	-0.159 (0.166)
lag_regime	-0.365** (0.159)
lag_exchange_rate	0.470*** (0.140)
lag_fdi	0.206 (0.144)
lag_forex	0.179 (0.143)
interaction_sanctions_regime	-0.399 (0.265)
interaction_trade_inflation	-0.471 (0.367)
Constant	3.748*** (0.165)
Observations	1,566
R^2	0.024
Adjusted R^2	0.017
F Statistic	37.835***
Note:	***p < 0.01, **p < 0.05, *p < 0.1

Appendix E: Inflation Model Random Results

Model random

	Dependent variable:
	inflation
lag_gdp	0.117 (0.083)
lag_sanctions	1.269 (0.877)
lag_inflation	2.696** (1.183)
lag_trade	-2.131*** (0.539)
lag_regime	-0.580 (0.514)
lag_exchange_rate	-0.300 (0.453)
lag_fdi	0.141 (0.467)
lag_forex	-0.604 (0.462)
interaction_sanctions_regime	0.131 (0.857)
interaction_trade_inflation	6.052*** (1.187)
Constant	6.540*** (0.535)
Observations	1,566
R^2	0.212
Adjusted R^2	0.207
F Statistic	417.365***
Note:	***p < 0.01, **p < 0.05, *p < 0.1

Appendix F: Descriptive Data Code

```
# ================================

# Install and Load Packages

# ================================

install.packages("tidyverse")

install.packages("readr")

install.packages("ggcorrplot")

install.packages("rworldmap")

install.packages("readxl")

install.packages("knitr")

install.packages("gridExtra")

install.packages("grid")

install.packages("ggplot2")

install.packages("writexl")

library(tidyverse)

library(readr)

library(ggcorrplot)

library(lubridate)

library(rworldmap)

library(readxl)

library(knitr)

library(gridExtra)

library(grid)

library(ggplot2)

library(writexl)

library(purrr)


# ================================

# Citation

# ================================

c("tidyverse", "readr", "ggcorrplot", "lubridate", "rworldmap", "readxl", "knitr", "gridExtra",
"grid", "ggplot2", "writexl", "purr", "stargazer", "plm", "dplyr" ) %>%
```

```
  map(citation) %>%
  print(style = “text”)

# ================================
# Load Software
# ================================
df  <- read_excel(“Thesis_MIRD_Salessy_stats.xlsx”)

# ================================
# Data preview
# ================================
head(df)
summary(df)

# ================================
#  Create the column duration
# ================================
df <- df %>%
  mutate(duration = as.numeric(difftime(end, begin, units = “auto”)))

# ================================
# Check column names
# ================================
print(colnames(df))
str(df)

# ================================
# Convert numeric columns
# ================================
df <- df %>%
  mutate(across(where(is.character), as.factor)) %>%  # Convertir les colonnes texte en
facteurs
```

```
  mutate(across(c(arms, military, financial, travel, other_sanction), as.numeric, na.rm =
TRUE))  # Assurer que les colonnes numériques sont bien reconnues


# ================================
# Create a summary table
# ================================
summary_table <- df %>%
  group_by(sanctioned_state) %>%
  summarise(
    total_sanctions = n(),
    avg_duration = round(mean(duration, na.rm = TRUE), 2),
    min_duration = min(duration, na.rm = TRUE),
    max_duration = max(duration, na.rm = TRUE)
  ) %>%
  arrange(desc(total_sanctions))

global_summary <- df %>%
  summarise(
    sanctioned_state = "TOTAL",
    total_sanctions = n(),
    avg_duration = round(mean(duration, na.rm = TRUE), 2),
    min_duration = min(duration, na.rm = TRUE),
    max_duration = max(duration, na.rm = TRUE)
  )

final_table <- bind_rows(summary_table, global_summary)
write_xlsx(final_table, "final_sanctions_summary.xlsx")
getwd()
```

```
# ================================
# Distribution of sanctions by country
# ================================
sanctions_by_country <- df  %>%
  count(sanctioned_state, name = “total_sanctions”) %>%
  arrange(desc(total_sanctions))


ggplot(sanctions_by_country, aes(x = reorder(sanctioned_state, total_sanctions), y =
total_sanctions)) +
  geom_bar(stat = “identity”, fill = “steelblue”, width = 0.7) +
  geom_text(aes(label = total_sanctions), hjust = -0.2, size = 4) +
  coord_flip() +
  labs(
    title = “Number of Sanctions per Country”,
    x = “Sanctioned Country”,
    y = “Number of Sanctions”
  ) +
  theme_minimal() +
  theme(
    axis.text.y = element_text(size = 10, face = “bold”),
    axis.text.x = element_text(size = 10),
    plot.title = element_text(size = 14, face = “bold”),
    panel.grid.major.y = element_blank()
  )


# ================================
# Types of sanctions applied
# ================================
sanctions_types <- df %>%
  summarise(
    arms = sum(arms, na.rm = TRUE),
    military = sum(military, na.rm = TRUE),
```

```
    financial = sum(financial, na.rm = TRUE),
    travel = sum(travel, na.rm = TRUE),
    trade = sum(trade, na.rm = TRUE),
    other = sum(other_sanction, na.rm = TRUE)
  ) %>%
  pivot_longer(cols = everything(), names_to = “sanction_type”, values_to = “count”)


ggplot(sanctions_types, aes(x = sanction_type, y = count, fill = sanction_type)) +
  geom_bar(stat = “identity”) +
  labs(title = “Which sanctions are more often used”, x = “Type of sanction”, y =
“Frequency”) +
  theme_minimal()


# ================================
# Changes in the number of sanctions over time
# ================================
df %>%
  group_by(begin) %>%
  summarise(total_sanctions = n()) %>%
  ggplot(aes(x = begin, y = total_sanctions)) +
  geom_line(color = “red”, size = 1) +
  geom_point(color = “red”, size = 2) +
  labs(title = “Number of imposed sanctions per year”, x = “Year”, y = “Number of
sanctions”) +
  theme_minimal()
summary(df$begin)
head(df$begin)


# ================================
# Success rate of sanctions
# ================================
df %>%
  count(success) %>%
```

```
  ggplot(aes(x = reorder(success, -n), y = n, fill = success)) +
  geom_bar(stat = "identity") +
  labs(title = "Distribution of sanctions' results", x = "Status of sanctions", y = "Number of
case") +
  theme_minimal()


# ================================
# Aggregate sanctions by country
# ================================
sanctions_map <- df %>%
  count(sanctioned_state, name = "total_sanctions")


# ================================
# Merge with the world map
# ================================
world_map <- joinCountryData2Map(sanctions_map, joinCode = "NAME",
nameJoinColumn = "sanctioned_state")


mapCountryData(world_map, nameColumnToPlot = "total_sanctions",
               mapTitle = "Number of sanctions per country",
               colourPalette = "heat",
               catMethod = "fixedWidth")


# ================================
# Correlation between the duration of sanctions and their success
# ================================
ggplot(df, aes(x = duration, y = success, color = success)) +
  geom_jitter(alpha = 0.6, size = 3) +
  geom_smooth(method = "lm", color = "blue", se = FALSE) +
  labs(title = "Correlation between sanction's success and duration",
       x = "Sanctions' duration (in years)",
       y = "Success") +
  theme_minimal()
```

```
# ================================
# Frequency graph of sanctions targets
# ================================
objectives_columns <- c('terrorism', 'human_rights', 'democracy', 'end_war',
'other_objective', 'prevent_war', 'policy_change')


# ================================
# Number of sanctions for each objective
# ================================
objectives_counts <- df %>%
  summarise(across(all_of(objectives_columns), sum, na.rm = TRUE)) %>%
  pivot_longer(cols = everything(), names_to = "Objective", values_to = "Count") %>%
  arrange(desc(Count))


# ================================
# Bar Graph
# ================================
ggplot(objectives_counts, aes(x = reorder(Objective, -Count), y = Count, fill = Objective)) +
  geom_bar(stat = "identity") +
  coord_flip() +
  labs(title = "Different sanctions for different objectives",
       x = "Objectives",
       y = "Number of sanctions") +
  theme_minimal()


# ================================
# Graph of the link between sanctions objectives and success
# ================================
df_melted <- df %>%
  pivot_longer(cols = all_of(objectives_columns), names_to = "Objective", values_to =
"Present") %>%
  filter(Present == 1)  # Ne garder que les sanctions ayant ces objectifs
```

```
# ================================
# Bar graph with color by success
# ================================
ggplot(df_melted, aes(x = Objective, fill = success)) +
  geom_bar(position = “dodge”) +
  coord_flip() +
  labs(title = “Link between sanctions’ objectives and success”,
       x = “Sancxtions’ objectives”,
       y = “Number of sanctions”) +
  theme_minimal()


# ================================
# Average duration of sanctions by type
# ================================
df %>%
  group_by(type = case_when(
    arms == 1 ~ “Arms”,
    military == 1 ~ “Military”,
    financial == 1 ~ “Financial”,
    travel == 1 ~ “Travel”,
    trade == 1 ~ “Trade”
  )) %>%
  summarise(mean_duration = mean(duration, na.rm = TRUE)) %>%
  ggplot(aes(x = reorder(type, mean_duration), y = mean_duration, fill = type)) +
  geom_bar(stat = “identity”) +
  labs(title = “Average duration of sanctions by type”, x = “Type of sanction”, y = “Average
duration (years)”) +
  coord_flip() +
  theme_minimal()
```

Appendix G: Emprirical Data Code

```
# ================================
# Install and Load Packages
# ================================
install.packages("plm")
library(plm)
library(readxl)
library(dplyr)
library(stargazer)

# ================================
# Load and Prepare Data
# ================================
# Load the Excel file
df <- read_excel("Thesis_MIRD_Salessy_num.xlsx")

# Delete NA
df_na <- df %>%
  select(Country, Year, GDP_growth, CPI, Exchange_Rate, Sanctions, Trade_GDP, FDI_GDP, FOREX, Political_Regime) %>%
  na.omit()

sum(is.na(df_na))

# Rename columns
df_na <- df_na %>%
  rename(
    country       = Country,
    year          = Year,
    gdp           = GDP_growth,
    inflation     = CPI,
    sanctions     = Sanctions,
```

```
  trade_balance  = Trade_GDP,
  regime         = `Political_Regime`,
  exchange_rate  = Exchange_Rate,
  fdi            = FDI_GDP,
  forex          = FOREX
 )

df_clean <- df_na %>%
 distinct(country, year, .keep_all = TRUE)

# ================================
# Set Panel Structure
# ================================
# Convert to panel data: individual = country, time = year
pdata <- pdata.frame(df_clean, index = c("country", "year"))

# ================================
# Lagged Variables (DVs, IVs, Controls)
# ================================
pdata$lag_sanctions     <- lag(pdata$sanctions, 1)
pdata$lag_inflation     <- lag(pdata$inflation, 1)
pdata$lag_trade         <- lag(pdata$trade_balance, 1)
pdata$lag_regime        <- lag(pdata$regime, 1)
pdata$lag_exchange_rate <- lag(pdata$exchange_rate, 1)
pdata$lag_fdi           <- lag(pdata$fdi, 1)
pdata$lag_forex         <- lag(pdata$forex, 1)

# Convert all lag vars to numeric after cleaning text
clean_numeric <- function(x) {
 as.numeric(gsub("[^0-9.-]", "", as.character(x)))
}
```

```
vars_to_num <- c("lag_sanctions", "lag_inflation", "lag_trade", "lag_regime",
                 "lag_exchange_rate", "lag_fdi", "lag_forex")

pdata[vars_to_num] <- lapply(pdata[vars_to_num], clean_numeric)

# Ensure all lagged vars are numeric
vars_to_num <- c("lag_sanctions", "lag_inflation", "lag_trade", "lag_regime",
                 "lag_exchange_rate", "lag_fdi", "lag_forex")
pdata[vars_to_num] <- lapply(pdata[vars_to_num], as.numeric)

pdata_clean <- na.omit(pdata)

# Interactions
pdata_clean$lag_trade <- as.numeric(pdata_clean$lag_trade)
pdata_clean$lag_inflation <- as.numeric(pdata_clean$lag_inflation)

pdata_clean$interaction_sanctions_regime <- pdata_clean$lag_sanctions *
pdata_clean$lag_regime
pdata_clean$interaction_trade_inflation  <- pdata_clean$lag_trade *
pdata_clean$lag_inflation
pdata_clean$interaction_trade_forex <- pdata_clean$lag_trade * pdata_clean$lag_forex
pdata_clean$interaction_regime_forex <- pdata_clean$lag_regime * pdata_clean$lag_forex
pdata_clean$interaction_regime_fdi <- pdata_clean$lag_regime * pdata_clean$lag_fdi

# Convert key variables to numeric (forcefully and safely)
vars_to_convert <- c("gdp", "inflation", "sanctions", "trade_balance", "regime",
                     "exchange_rate", "fdi", "forex",
                     "lag_sanctions", "lag_inflation", "lag_trade", "lag_regime",
                     "lag_exchange_rate", "lag_fdi", "lag_forex",
                     "interaction_sanctions_regime", "interaction_trade_inflation",
"interaction_trade_forex",
                     "interaction_regime_forex", "interaction_regime_fdi")
```

```
# Force conversion for pseries stored as characters
pdata_clean[vars_to_convert] <- lapply(pdata_clean[vars_to_convert], function(x) {
  as.numeric(as.character(x))
})

pdata_clean1 <- na.omit(pdata_clean)

# Scale all selected variables
vars_to_scale <- c("lag_sanctions", "lag_inflation", "lag_trade",
                   "lag_exchange_rate", "lag_fdi", "lag_forex",
                   "lag_regime", "interaction_sanctions_regime", "interaction_trade_inflation",
"interaction_trade_forex",
                   "interaction_regime_forex", "interaction_regime_fdi")

pdata_scaled <- pdata_clean1
pdata_scaled[vars_to_scale] <- scale(pdata_scaled[vars_to_scale])

pdata_scaled$lag_gdp <- lag(pdata_scaled$gdp, 1)
pdata_scaled$lag_gdp <- as.numeric(scale(pdata_scaled$lag_gdp))

# ================================
# Fixed Effects Regression: DV = GDP Growth
# ================================
model_gdp <- plm(
  gdp ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade +
    lag_exchange_rate + lag_fdi + lag_forex + lag_regime +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
  data = pdata_scaled,
  model = "within"
)
summary(model_gdp)
```

```
# Export
stargazer(model_gdp, type = “html”, out = “regression_gdp.doc”,
          title = “Fixed Effects Regression - GDP”,
          digits = 3, single.row = TRUE)

# ================================
# Fixed Effects Regression: DV = Inflation
# ================================
model_inflation <- plm(
  inflation ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_regime +
    lag_exchange_rate + lag_fdi + lag_forex +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
  data = pdata_scaled,
  model = “within”
)
summary(model_inflation)

# Export
stargazer(model_inflation, type = “html”, out = “regression_inflation.doc”,
          title = “Fixed Effects Regression - Inflation”,
          digits = 3, single.row = TRUE)

# ================================
# Pooled OLS
# ================================
model_pooled_GDP <- plm(
  gdp ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_regime +
    lag_exchange_rate + lag_fdi + lag_forex +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
  data = pdata_scaled,
```

```
  model = “pooling”
)
summary(model_pooled_GDP)

# Export
stargazer(model_pooled_GDP, type = “html”, out = “model_pooled_GDP.doc”,
          title = “model_pooled_GDP”,
          digits = 3, single.row = TRUE)
# ================================

model_pooled_inflation <- plm(
  inflation ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_regime +
    lag_exchange_rate + lag_fdi + lag_forex +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
  data = pdata_scaled,
  model = “pooling”
)
summary(model_pooled_inflation)

# Export
stargazer(model_pooled_inflation, type = “html”, out = “model_pooled_inflation.doc”,
          title = “model_pooled_inflation”,
          digits = 3, single.row = TRUE)
# ================================
# Random Effects
# ================================
model_random_GDP <- plm(
  gdp ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_regime +
    lag_exchange_rate + lag_fdi + lag_forex +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
```

```
  data = pdata_scaled,
  model = “random”
)
summary(model_random_GDP)

# Export
stargazer(model_random_GDP, type = “html”, out = “model_random_GDP.doc”,
          title = “model_random_GDP”,
          digits = 3, single.row = TRUE)
# ================================

model_random_inflation <- plm(
  inflation ~ lag_gdp + lag_sanctions + lag_inflation + lag_trade + lag_regime +
    lag_exchange_rate + lag_fdi + lag_forex +
    interaction_sanctions_regime + interaction_trade_inflation + interaction_trade_forex +
    interaction_regime_forex + interaction_regime_fdi,
  data = pdata_scaled,
  model = “random”
)
summary(model_random_inflation)

# Export
stargazer(model_random_inflation, type = “html”, out = “model_random_inflation.doc”,
          title = “model_random_inflation”,
          digits = 3, single.row = TRUE)

# ================================
# Hausman Test
# ================================
hausman_test_GDP <- phtest(model_gdp, model_random_GDP)
print(hausman_test_GDP)
```

```
hausman_test_inflation <- phtest(model_inflation, model_random_inflation)
print(hausman_test_inflation)
```