Investigating the Impact of Economic Sanctions on Iran-Nigeria Bilateral Trade (2012-2022)

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Abstract:
This study employs a quantitative approach, utilizing the gravity model and FMOLS estimation, to examine how economic sanctions affect the trade relationship between Iran and Nigeria. Additionally, it explores the influence of factors such as GDP, exchange rate, strong sanctions, and weak sanctions. By doing so, this research contributes to the existing knowledge on bilateral trade between these two nations and provides valuable insights into areas that require attention for fostering trade development between them. The research findings reveal that in the bilateral trade relationship between Iran and Nigeria, there exists a positive correlation between GDP and weak sanctions (LIM) with trade. An increase of 1% in GDP leads to a 7.79% increase in trade, while a 1% increase in weak sanctions contributes to a 3.91% increase in trade. Conversely, strong sanctions and exchange rate have a negative impact on trade, with a 1% increment in strong sanctions resulting in a 1.18% decrease in trade, and a 1% increment in exchange rate leading to a 1.96% decrease in trade.

1. Introduction

In 2011, the United States and European Union imposed economic sanctions on Iran due to its nuclear program. These sanctions targeted Iran's oil exports, banking system, and access to international trade. As a result of these sanctions, Iran's economy suffered greatly, with a significant reduction in oil revenues and a decline in foreign investment" (Olaniyi & Adeniran, 2016). Nigeria, on the other hand, is one of Africa's largest economies and has a growing trade relationship with Iran. Prior to the sanctions, Nigeria was importing crude oil from Iran and exporting a variety of goods to Iran, including textiles, carpets, and food items"(Oyekanmi, 2015).

However, with the imposition of the economic sanctions, bilateral trade between Iran and Nigeria declined significantly. Nigeria had to find alternative sources of oil, which led to increased imports from Saudi Arabia and other countries. Additionally, Nigerian exporters faced challenges in trading with Iran due to the limitations of international banking and finance transactions. The impact of the economic sanctions on bilateral trade between Iran and Nigeria has been significant. According to reports, trade between the two countries fell by almost 80% after the sanctions were imposed. This has affected both countries' economies negatively, with Iran losing an important trading partner and Nigeria facing higher costs for oil imports and a reduction in export opportunities.

A report states that trade between Iran and Nigeria fell from $1.2 billion in 2011 to only $451 million in 2018 following the imposition of sanctions (Tehran Times, June 12, 2019). Another article by The Guardian Nigeria in 2016 notes that "the economic sanctions against Iran have affected its ability to export oil, leading to Nigeria searching for alternative sources of crude oil (The Guardian Nigeria, November 20, 2016). Economic sanctions are mostly known as alternative to war and coercive force. Different countries use limited economic sanctions against target countries to achieve their own political purposes, but this kind of sanctions has been generally ineffective. Diplomatic and economic sanctions have been rarely done on the part of international organizations (Ajili & Moghaddam, 2013).

Since the Islamic Revolution of 1987, Iran has been among the countries affected by economic sanctions imposed by Western countries, especially the U.S. However, the effectiveness of the sanctions imposed against Iran has always been questioned due to the fact that other countries have not accompanied the U.S. in this respect. Since 2006 and with the development of the Iranian nuclear conflict, the United Nations has frequently imposed economic and financial sanctions against Iran (Katzman, 2015). As a result of these international restrictions and their administration by an international organization, Iran's economy has been heavily influenced in a way that Iran's crude oil exports have dropped from 2.5 million barrels per day in 2011 to 1.1 barrels in 2013. Accordingly, Iran's

economy has declined by 5 percent in 2013 due to the limitations imposed on the private sector (Katzman, 2015).

Iran is one of the countries that have been the target for economic sanctions in recent years. Economic sanctions have been the promotion of democracy and human rights and this tool could be used against countries that have dictatorship or coup-oriented governments or governments different from the ones elected by the people; nonetheless, the employment of this instrument by Western countries is selective. Due to the high political and economic costs placed on stable regimes as a result of sanctions, Western countries tend to put more pressure on vulnerable countries (Dizaji and van Bergeijk, 2013).

This tends to put Nigeria and Iran at par. In the West African subregion, Nigeria is a hegemon of some sort, globally it is referred to as the giant of Africa and except South Africa in terms of its economy Nigeria has no rival as a regional bloc leader. Thus, the two countries can tangle and make the best out their relationship that has seen decades of close and friendly ties.

Studies and researches on the bilateral relations between Nigeria and Iran trade are very scanty. In fact, aside from few journalistic write-ups on issues involving both countries in newspapers and magazines, there is virtually no research by scholars in terms of constructive studies and researches that focuses solely on the effect of economic sanctions on trade between Iran and Nigeria.

This study attempts to outline the impacts of economic sanctions on Iran-Nigeria trade not relations. In addition, this research aims to explore how GDP, exchange rate, strong and weak sanctions influence the bilateral trade between Iran-Nigeria. A study on the impact of economic sanctions on Iran-Nigeria trade can help researchers gain insights into the specific mechanisms through which these restrictions affect trade flows, including changes in prices, quantities, and market structure. It can also help businesses and investors to better understand how sanctions can affect trade flows and allow businesses to make more informed decisions about investments, market entry, and risk management strategies. The recommendations derived from this study can be useful to enhance trade between Iran and Nigeria or other countries for economic growth and development.

Sanction

Sanctions refer to a range of measures that can be taken by one country or group of countries against another as a means of encouraging a change in behavior. Sanctions can take many different forms, including economic sanctions (such as trade embargoes or restrictions on financial transactions), travel bans and asset freezes on individuals, or diplomatic measures (such as the downgrading of political ties or the withdrawal of ambassadors. Sanctions are measures taken by states or international organizations to exert pressure on another state or entity to comply with international law, norms, or policies" (United Nations, 2020).

Targeted sanctions can be more effective at achieving their objectives while minimizing unintended consequences (Drezner, 2019).

Strong Sanction

Strong sanctions encompass a range of measures employed by countries or groups of countries to discourage or penalize undesirable behavior. These sanctions can take various forms, including economic, diplomatic, and military measures (Congressional Research Service, 2019). Recent examples of strong sanctions include the United States' economic sanctions on Iran, which have had a significant impact on Iran's economy; the European Union's sanctions on Russia in response to its actions in Crimea and Ukraine; and the United Nations' sanctions on North Korea due to its nuclear weapons program (Congressional Research Service, 2019).

In the short term, strong sanctions can lead to reduced trade and investment, limited access to vital resources and technologies, and increased costs for affected businesses and consumers. This can result in economic decline, job losses, and inflation. The uncertainty generated by sanctions may also cause financial market instability, currency devaluation, and capital flight (Congressional Research Service, 2019). Over the long term, the consequences of strong sanctions may become even more severe. Infrastructure damage, brain drain as skilled workers emigrate, reduced foreign investment and technology transfer, and an unfavorable business environment can all hamper economic competitiveness and growth (Congressional Research Service, 2019).

It is important to recognize that the impact of strong sanctions on an economy can vary depending on specific circumstances, including the targeted country's size and economic structure, the severity and duration of the sanctions, and its ability to adapt to the imposed changes (Congressional Research Service, 2019).

Weak Sanction

Weak sanctions are measures taken to punish a country for violating international laws or norms, but they often have limited impact and may not effectively change the behavior of the targeted country (The Balance, 2021). Examples of weak sanctions include targeted economic measures that focus on specific industries or individuals, travel bans on government officials, and limited diplomatic actions like expelling ambassadors (The Balance, 2021). These types of sanctions are considered weak because they do not disrupt the lives of ordinary citizens in the targeted country and do not impose significant costs on the government or its leaders (The Balance, 2021).

Several recent examples of weak sanctions include those imposed on Russia for its annexation of Crimea, on North Korea for its nuclear weapons program, on Iran to limit its nuclear program, on Syria for the ongoing civil war, on Myanmar following the military coup, and on Venezuela to address human rights abuses and restore democracy (The Balance, 2021). While some of these sanctions have

had economic impacts, they have been criticized for not effectively changing the behavior of the targeted countries or resolving the conflicts (The Balance, 2021). Weak sanctions may not have a significant impact on the economy compared to stronger sanctions (The Balance, 2021). They may not deter the targeted behavior effectively and can result in continued economic harm, affecting businesses, individuals, and entities involved in the affected industry or sector (The Balance, 2021). Additionally, weak sanctions may have limited effects on international trade and commerce, reducing their effectiveness in achieving desired policy outcomes (The Balance, 2021). It is important to acknowledge that weak sanctions can still have negative consequences if they are insufficient to deter harmful behavior or gain respect from the targeted entities (The Balance, 2021).

Economic Sanctions

Economic sanctions are penalties or restrictions imposed by one country, group of countries, or international organization on another country, group of countries, or individual entities with the aim of pressuring them to change their behavior or policies, comply with international norms, or face isolation from the global economy (World Bank, 2017). These sanctions can take various forms, including trade embargoes, asset freezes, financial restrictions, travel bans, and diplomatic measures.

While economic sanctions can have some impact on the targeted country's economy, they often fail to achieve their intended goals of changing the behavior of the targeted government (Congressional Research Service, 2020). Instead, they can lead to unintended consequences such as an increase in human rights abuses, a higher risk of violence, and harm to the civilian population, including limited access to basic needs such as healthcare and food (Cortright & López, 2015; Lektzian & Sprecher, 2020; UNOCHA, 2021).

Studies have also shown that economic sanctions can have limited overall impact on the target country's economy due to its ability to adapt and find alternative sources of revenue (European Parliament, 2020). The complexity of the impacts of economic sanctions highlights the need for policymakers to carefully consider the likely consequences of sanctions before imposing them and to evaluate their effectiveness over time.

These economic sanctions can make the target country vulnerable, leading to economic losses, declining exchange rates, inflationary pressures, declining assets, rising interest rates, and reduced foreign direct investment (Askari et al., 2005; Pettinger, 2022). While economic sanctions do not involve the destruction of infrastructure or human capital like military warfare, they can have similar consequences for the well-being of people in the target economy (Allen & Lektzian, 2013). Additionally, economic sanctions can disproportionately harm innocent civilians and burden firms participating in international trade (Kaempfer & Lowenberg, 2007).

In conclusion, economic sanctions are a widely used foreign policy tool with the aim of pressuring targeted countries or entities to change their behavior. However, their effectiveness in achieving their intended goals is often limited, and they can have unintended negative consequences. Policymakers must carefully consider the impacts of sanctions and evaluate their effectiveness over time, taking into account the potential harm to innocent civilians and broader political instability.

Impact of Economic Sanctions

Research indicates that economic sanctions have significant negative effects on international trade. These sanctions restrict or prohibit the movement of goods, services, and capital between countries and are often imposed for political leverage or as a form of punishment (Fontanelle et al., 2017). Studies have found that economic sanctions reduce trade flows between targeted countries and both sanctioning countries and third-party countries (Mohammadi & Gasiorowski, 2015; Francois & Manchin, 2013). The imposition of sanctions on Iran, for example, led to a significant reduction in exports, imports, and foreign exchange earnings, as well as negative impacts on the labor market (Doroudian et al., 2020).

Furthermore, research demonstrates that GDP of target nations tends to decrease following the imposition of sanctions and may not fully recover even after the lifting of sanctions (Gutmann et al., 2021; Neuenkirch & Neumeier, 2015; Kwon et al., 2020). Trade flows are also affected, with comprehensive sanctions having a larger impact on reducing bilateral trade compared to trade sanctions alone (Afesorgbor, 2018). Essential goods like food, animal products, and medical supplies are particularly vulnerable to the effects of economic sanctions, leading to increased infant mortality, infectious diseases, and malnutrition in some cases (Hufbauer et al., 2007).

The impact of economic sanctions extends beyond trade and GDP. The Venezuelan case highlights how sanctions can severely affect people's livelihoods and health by depriving the economy of foreign currency and restricting access to necessary imports, including food and medicine (Weisbrot & Sachs, 2019). Sanctions have been associated with increased mortality rates, limited access to medications and treatment, and heightened poverty levels (ENCOVI, Alnasrawi, 2001; Neuenkirch & Neumeier, 2016). In Iraq, sanctions resulted in lower food and living standards, high unemployment rates, and a significant brain drain (Alnasrawi, 2001).

In summary, economic sanctions have significant and wide-ranging negative effects on international trade, GDP, access to essential goods, and the well-being of affected populations. These impacts vary depending on factors such as the severity and duration of sanctions and the specific characteristics and geopolitical context of the targeted countries.

Iran and Economic Sanctions

The discovery of Iran's nuclear activities in 2003 led to international calls for Iran to halt its program. Sanctions were imposed on Iran, and despite the signing of the JCPOA in 2015, tensions have persisted, with the United States withdrawing from the agreement in 2018 and reimposing sanctions. Efforts are currently underway to negotiate a return to compliance with the JCPOA and ease economic sanctions on Iran.

In 2003, Iran's nuclear technology and uranium enrichment projects were discovered by the International Atomic Energy Agency (IAEA), leading to calls from the IAEA, the European Union, and major powers like the United States, China, and Russia for Iran to halt its nuclear activities (Jacobson, 2008). However, Iran did not respond forcefully, resulting in tensions between Iran and the international community (Jacobson, 2008). As a response, the United States imposed sanctions on Iranian banks in 2006 and restricted their access to the U.S. financial system (Ataev, 2013). Over time, multiple rounds of sanctions were imposed on Iran, including restrictions on trade in petroleum products and investments in the oil and gas industry (Caruso, 2003; UNSC, 2008).

In 2015, Iran signed the Joint Comprehensive Plan of Action (JCPOA) with the United States, European Union, and other world powers. The agreement aimed to lift sanctions on Iran in exchange for its agreement to limit its nuclear program (Ianchovichina et al., 2015). However, in 2018, President Donald Trump withdrew the United States from the JCPOA and reinstated sanctions on Iran, leading to increased tensions and attacks in the region (Gordon & Sanger, 2015). Since then, there have been ongoing efforts by various parties, including President Joseph Biden, to negotiate a return to compliance with the JCPOA and ease economic sanctions on Iran (Rennack, 2022).

Impact of Economic Sanctions on Iran

Iranian oil production and exports decreased from 3.8 million and 2.4 million barrels per day to 2.3 million to 2.7 million and 0.9 million to 1 million barrels per day, respectively, between 2011 and 2015 (see Table 2.1). The most difficult period for Iran's economy was from 2012 to 2015 (from the EU's endorsement of Iran's oil embargo to the nuclear deal). Iran's oil revenues plunged by almost 50% in 2013, a year after the EU's oil trade embargo was put in place, and by 70% in 2015, as a result. This sharp decline inevitably resulted in a budget deficit in Iran, which heavily depended on the inflow of petrodollars. Iran's GDP growth in 012 was estimated at -7.4%, official inflation was 26%, and annual consumer price inflation exceeded 32%. Inflation continued to rise, and in 2016.

Table 0.1. Selected Economic Indicators for Iran, 2012-2021.

Year	Annual GDP growth, %	Consumer price growth (2012-100%)	Annual inflation rates, %	Volume of oil exports, mn barrels per day	Net oil export revenues (current prices, USD bn)
2012	-7.4	152	26	2.1	69.76
2013	-0.2	212	39	1.2	49.85
2014	4.6	248	17	1.1	51.74
2015	-1.3	282	14	1	29.98
2016	13.4	306	8.6	1.9	37.55
2017	3.8	337	10	2.2	55.34
2018	-6.0	394	18	1.5	66
2019	-6.8	551	40	0.651	30
2020	3.4	n/a	30.6	0.404	21
2021	4.1	n/a	40	0.81	25

Government initiatives to develop Iran's oil, gas, and petrochemical industries have been hindered by a lack of budgetary funds. The country's investment in the oil sector decreased from $21 billion in 2012 to $17 billion in 2013, and experts believe that without the signing of the JCPOA in 2015, Iran's oil exports would have only generated $30 billion. As a result, some oil fields and infrastructure projects have been delayed or shelved. However, if successfully implemented, a plan is expected to increase Iranian oil production from 600,000 to 700,000 barrels per day.

Between 2012 and 2013, Iran faced significant economic challenges, including high exchange rate volatility and the devaluation of the Iranian rial. The Central Bank of Iran was forced to devalue the currency due to its excessively high value, leading to a sharp increase in the exchange rate between Rials and US dollars. This resulted in socioeconomic shocks, including civil unrest and an increase in poverty rates. Despite these difficulties, there were signs of economic stabilization between 3 and 2015, with positive GDP growth and a decline in inflation. However, the economy contracted again in 2018, with high inflation remaining a persistent issue.

Trade

Trade has a significant impact on economies, both positively and negatively. The World Trade Organization (WTO) defines trade as the exchange of goods and services between countries and provides a platform for countries to negotiate and resolve trade disputes (WTO). Empirical evidence suggests that trade has been an important driver of growth for many countries, allowing businesses to take advantage of economies of scale and consumers to benefit from access to a wider range of products at lower prices (Irwin, 2002). The IMF also highlights the benefits of trade, including economic growth, efficiency, and access to a greater variety of goods and services at lower costs (IMF). However, trade can also have negative consequences such as job losses, environmental degradation, and concerns about inequality and social justice (Bhagwati, 2004).

Positive effects of trade include increased competitiveness, as businesses can compete in a global market and drive innovation and productivity. Trade opens up new markets for goods and services, allowing businesses to expand their customer base and increase sales. Additionally, trade can lead to lower prices and a greater variety of products for consumers, as well as attract foreign investment, creating jobs and stimulating economic growth.

On the other hand, trade can result in job losses in industries that struggle to compete with cheaper imports. Increased trade can contribute to environmental degradation due to increased production and transportation. Heavy reliance on imports can make economies vulnerable to global market fluctuations, and trade can also exacerbate income inequality within countries, as the benefits of trade may not be evenly distributed among different groups.

Impact of Economic Sanction on Trade

Dizaji (2018), Yang et al. (2004), Caruso (2003), Kohl and Reesink (2019), and Felbermayr et al. (2020) have conducted studies on the effects of sanctions on trade, with a particular focus on Iran. Their findings suggest that sanctions have had both beneficial and negative impacts on trade. In the case of Iran's agricultural trade with the European Union (EU), the sanctions have positively affected Iran's agricultural product exports to EU nations, although imports from those countries have experienced a minor decrease (Dizaji, 2018). Additionally, Felbermayr et al. (2020) estimate that during full episodes of bilateral sanctions, there is a potential average reduction in bilateral trade between sending and receiving countries of 85%, and during bilateral trade sanctions only, the reduction is estimated to be 17%.

However, the impact of sanctions on trade flows between the United States and the sanctioned countries has been relatively small according to Yang et al. (2004). Nonetheless, Hinz (2017) estimated that trade losses resulting from sanctions against Iran, Russia, and Burma would amount to approximately $50 billion, equal to 0.4% of global trade. Sanctions can hinder trade by depriving the targeted nation of capital, money, and credit, thus raising the cost of borrowing (World bank, 2020). Additionally, transportation sanctions can make it more challenging to find carriers willing to transport cargo.

Iran, located in western Asia, has a diverse economy with major industries including oil and gas production, agriculture, and manufacturing. The country possesses rich natural resources and has a population estimated to be around 85 million people (World bank, 2020). Iran's history dates back thousands of years, and it has a vibrant culture, notable for its art, literature, architecture, and music. Persian (Farsi) is the official language, and the majority of Iranians practice Islam, with the largest denomination being Shia. Iran has faced economic sanctions from various Western nations due to concerns over its nuclear program

and has been involved in regional conflicts and tensions with neighboring countries (World bank, 2020).

In conclusion, studies on the effects of sanctions on trade highlight both the positive and negative impacts, particularly in the case of Iran. The country's diverse economy and rich cultural heritage contribute to its standing in international politics and regional dynamics. Sanctions pose challenges to trade by limiting access to financial resources and transportation options.

Iran-Nigeria Trade Relations

The economic relationship between Iran and Nigeria has been established since the early 1960s when diplomatic ties were first established. Over the years, the two countries have maintained cordial relations and engaged in various trade activities (Tehran Times, September 26, 2019). In 2019, Nigeria imported goods worth 90 million from Iran, including items such as bitumen, chemicals, and plastics, while Nigeria′sexportstoIranwerevaluedat3.2 million and mainly consisted of agricultural and food products like tanned leather and frozen fish (Tehran Times, September 26, 2019). However, trade between the two countries has been impacted by international sanctions imposed on Iran by the United States and other Western countries, limiting Iran's ability to engage in international trade, including with Nigeria. Despite these challenges, both Iran and Nigeria have expressed a desire to strengthen their economic ties, particularly in the energy sector, but it remains to be seen how these efforts will progress in the future (Tehran Times, September 26, 2019).

The bilateral relations between Iran and Nigeria have been influenced by various factors. Iran's involvement in the Shiite movement in Nigeria can be traced back to Ibrahim El-Zakzaky, whose desire for an Iranian-style revolution in Nigeria has led to Iranian funding and support for his activities (Nasr, 2017). However, there has been limited academic research on the relationship between the two countries, and newspaper articles tend to portray Iran negatively, except for stories about official exchanges (Nasr, 2017). Some critics have argued that Iran has betrayed Nigeria's trust through actions such as the discovery of arms and ammunition linked to Iran and the uncovering of an Iranian terror network in Lagos (Onoja, 2013). Nevertheless, there have been instances of cooperation, such as Iranian officials visiting Nigeria to discuss improving trade ties, especially in the mining industry (Adegbite, 2017).

The political and economic relationship between Iran and Nigeria can have a significant impact on their trade dynamics. Political tensions or conflicts between the two countries could lead to trade restrictions or disruptions, while positive relations could result in increased trade opportunities. Therefore, maintaining positive diplomatic ties and exploring trade partnerships is essential for enhancing economic cooperation between Iran and Nigeria.

Iran-Nigeria Bilateral Trade

Nigeria and Iran have a longstanding bilateral relationship, being members of various international organizations such as the Nonaligned Movement, OPEC, OIC, D-8, and GECF. Iran is seen as a role model for developing countries due to its experience in the 1979 Islamic revolution and its commitment to sharing its expertise with Nigeria in the fight against terrorism. During a visit to Abuja, Iranian Foreign Minister Mohammed Javad Zarif emphasized the importance of expanding economic relations and cooperation in counterterrorism efforts. Nigerian President Muhammadu Buhari praised Iran's achievements in economic, social, and technological areas, as well as its skillful negotiation in overcoming sanctions through the JCPOA. Iran's international capabilities, particularly in nuclear power and scientific development, surpass those of Nigeria, which still lags behind in these areas. Both countries possess significant oil and gas reserves, but Iran has effectively utilized its resources for infrastructure development, while Nigeria struggles with high prices, inadequate infrastructure, and unreliable power supply

Economic sanctions particularly from the US notwithstanding, Iran's revolutionary government had remained bluntly determined to pursue a nuclear weapons program, and its corresponding designs for projecting military power in the Middle East, particularly in the Persian Gulf region. With Iran out of economic sanctions, the country seems to have returned to regional reckoning and although it is not an Arab country, Iran's large geographic and economic size makes it a very influential player both economically and politically in the Middle East (DeRosa and Hufbauer, 2008). It has progressively made its way into the regional security equations and has become a force to be reckoned with in the region. According to its foreign minister, Muhammad Javad Zarif, Iran has successfully managed to bring itself to the core of regional security equations. In his words, "When I took office in the eleventh administration (August 2013 to August 2017), we were not given a place in any regional security negotiations. Today, however, Iran is a leg of any security talks in the region" (Tehran Times, 2017). This tends to put Nigeria and Iran at par. In the West African subregion, Nigeria is a hegemon of some sort, globally it is referred to as the giant of Africa and except South Africa in terms of its economy Nigeria has no rival as a regional bloc leader. Thus, the two countries can tangle and make the best out their relationship that has seen decades of close and friendly ties.

Gross Domestic Product (GDP)

According to the World Bank, Iran's Gross Domestic Product (GDP) in 2020 was US$484.98 billion. This represented a decrease from the previous year, as the GDP in 2019 was approximately $572.17 billion USD. The decline was largely due to the impact of COVID-19 and associated restrictions on economic activity (World Bank, 2020).

According to the same source, in terms of purchasing power parity (PPP), the GDP of Iran was approximately $1.66 trillion USD in 2020. PPP takes into account differences in the cost of living and provides a more accurate comparison of economic output across countries.

According to the World Fact book, Iran the largest sector of the Iranian economy is services, which accounts for around 50% of GDP. Industry and agriculture make up the remainder, with industry contributing around 30% and agriculture contributing around 10%. Oil and gas production is a significant component of the Iranian economy, accounting for around 25% of GDP and over 70% of export earnings. The GDP of Iran is primarily driven by the oil and gas industry, which accounts for a significant portion of the country's exports. As such, fluctuations in global oil prices can have a direct impact on Iran's GDP and overall economic health. For example, when oil prices are high, Iran's GDP tends to increase, while low oil prices can lead to a decrease in GDP.

According to research on Iran Economic Outlook, Iran is a resource-rich country with a large oil and gas sector that accounts for a significant portion of its GDP and government revenues. As such, changes in global oil prices can have a major impact on Iran's economy. For instance, during periods of high oil prices, Iran's GDP tends to grow rapidly, while during periods of low oil prices, its GDP growth can slow down significantly (FocusEconomics, April 2021).

In addition to its oil and gas sector, Iran's economy also depends on other sectors such as agriculture, manufacturing, and services. The performance of these sectors can also affect the country's GDP and overall economic growth.

However, as I previously mentioned, sanctions have limited Iran's ability to fully capitalize on its oil and gas resources.

On the other hand, Nigeria's Gross Domestic Product (GDP) is a key indicator of the overall health of its economy. GDP measures the total value of goods and services produced in the country over a specific period, usually a year. A higher GDP generally indicates that the economy is growing, while a lower GDP could indicate that the economy is struggling or contracting.

According to the World Bank, Nigeria's GDP (Gross Domestic Product) was $448.12 billion in 2019. The Nigerian economy is one of the largest in Africa and is heavily reliant on its oil sector, which accounts for around 90% of its export earnings (World Bank, 2019).

According to research on Understanding Economic Growth and Development, Nigeria has a large population and a significant number of natural resources, including oil. As a result, the country's GDP has historically been driven by its oil sector, which accounts for a sizeable portion of the country's exports and government revenues (African Development Bank, June 12, 2023).

However, Nigeria's economy is relatively diversified, with other sectors such as agriculture, manufacturing, and services contributing to the country's GDP.

Therefore, changes in the performance of any of these sectors can affect Nigeria's overall GDP.

A nation's imports and exports are correlated with its GDP. Through their effects on competition, imports raise productivity. Through reorganization and the eradication of inefficiencies, competitive pressures encourage internal improvement and offer incentives for innovation (Grossman & Helpman, 1991:525). Similar to this, Werner Kristjanpoller and Olson (2014) demonstrated that exports fuel the growth of the gross domestic product (GDP). Hallaert (2014) notes that imports increase GDP directly by boosting productivity and indirectly by improving export performance. In their 2015 study, Saaed and Hussain looked at how imports and exports affected Tunisia's economic growth from 1977 to 2012. Granger's causality and Johansen's cointegration approaches were used in this study to analyse long-term relationships. By employing the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) stationarity tests, they discovered that Granger economic growth causes imports. This suggests that exports and economic growth have a one-way causal relationship with respect to imports and vice versa. These findings suggest that both growth-oriented import strategies and imports focused on exports were responsible for Tunisia's economic expansion. The relationship between imports, exports, and economic growth in India was not found to be long-term in Mehta's (2015) analysis of the data. Granger's causality test revealed that while GDP causes an increase in exports, exports do not cause economic growth.

Gross Domestic Product, or GDP, is a statistic that expresses the monetary value of all goods and services that are purchased by the final consumer and produced domestically over the course of a given time period (e.g., quarterly or yearly) (Callen, 2008). It is calculated using the national currency of each country and is the most significant indicator of these economic activities. We must translate these estimates into a common currency, typically the United States Dollar (USD or US$), in order to compare the GDP of different nations. Current exchange rates are frequently used in conversions, which can result in inaccurate comparisons of the actual amounts of final goods and services in GDP (OCED, 2009).

"Gross" means that production costs do not include the depreciation of equipment, structures, or other capital goods. "Domestic" refers to production carried out by the nation's resident institutional unit. "Product" refers to the finished goods and services that governments, non-profit organizations that provide services to households, and households ultimately purchase, attribute, or otherwise acquire for their own use. In addition, exports (less imports) and capital assets.

In 2021, Nigeria's economy experienced a growth rate of 3.6% following a contraction 1.8% in the previous year. This growth was driven by a 4.4%

expansion in the non-oil sector, particularly in agriculture (2.1%) and services (5.6%), while the oil sector contracted by 8.3%. Public and private consumption contributed to the increase in GDP, and per capita income grew by 1.0%. The fiscal deficit decreased to 4.8% of GDP, financed through borrowing, and public debt stood at $95.8 billion, equivalent to 22.5% of GDP. Inflation remained high at 17.0%, driven by food price increases and exchange rate pass-through. The central bank maintained a policy rate of 11.5% to support economic recovery. The current account deficit narrowed to 2.9% GDP, aided by improved oil receipts and disbursement of the SDR allocation. However, poverty and unemployment rates remained high 40% and 33.3% respectively. Looking ahead, economic growth is expected to slow down an average of 3.2% during 2022-23 due to low oil production and rising insecurity. Inflation is projected to remain elevated, and capital inflows and oil exports are expected to recover slightly. However, infrastructure deficiencies and security challenges may offset the positive impact of higher oil prices on exports. The fiscal deficit is anticipated to narrow to an average of 4.5% of GDP with improved revenue collection.

Exchange Rate

Exchange rates determine the value of one country's currency relative to another and are influenced by economic conditions, political events, and market sentiment (The Balance, 2021). Exchange rates play a crucial role in international trade, investment, and tourism, with fluctuations impacting trade patterns (The Balance, 2021).

Research using a gravity model approach suggests that while exchange rate movements do affect trade, their influence is relatively small compared to factors like income and distance (Bénassy-etel, 2010). Thus, understanding the complex relationship between exchange rates and trade requires considering multiple factors (Bénassy-etel, 2010). It is crucial for policymakers to carefully monitor and manage exchange rate movements to minimize adverse impacts on international trade (The Balance, 2021).

The exchange rate between Iran and Nigeria significantly influences their trade relationship. Fluctuations in the exchange rate affect the relative prices of goods and services traded between the two countries, potentially impacting demand (IMF, 2019). For example, if the Nigerian Naira appreciates against the Iranian rial, Nigerian goods become relatively more expensive for Iranian buyers, potentially reducing demand (IMF, 2019). Additionally, economic sanctions imposed on Iran by the United States have further affected trade between Iran and Nigeria (Ibeh, 2020). Consequently, the exchange rate and other factors like sanctions shape the volume and direction of trade flows between the two nations (Ibeh, 2020).

Models of International Trade

There are several models of international trade that have been developed to explain trade patterns between countries. The Ricardian model, first proposed by

David Ricardo in 1817, is based on the concept of comparative advantage, where countries specialize in producing goods they can produce most efficiently and then engage in trade for goods they cannot produce as efficiently (Investopedia, 2023). The model considers factors of production such as land, labor, and capital, and suggests that differences in factor endowments lead to comparative advantage in specific goods and services (Investopedia, 2023).

The Heckscher-Ohlin model, developed by Heckscher and Ohlin in the early 20th century, explains trade patterns based on differences in factor endowments between countries (Wood & Mayer, 2001). It assumes that countries have varying levels of factors such as labor, capital, and land, and that goods can be produced using different combinations of these factors. Countries will specialize in and export goods that use their abundant factors intensively and import goods that use their scarce factors intensively (Jellinger et al., 2017).

Both the Ricardian and Heckscher-Ohlin models provide frameworks for understanding international trade patterns. The Ricardian model focuses on comparative advantage based on relative productivity, while the Heckscher-Ohlin model emphasizes factor endowments and specialization (Morrow, 2020). These models help identify potential gains from trade and can guide policymakers in promoting cooperation and collaboration between countries (Lundahl, 2022).

In the case of Iran and Nigeria, the Ricardian model suggests that each country could have a comparative advantage in specific sectors. Iran, being rich in oil and gas resources, could specialize in the production and export of these energy products. On the other hand, Nigeria, with significant reserves of minerals like tin and iron ore, could focus on these natural resource exports. By specializing and trading in their respective areas of comparative advantage, both countries could potentially increase their economic output and welfare (Nonejad & Zamani, 2013).

While the Ricardian and Heckscher-Ohlin models provide valuable insights, it's important to consider other factors that can influence trade patterns, such as transportation costs, technological differences, political barriers, and exchange rates (Capello, 2015). Additionally, challenges related to infrastructure, political instability, and fluctuations in the global energy market should be taken into account when analyzing the potential benefits of trade between Iran and Nigeria (Faccerelo, 2015). Nevertheless, these models offer a useful analytical framework for policymakers to consider when exploring opportunities for trade cooperation and maximizing mutual benefits.

Gravity Model of Trade

In 1954, Walter Isard introduced the Gravity Model of Trade, which proposes that countries engage in trade to exchange goods and services they cannot produce domestically or produce at a lower cost than their trading partners. According to the model, trade flows are influenced by bilateral GDP and are

inversely related to distance. Research has shown that trade declines as distance increases. Factors such as shared borders, languages, legal systems, currencies, colonial legacies, and trade agreements influence bilateral trade flows, analogous to the concept of gravitational and drag forces in Newtonian physics. The model expresses the attraction force mathematically as

$$F_{ij} = G \cdot \frac{M_i M_j}{D_{ij}}.$$

Where G is a constant, F is the force of attraction, D is the distance, and M represents the mass dimensions of the objects being measured (Little, 2023).

The implications of the Gravity Model of Trade are significant. Firstly, the model suggests that larger economies have an advantage in trade due to their greater resources and more efficient production capabilities, making them attractive trading partners. Secondly, proximity plays a vital role in determining trade levels between countries. Geographically closer nations tend to engage in more trade as they may share similar cultures or languages, resulting in easier business transactions and lower transportation costs. Thirdly, the model implies that policies aimed at reducing trade barriers, such as tariffs or regulations, have the potential to bolster trade flows by lowering the costs associated with international exchange (Little, 2023).

Materials and Method
Research Method
The impact of economic sanctions on the overall economy, trade, and economic growth have been analyzed and calculated using a variety of different methodologies in various studies. The most well-known and significant techniques are the Consumer Surplus Model, Gravity Model, Offer Curves, and Game Theory Model as well as the Public Choice Model. The gravity model was used for our research analysis.

The Model
The gravity approach is employed in this study to explain how economic sanctions affect trade between Iran and Nigeria. The gravity equation-based empirical evidence supports the hypothesis that geographic factors and country size are related to bilateral trade flows. It is claimed that bilateral trade is specifically positively correlated with country size and negatively correlated with distance between countries.

The origin of the gravity equation, which has been used for decades in international trade, goes back to the law of gravity in physics developed by Newton in 1687. In the 1860s, this law was appropriated by H. Gary from physics into the study of human behavior. Gravity models were first used in relation to international trade by Tenbergen in 1962. Later, Poyhonen (1963) examined the general patterns of bilateral trade flows among European countries. The gravity equation in international trade is one of the most important empirical

findings of econometrics which provides the possibility of estimating bilateral trade flows at a particular time and simultaneously from the perspectives of both the exporting and importing countries (H. Gary). Linnman (1966) generalized the gravity model that was proposed by Tenbergen and added explanatory trade variables such as population to the basic model. In the simplest form, the gravity equation can be expressed as follows:

$$T_{ij} = F(GDP_i,\ GDP_J,\ DIS_{ij}) \qquad (3.1.1)$$

We are aware that the GDP and population of two countries are directly correlated with the volume of their imports and exports, and that their distance from one another is inversely correlated with their distance. Based on this, using the fundamental Tinbergen and Linman model and Newton's general law of gravitation in physics, we can rewrite function number 3.1.1 as

$$T_{ij} = A\frac{(Y_i.Y_J)^\alpha}{Dij^\lambda} \qquad (3.1.2)$$

Trading volume, Tij The geographic separation between two nations, i and j, is called Dij. Distance between two countries taking into account factors like: It displays the separation between two major cities, the separation between two ports, the travel time, and the cost of transportation. The two exporting and importing countries' populations are used as explanatory variables in the formula. On the basis of this, relation (3.1.2) is written as relation (3.1.3) .

$$T_{ij} = A\frac{(P_i.Y_J)^\alpha (P_j.Y_J)^\beta}{Dij^\lambda} \quad or \quad T_{ij} = A\frac{(Y_i.Y_J)^\alpha (P_i.P_J)^\beta}{Dij^\lambda} \qquad (3.1.3)$$

Taking the logarithm equation from both sides provides the following equation:

$$\log T_{ij} = A^* + \alpha \log(Y_i.Y_J)$$
$$+ \beta \log(p_i.p_J) + \lambda \log(D_{ij.}) + \varepsilon_{ij} \qquad (3.1.4)$$

The population Pi of country i and the population Pj of country j are represented by the logarithm of A in 3.1.4, A*.,, and are estimated parameters, and is a component of the perturbation to the normal distribution. The fundamental gravity model is supplemented with a set of sanctions "dummy variables" to simulate the effects of economic sanctions. These dummies are intended to document the "aftermath" or "afterlife" of sanctions. The model or pattern previously employed by Frank Jonas (2017:5) is adopted by adding a dummy variable for sanctions as follows:

$$\ln(Tijt) = \beta 1\ln(Yit) + \beta 2\ln(Yjt) + \beta 3\ln(Dij) + \beta 4 sancijt + \beta 4 rtaijt + \gamma Xij + \varepsilon_{ijt} \qquad (3.1.5)$$

Utilising logarithms, the original multiplication function was changed to reflect the value of imports from shipper j to destination i during the year t. The GDPs of countries i and j in year t are represented by Yit and Yjt, respectively. The geographical separation between two trading nations is known as dij, and it is roughly represented by the distance between their two largest cities, weighed by the population of each city. If country j-imposed sanctions on country i during

year t, the sanction dummy sancijt would have the value 1, otherwise it would have the value 0.

The three main sources of sanctions—the United States, the European Union, and the United Nations—are divided into groups based on (Capello, R. (2015).) in order to distinguish the severity impact of various types of sanctions. Weak sanctions, moderate sanctions, and heavy sanctions are typically separated into three categories based on the strength of the sanctions imposed on Iran. Also included is a dummy rtaijt that captures active regional trade agreements (RTAs). Xij contains a vector of common time-invariant dummy variables for common language, neighborhood, and colony ties. Finally, $ijt.$ is used to represent the error term.

Regression

The final representation of the error term is b.Regression analysis is a statistical method for assessing the degree of correlation between a dependent variable (typically represented by Y) and one or more independent variables (typically represented by X). Ordinary least squares (OLS) or simple lbinear regression (SLR) is the process of permuting the relationship between dependent and independent variables. Multiple regression analysis is the procedure used to examine the relationship between a dependent variable and a number of independent variables. y εijt.

Simple linear regression:

$$Y = a + bX + u \qquad\qquad (3.1)$$

Multiple linear regression:

$$Y = a + b1X1 + b2X2 + b3X3 + ... + btXt + u \qquad\qquad (3.2)$$

Where:

Y is the dependent variable that you are attempting to explain or predict.

b= (beta coefficient) represent the slope of the explanatory variable(s)

u=the error term or regression residual

This is how the gravity model is represented.

Estimating The Model

The gravity model has the following log-linearized form at its most basic level, which is discussed here for estimation using ordinary least squares:

$$\text{Log } Xij = b0 + b1 \log GDPi + b2 \log GDPj + b3 \log \tau ij + eij \qquad\qquad (3.2.1)$$

Where the random error term (error) eij was added. The objective of this econometric problem is to estimate the unknown b parameter. Ordinary least squares (OLS) is an appropriate place to start. The line of best fit used to depict the association between trade and GDP or trade and distance has an econometric equivalent in this case. OLS reduces the sum of squared errors, as the name suggests. OLS has parameters that are not only visually appealing, but also have useful statistical properties that let us test hypotheses and draw conclusions under specific assumptions about the error term eij. Provide. Send a cost projection. What circumstances lead to the statistical significance of OLS estimates from

gravity models? Three necessary and sufficient conditions are established by fundamental econometric theory:

The errors eij need to have a mean of 0 and be unrelated to any explanatory factors (orthogonality assumption).

The error eij is displayed independently of a normal distribution with equal variances and a given (fixed) variance.

The full rank assumption states that none of the explanatory variables are linear combinations of other explanatory variables.

The OLS estimation is consistent, unbiased, and effective within its class of linear models if all three of these conditions are satisfied. Consistent refers to the fact that as sample size grows, the estimates of the OLS coefficients tend to converge towards population values. Even if they are based on a sample rather than the entire population, unbiassed means that the OLS coefficient estimates do not consistently deviate from the population values. Being efficient means that there isn't another unbiased, linear estimator that can lower the estimated coefficients' standard errors. Once we have estimates of the OLS coefficients that satisfy assumptions 1-3, we can use them to test the hypotheses using data and models, using the t-statistic to test single parameter hypotheses (for example, distance elasticity of -1) and the F-statistic to test compound hypotheses on multiple variables (for example, both GDP coefficients equal 1), while also taking into account the serial correlation effect and the endogeneity of regressors resulting from the presence of covariates.

Fully Modified Ordinary Least Squares (FM-OLS)

Phillips and Hansen (1990) introduced the Fully Modified Least Squares Regression (FM-OLS) technique, which is designed to improve the estimation of cointegration regression models. FM-OLS addresses issues related to serial correlation and endogeneity by modifying the standard least-squares method. By incorporating lagged values of both the dependent and independent variables, FM-OLS captures the dynamic nature of the relationship between variables and reduces bias caused by heterogeneity. Additionally, the FMOLS estimator includes a correction factor for serial correlation in the errors, ensuring accurate estimation of standard errors and valid t-statistics. FM-OLS is particularly useful for modeling time series data that exhibit heterogeneity and serial correlation, offering more precise estimates of regression coefficients compared to OLS (Phillips & Hansen, 1990).

It is assumed that the linear regression model has the following mathematical form:

$$Y_t = B_1 + B X_t + U_t \qquad (3.3.1)$$

Y is a co-cumulative variable in general. With the assumption that there is no co-cumulative relationship between them, I(1) and X are a Kx1 vector of I(1)

regressions, and X follows the mana difference. The variable vector has the following definition in accordance with the long-term theoretical relationship:

$$\Delta X_t = \beta + \theta_t \qquad (3.3.2)$$

Where, the Kx1 vector of I(0) sets, and, the Kx1 vector of drift parameters. This approach to estimating B (B0, B1) by Phillips and Hansen is consistent even when U Xt and U are closed simultaneously. However, in general, the estimator's OLS asymptotic distribution is not standardized, making it typically invalid to infer the coefficients statistically using the t-statistic. It is advised to establish a correlation between U and take the values into account to solve this issue. The quasi-parametric FM-OLS method takes correlation into account.

It should be noted that the X vectors must not differ in value or accumulate in order for this method to be valid. The FM-OLS method requires co-accumulative relationships between a group of I (1) variables in order to produce long-term parameters.

Analysis
Unit Root Test

Unit root tests are statistical tests used to determine if a time series data set is non-stationary by examining the presence of a unit root. Different types of unit root tests, such as the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests, assess various aspects of the data. Stationary series have a constant mean and variance over time, while non-stationary series do not. The ADF test, commonly used, evaluates the significance of the coefficient on the first lag to accept or reject the null hypothesis of a unit root. The PP test considers autocorrelation and heteroskedasticity, while the KPSS directly tests for stationarity based on trend. However, unit root tests should be used alongside other diagnostic tools as they are not definitive. In this study, the researchers employed the augmented Dickey-Fuller test to investigate the stationarity of the variables.

Table 4.1: Result of Unit Root Test

Variables	Probability value	Dickey-Fuller Statistics	Critical Value			Stationary & Non-Stationary
			1%	5%	10%	
TRADE	0.0318	-2.247738	-2.886101	-1.995865	-1.599088	Stationary
GDP	0.0336	-2.216608	-2.886101	-1.995865	-1.599088	Stationary
Exchange rate	0.0139	-5.919771	-6.292057	-4.450425	-3.701534	Stationary
Strong sanctions (EXE1)	0.0088	-4.922476	-4.803492	-3.403313	-2.841819	Stationary
Weak sanctions (LIM1)	0.0153	-2.45751	-2.886101	-1.995865	-1.599088	Stationary

Cointegration Test

In data analysis, after conducting a unit root test to assess stationarity, the next step involves performing a co-integration test. Co-integration testing, such as the

Engle-Granger test, is used to examine the long-term relationship between variables. This statistical method determines if multiple time series variables have a stable equilibrium relationship despite short-term fluctuations, distinguishing between spurious correlations and meaningful relationships with economic and theoretical significance. The Engle-Granger two-step method is commonly used, involving unit root testing, differencing for stationarity, regression of one variable on the other(s), and testing residuals for stationarity. The Johansen test is an alternative approach that handles multiple variables and identifies the number of co-integrating present. Co-integration testing is particularly useful for financial and economic data that often exhibit non-stationarity and trends, confirming genuine long-run associations among variables.

Table 4.2: Result of Engle and Granger Cointegration Test

Variables	Probability value	Dickey-Fuller Statistics	Critical Value		
			1%	5%	10%
-4.133275	0.0572	-5835186	-4.246503	-4.246503	-3.590496

According to the table above, there is a long-run relationship between the variables at the probability value of 0.0572. This means that the error term is stationary at levels.

Results and Discussion
Model Estimations Results
In this study, the following gravity equation from Syed Murtaza Kazmi is adopted;

$(LnTRADEijt = \alpha Zi + \alpha Zj + \beta1\ Ln\ TGDPijt + \beta2lnRERijt + \beta3LnPOPijt + +\beta4EXE + \beta5\ LIM + \beta6EXE1 + \beta7LIM1)$

It is then modified into the following:

$LnTRADEijt = ai + aj + \beta1\ln(TGDPij) + \beta2EX\_RATEijt + \beta3EXE + \beta4\ LIM$

Operational definition of variables

$LnTRADEijt$ is the dependent variable. It is the amount of trade between Iran and Nigeria in US dollars at the time "t" taken from the World Bank database. The data is entered into the model in its natural logarithm form.

$Ln TGDPijt$ is a multiplication of GDP of Iran and Nigeria in US dollars and its natural logarithm form is used in the model to ensure stationarity. This shows the economic size of the countries and their production power. The larger the economic size with a greater production capacity, the higher the production at a lower cost, and as a result, it will have a comparative advantage in the international markets. The countries' exports will increase as well as the attraction of foreign goods. Therefore, it is expected that as the GDPs increases, the trade between the countries will increase.

$\beta2EX\_RATE$ =In the context of a study, the term "Ex_rate" refers to the exchange rate between two countries, namely Iran and Nigeria. The phrase "is the multiplication of the exchange rate of both countries taken in the natural logarithm form" means that the exchange rate value is calculated by multiplying the natural logarithm values of the exchange rates of the two countries.

The natural logarithm is a mathematical function that is often used to transform data to facilitate statistical analysis. By taking the natural logarithm of a value, we can convert it into a more linear scale, making it easier to work with mathematically. In this case, the natural logarithms of the exchange rates for Iran and Nigeria are multiplied together to derive the value of Exchange rate.

$B3EXE$ and $\beta4\ LIM$ = are the strong and weak sanctions imposed against Iran, respectively. These sanctions are usually imposed from the United States, the European Union and the United

Nations, which are included in the model in the form of dummy variable.

Table 4.3: estimation results of the gravity equation

Variables	Coefficients	Standard Deviation	T-Statistics	probability
LnTGDP	7.798255	0.215719	36.15006	0.0176
Exchange rate	-1.961118	0.081206	24.14999	0.0263
EXE	-1.182818	0.077057	-15.34984	0.0414
LIM	3.911100	0.1429812	27.35386	0.0233
C	-376.3591	11.56543	-32.26278	0.0197

From this table, GDP and weak sanctions (LIM) has a positive correlation with trade. At every 1% increment in GDP, trade increases by 7.79%. Weak sanctions also have the same effect on trade whereby trade increases by 3.91% at every 1% increase of weak sanctions. However, Strong sanctions and Exchange rate have a negative effect on trade whereby trade decreases by -1.18% at every 1% increment of strong sanctions and -1.96% at every 1% increment of exchange rate.

Discussion

Economic sanctions are a powerful tool used by nations to influence other countries for political purposes. By restricting trade and financial transactions, sanctions aim to achieve foreign policy objectives. While effective, sanctions have wide-ranging consequences on the sanctioned country and the global economy. Businesses struggle with cross-border trade, resulting in job losses and revenue declines. The impact extends beyond the target, affecting citizens of the sanctioning country as well. Policymakers must carefully consider the costs and benefits of sanctions, exploring alternative strategies to minimize unintended economic and social consequences and ensure actions align with national interests.

Moreover, this study found that there is a positive relationship between a country's GDP and its trade, meaning that as a country's GDP increases, its level of trade tends to increase as well. Additionally, weak economic sanctions were found to have a significant effect on trade, leading to an increase in trade volume. On the other hand, strong sanctions had a negative effect on trade, causing a decline in trade volume. Furthermore, the study showed that there is a negative relationship between the exchange rate and trade, with an increase in the exchange rate leading to a decrease in trade activities.

Conclusions

The study recommends that both Iran and Nigeria focus on policies that promote economic growth and increase GDP. This can be achieved by investing in infrastructure, education, healthcare, and other sectors that drive economic growth. It is also suggested to encourage stable exchange rates to foster increased trade between the two nations. Exploring partnerships, investments, and other initiatives to expand trade ties is also recommended. However, policymakers should carefully consider the potential unintended consequences of imposing strong sanctions and conduct further research to fully understand the factors driving trade between Iran and Nigeria.

The study found that GDP is positively correlated with trade, indicating that both countries should prioritize policies that promote economic growth and increase GDP. Weak economic sanctions are recommended to promote trade between Iran and Nigeria, as even a small increase in sanctions can lead to a significant boost in trade. However, strong sanctions have a negative effect on trade and hinder economic activities, so alternative approaches should be considered. Additionally, stabilizing the exchange rate and exploring alternative trade channels and partners can help mitigate the impact of economic sanctions and foster economic growth in both countries. Future studies should consider additional factors such as trade policies, regional trade agreements, foreign currency reserves, and population to gain a more comprehensive understanding of bilateral trade between Iran and Nigeria. Analyzing the specific sectors or products most affected by sanctions, conducting qualitative research, and studying the impact on small and medium-sized enterprises would provide valuable insights into the broader economic effects of sanctions.

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APENDIX

Dependent Variable: LNTRADE
Method: Fully Modified Least Squares (FMOLS)
Date: 06/05/23   Time: 12:05
Sample (adjusted): 2013 2021
Included observations: 9 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth
    = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNTGDP	9.529467	6.363439	1.497534	0.2086
EXCH01	17.48916	4.180135	4.183875	0.0139
EXE	5.673688	2.350035	2.414299	0.0732
LIM	-25.60707	7.749196	-3.304481	0.0298
C	-768.0242	349.2716	-2.198931	0.0928

R-squared	0.482140	Mean dependent var		12.56243
Adjusted R-squared	-0.035719	S.D. dependent var		7.143094
S.E. of regression	7.269548	Sum squared resid		211.3853
Long-run variance	8.721827			

Augmented Dickey-Fuller Unit Root Test on ERROR		

Null Hypothesis: ERROR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.133275	0.0572
Test critical values:	1% level	-5.835186	
	5% level	-4.246503	
	10% level	-3.590496	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
    and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ERROR)
Method: Least Squares
Date: 06/12/23   Time: 14:48
Sample (adjusted): 2014 2021
Included observations: 8 after adjustments

Augmented Dickey-Fuller Unit Root Test on LNTRADE

Null Hypothesis: LNTRADE has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.875481	0.3096
Test critical values:	1% level	-2.847250	
	5% level	-1.988198	
	10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
　　and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNTRADE)
Method: Least Squares
Date: 06/12/23　Time: 14:36
Sample (adjusted): 2013 2021
Included observations: 9 after adjustments

Augmented Dickey-Fuller Unit Root Test on EXCH01

Null Hypothesis: EXCH01 has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.261625	0.9867
Test critical values:	1% level	-2.847250	
	5% level	-1.988198	
	10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
　　and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH01)
Method: Least Squares
Date: 06/12/23　Time: 14:42
Sample (adjusted): 2013 2021
Included observations: 9 after adjustments

Augmented Dickey-Fuller Unit Root Test on LNTGDP

Null Hypothesis: LNTGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.539509	0.4699
Test critical values:	1% level	-4.420595	
	5% level	-3.259808	
	10% level	-2.771129	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
     and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNTGDP)
Method: Least Squares
Date: 06/12/23   Time: 14:40
Sample (adjusted): 2013 2021
Included observations: 9 after adjustments

بررسی تأثیر تحریم های اقتصادی بر تجارت دوجانبه ایران و نیجریه (2012–2022)

چکیده:

این مطالعه با استفاده از یک رویکرد کمی، با استفاده از مدل جاذبه و برآورد حداقل مربعات کاملا اصلاح شده، به بررسی تاثیر تحریم‌های اقتصادی بر روابط تجاری ایران و نیجریه می‌پردازد. علاوه بر این، تأثیر عواملی مانند تولید ناخالص داخلی، نرخ ارز، تحریم‌های قوی و تحریم های ضعیف را بررسی می‌کند. با انجام این کار، این تحقیق به دانش موجود در مورد تجارت دوجانبه بین این دو کشور کمک می‌کند و بینش‌های ارزشمندی را در زمینه هایی ارائه می‌دهد که برای تقویت توسعه تجارت بین آنها نیاز به توجه دارد. یافته‌های پژوهش نشان می‌دهد که در روابط تجاری دوجانبه ایران و نیجریه، همبستگی مثبتی بین تولید ناخالص داخلی و تحریم‌های ضعیف با تجارت وجود دارد. افزایش 1 درصدی تولید ناخالص داخلی منجر به افزایش7979 درصدی تجارت می‌شود، در حالیکه افزایش 1 درصدی در تحریم‌های ضعیف به افزایش3991 درصدی تجارت کمک می‌کند. برعکس، تحریم‌های قوی و نرخ ارز تأثیر منفی بر تجارت دارد، به طوری که افزایش 1 درصدی تحریم‌های قوی منجر به کاهش 1.18 درصدی تجارت و افزایش 1 درصدی نرخ ارز منجر به کاهش6996 درصدی تجارت می‌شود.

کلمات کلیدی: تحریم‌های اقتصادی، تجارت، تولید ناخالص داخلی، نرخ ارز، تحریم‌های شدید، تحریم‌های ضعیف.