



Investigating the Impact of Economic Sanctions on the Iran-Afghanistan Trade (2004-2018)

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Abstract

Iran and Afghanistan share deep historical, cultural and civilizational ties. Iran is one of Afghanistan's largest trading partners. However, economic sanctions have disrupted bilateral trade between these two neighboring countries through various channels. This paper presents an empirical analysis of the impact of economic sanctions on trade between Iran and Afghanistan in the period 2004-2018 by applying the Gravity Model, while the estimation is performed using fully modified least-squares technique. Findings of the research indicate that the imposition of any strong economic sanctions, in the long run, not only during the sanctions period but also in the post-sanctions period, has increased trade between Iran and Afghanistan. On the other hand, weak sanctions during the sanctions period have reduced trade; nevertheless, weak sanctions in the post-sanctions period have increased bilateral trade. Development of trade cooperation between the two countries, facilitation of trade affairs and expansion of joint regional and international cooperation should be on the agenda of economic policymakers in Iran and Afghanistan.

Keywords: Co-integration, Fully Modified Least Square, Geopolitics, Gravity Model, Sanction

JEL Classification: F10, F13, F51, G10

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1. Introduction

One of the common economic-political tools to impose the demands of one country over another is the use of various types of sanctions, especially economic sanctions. In other words, sanctions are a form of coercive diplomacy that uses a combination of force and coercion in a planned manner by powerful countries. Since the 1990s, economic sanctions have been used as a tool of political confrontation as well as a means to achieve the goal and promote the foreign policy interests of countries, which has resulted in disruption of trade between many countries. The victory of the Islamic Revolution in Iran and the fall of the monarchy in 1979 shocked the world and caused severe differences between the ideologies of Iran and the United States (for details, see Morgan, 2015; Congressional Research Service, 2022). In order to weaken the newly formed Iranian government, the United States, on one hand imposed sanctions on Iran, which caused trade problems between Iran and its trading partners, and on the other, gained the relative support of certain countries to contain, confront and at times engage with Iran, which has entailed various challenges and benefits for Iran during the last 42 years.

In the wake of the imposed economic sanctions, Iran has been consistently changing the structure of foreign trade and increasing trade with countries such as China, India, Afghanistan and other countries that are not subject to US economic sanctions or for other reasons, are circumventing sanctions in their trade relations with Iran to maintain the flow of goods necessary for economic growth and development. According to the Iranian bureau of statistics data, in the period of 2004-2018, despite severe economic sanctions, Iran's trade with China and Afghanistan has increased 15.8 and 13.5 times respectively. The trade volume between Iran and

Afghanistan has increased more than \$2,961 million in 2018 from \$225.8 million in 2004. Iran's imports from Afghanistan were \$3.8 million in 2004, which increased to more than \$ 11 million in 2018. Similarly, Iran's exports to Afghanistan were \$232 million in 2004, which increased to \$293 million in 2018, according to the United Nations COMTRADE database on international trade. Besides, studies on Afghanistan's economic growth indicate that among the neighboring countries, Iran has had the most positive impact on Afghanistan's economic growth (Khashei & Mehregan, 1398 [2019 A.D.]), which provides an impetus to boost bilateral trade relations.

The word sanction means official permission or approval for an action or a threatened penalty for disobeying a law or rule. Galtung (1967) first proposed the sanctions hypothesis to express dissatisfaction and deter countries (Akbari, 1396 [2017 A.D.], p. 8.) Sanctions can be classified into economic and non-economic sanctions.

Non-economic sanctions are usually applied before economic sanctions and are intended to persuade the target country to change policy. There are different types of non-economic sanctions, which usually include the following: 1) Refusal of visa; 2) reducing the level of political representation; 3) Preventing the target country from membership in international organizations; 4) Opposition to host international conferences; 5) Refusal and suspension of financial aid and official assistance, especially in case of poor countries (Akbari, 1396 [2017 A.D.], p. 8).

Economic sanctions have become increasingly significant as alternatives to military conflict since the end of the Cold War. Economic sanctions are coercive economic measures taken against one or more countries to change their policies. These types of

sanctions are supposed to work by imposing some kind of pain on the target country, and particularly on its ruling regime, which then alters its policies in order to comply with the sender's demands and thereby avoid further sanctions damage (Krishner, 1997, p. 42). Article 41, Chapter 7 of the UN Charter states that "The Security Council may decide what measures not involving the use of armed force are to be employed to give effect to its decisions, and it may call upon the Members of the United Nations to apply such measures. These may include complete or partial interruption of economic relations and of rail, sea, air, postal, telegraphic, radio, and other means of communication, and the severance of diplomatic relations." Literature and research work indicates that poverty increases in any country that faces economic sanctions.

Sanction experts divide sanctions in several categories based on the perspective of the number of parties issuing the sanctions. A 'unilateral' sanction means that a powerful country enacts the sanction on a target country. While a multilateral sanction means that a group of countries impose sanction on a target country. In the current context of the international system, the most important international body imposing sanctions is the United Nations Security Council; because all UN member states, under Chapter VII of the UN Charter, are committed to complying with UN Security Council rules and regulations (Alexander, 2009, p. 20). From the point of view of those who are required to comply with the sanctions (the target audience), sanctions are divided into primary and secondary. Primary sanctions effectively prohibit and punish legal entities for violating sanctions from doing business, and block all of the assets of firms or individuals (for details see Golliard, 2013). However, in some cases, governments also punish citizens of other governments who do business with firms and individuals and for violating sanctions, known as secondary

sanctions (see Schott, 2021; Nikoogoftar Safa & Raddadi, 1394 [2015 A.D.], p. 81).

The economic sanctions imposed on the Islamic Republic of Iran after the victory of the Islamic Revolution, can be divided into several periods:

1. From the onset of the revolution to the beginning of 2006.
2. From 2006 until the JCPOA Agreement on July 14, 2015.
3. From July 14, 2015 until the unilateral withdrawal of the United States from the JCPOA Agreement in 2018.
4. After the unilateral withdrawal of the United States from the JCPOA Agreement.

The analysis of the sanctions illustrates that the trade embargo policies in the first period were completely one-sided: from the beginning of the Islamic Revolution until 2006, no country including the United Nations Security Council supported the unilateral US sanctions or trade bans. However, after 2006 trade bans were imposed on Iran by certain European countries, Canada, Australia and even some Asian countries. Besides, the United States severely punished the violators of the trade embargo. Severe sanctions were imposed against Iran in 2011 and the suspension of the Central Bank of Iran from Swift services in 2012, which some interpreted as an economic war, are important features of this period of sanctions against Iran (Sadat Akhavi & Hosseini, 1396 [2017 A.D.], p. 41). It is important to mention that since 2006, non-governmental economic actors have also been sanctioned by the United States and some other countries (see, Nademi & Hasanvand, 1398 [2019 A.D.], p. 5). On July 14, 2015, when the JCPOA agreement was signed to the unilateral withdrawal of the United States from the agreement, Iran pledged to reduce its nuclear program. The world powers pledged that in exchange for Iran

fulfilling its obligations, sanctions against Iran imposed by the United States, the European Union, and the UN Security Council would be lifted or suspended. But on May 8, 2018, the United States withdrew from the international JCPOA agreement and imposed unilateral sanctions on Iranian institutions (governmental and non-governmental) and individuals.

Since the victory of the Islamic Revolution, Iran has been the target of numerous sanctions imposed by the United States, some international organizations and some other countries, and over time (with exception of the implementation period of JCPOA) these sanctions have intensified. Likewise, sanctions have become a fundamental phenomenon for the Iranian economy. One of the effects of sanctions is a negative impact on Iran's foreign trade. Iran's exports of crude oil and lease condensate shrank by approximately 40%, to approximately 1.5 million barrels per day (bbl/d) in 2012, compared with 2.5 million bbl/d in 2011 (UNCTAD Trade and Development Report, 2013).

Afghanistan is also facing an uneasy economic situation. According to the World Bank Report (April 2022), per capita incomes are likely to have fallen by approximately one-third over the last months of 2021 in Afghanistan, wiping out economic progress achieved since 2007, and leading to significantly increased household hardship. The economic collapse has been driven by sharp declines in international grants, loss of access to the overseas assets of the central bank, disruption of international banking relationships, and loss of investment confidence.

In the current study, we have selected Iran and Afghanistan these two countries are major trading partners since they share an extensive border region. As part of the trade corridor with Central Asia, Iran has become Afghanistan's biggest trading partner.

Moreover, according to the Iran Customs Administration (IRICA), during the outbreak of the COVID-19 pandemic, Iran's trade border with several neighboring countries including Iraq, Azerbaijan, Turkey and other countries mostly remained closed; However, border trade between Iran and Afghanistan remained open. It is therefore important to assess the impact of economic sanctions on these two neighboring trade partners. The main purpose of this paper is therefore to provide an empirical analysis of the impact of economic sanctions on bilateral trade between Iran and Afghanistan during the years 2004-2018—because the latest information was available for Afghanistan during 2004-2018—by using a fully modified least-squares technique. This research is organized in such a way that it first reviews theoretical concepts regarding sanctions, followed by a literature review on studies regarding sanctions. The third section introduces the theoretical framework of the model used in the study, as well as the analysis and interpretation of the results. The last section concludes the research and it is dedicated to policy recommendations with future research directions.

2. Literature Review

Hufbauer, Elliott, Cyrus, and Winston (1997) examines the impact of US economic sanctions on US trade based on the model of gravity. He estimates the number of trade losses and the impact of sanctions on the US economy and shows that among the six countries studied, Iran is the second country that has inflicted the most losses or trade losses on the US economy.

Amuzegar (1997) documented that US sanctions did not bring significant results because no changes were observed in Iran's

behavior, decisions and foreign policy approach. Alikhani (2000) studied the political and historical implications of sanctions against Iran. He concluded that the effectiveness and significance of such policy have failed against Iran.

Askari, Forrer, Teegen, and Yang (2001) studied the economic impact of sanctions on Iran. The effect of trade sanctions were estimated at around \$27 million and the effect of financial sanctions accounted for \$1,160 to \$1,321 million per year. According to their estimates, the total cost of sanctions on Iran was between 1160 to 1348 million dollars per year. Despite heavy losses inflicted on both countries (Iran and the United States), Iran has not changed its approach and continues to pursue its policies.

Heine-Ellison (2001)'s research focused on human rights studies of sanctioned countries (Iraq, Yugoslavia, Angola and Sierra Leone). This study rejected the hypothesis that 'that targeted sanctions are more humane than comprehensive sanctions'. However, the case of Sierra Leone indicated that even targeted sanctions can have unintended humanitarian consequences and should therefore be applied with extreme caution.

Evenett (2002) studied the effects of sanctions imposed by eight industrialized countries on their South African imports and concluded that the comprehensive US sanctions against the apartheid state had the greatest effect.

Caruso (2003) presented the impact of economic sanctions on US foreign trade over the period 1960-2000 and concluded that the relationship between economic sanctions and foreign trade was negative and significant.

Linderman, Reema and Chisholm (2007) discussed the dimensions of economic sanctions imposed by countries and

international institutions against Iran. Their research concluded that sanctions through different channels, such as ship contracts, insurance contracts, and financial institutions had significant impacts on the business sector in Iran and, as a result, significantly affected Iran's foreign trade.

Ajdari and Hosseinzadeh (1392 [2013 A.D.]) studied the effects of economic sanctions on Iran's foreign trade (exports and imports) and its important economic partners when the economic sanctions were toughened during the period (2011-2012). The result indicated that exports and Imports fluctuated due to imposed economic sanctions. Moreover, according to this research, China, Iraq, UAE, Afghanistan, and India were major destinations for Iranian exports.

Neuenkirch and Neumeier (2015) studied the comparative effect of sanctions imposed by sanctioning countries including the United States and the United Kingdom on the economic growth of target countries (including 68 countries) over the period 1976-2000. The results indicated that, on average, British sanctions reduced GDP per capita growth from 2.3 to 3.5%. The effect of US sanctions were however much lower and over the 7 years, they reduced the GDP growth of target countries on average by 0.5 to 0.9%.

Khodadadi, Farid Fathi, and Masum Zadeh (1397 [2018 A.D.]) studied the effects of sanctions on Iran's trade and major trading partners in the sports industry during (1992-2013) using the DOLS method, and concluded that in the current period, weak sanctions affected Iran's trade with its partners negatively other than with Kazakhstan and Kyrgyzstan. The effect of severe sanctions on Iran's trade and all its trading partners has been positive. The effect of weak sanctions in the previous period was negative in countries other than China, while strong sanctions in the previous period

have had a negative effect on trade between Iran-China, Kazakhstan and Kyrgyzstan.

Devarjan and Mottaghi (2015) investigated the effect of sanctions imposed on Iran's trade with major trading partners. In this study, 28 commercial partners of Iran in the time period of 2000-2014 were considered. According to the results, with severe economic sanctions by the European Union (EU) and the U.S., Iran's export revenue was decreased by 17.1 billion dollars during the years 2012-2014. Also, in the case of lifting the economic sanctions against Iran, imports would be oriented to the U.S., Germany, and the Netherlands as well as Asian countries such as South Korea, China, and Singapore.

Yadollahi, Daliri and Kiyani (1397 [2018 A.D.]) examined the effect of future oil-sales sanctions on Iran's economy and ways to deal with it. Their research concluded that sanctions that aim to change the political behavior of the Islamic Republic have not been successful. Furthermore, the authors state that the US failed to achieve the desired outcome of the sanctions and to suspend Iran's nuclear activities.

Tuzova and Qayum (2016) studied the effects of US and EU sanctions imposed on the Russian oil sector and the economy by applying the VAR model using quarterly data from 1999:1 to 2015:1. The result of this study indicated that economic sanctions had a negative impact on the Russian economy.

Rasoulinezhad and Popova (2017) explored the relationship between sanctions (financial and non-financial), oil price shocks and Iran-Russian bilateral trade flows over the period 1991–2014. Their results indicated that financial sanctions, non-financial sanctions and oil price shocks negatively impacted the Iranian-Russian trade. Furthermore, financial sanctions had the greatest

negative impact on Iran-Russian trade, rather than non-financial sanctions and sharp oil price shocks. Hussain and Fard (2021) documented that Iran is one of the leading resilient ECO member states because of low level of external debt and can absorb the external shocks to some extent.

Sadat Akhavi and Hosseini (1396 [2017 A.D.]) evaluated the effects of economic sanctions on inflation in Iran and concluded that sanctions have an expected direct effect on inflation, while exhibiting an indirect effect on liquidity. In addition, according to this study, the exchange rate also affected inflation through imported inflation. Gharehgozli (2017), using the synthetic control method estimated that the international sanctions targeting Iran's energy sector and its ability to access the international financial system, have harmed Iran's economic growth, specifically since 2011 through 2014 and they have therefore reduced Iran's real GDP by more than 17% with the largest drop occurring in 2012. The findings of Moghaddasi and Nistico (2021) indicate that the sanctions led to an overall decline in the manufacturing employment growth rate by 16.4 percentage points in 2012.

Akbari (1396 [2017 A.D.]) evaluated the effect of economic sanctions on the composition of exports and imports of goods in Iran and concluded that the imposition of unilateral sanctions had a lesser effect on the composition of imported and exported goods with a negative coefficient. However, bilateral and trilateral sanctions have had a far greater impact on the composition of imported and exported goods with a negative coefficient.

Frank (2017) examined the empirical consequences of trade sanctions in independent and non-independent countries by using the model of gravity over the period of 1990-2006. The research

estimates revealed that there is a significant decrease in the value of trade after the introduction of sanctions. Moreover, trade diversification is introduced as a potential instrument to neutralize the negative impact of sanctions.

Nademi and Hassanvand (1398 [2019 A.D.]) studied the severity of sanctions and poverty in Iran for the period of 1985-2013. They concluded that with the increasing intensity of economic sanctions, absolute poverty has increased in the country. Mehdiloo, Abolhasani Histani, and Rezaei (1398 [2019 A.D.]) ranked the types of sanctions and estimated the effect of sanctions risk index using fuzzy hierarchical approach. Their research concluded that the UN financial-banking sanctions 56%, the UN oil sanctions 21%, the EU banking financial sanctions 15% and the EU oil sanctions 9% are the riskiest types of sanctions on the Iranian economy. In total, 78% of all risks are against Iran while the United States accounts for 15% risk of sanctions. The UN and the EU financial sanctions on banking and oil are much higher than other forms of sanctions.

Izadkhasti and Qalambor Dezfuli (1398 [2019 A.D.]) studied the effects of exchange rate fluctuations on the value-added of the industrial and mining sector of Iran in the context of sanctions using the ARDL approach for the period of 1968-2017. The result indicated that severe sanctions have had negative and significant effects on the value-added growth of the industrial and mining sectors by creating exchange rate volatility.

Sajedianfard, Hadian, Samadi, and Dehghan Shabani (1398 [2019 A.D.]) studied the effects of international sanctions on Iran's trade structure using the Network Theory Approach. This research compared the structural position of Iran's economy in the international trade network and concluded that the structural

position of Iran's economy in the international trade network has not been significantly affected by sanctions and Iran remains one of the significant countries around the network.

The available literature illustrates that so far no research has been performed on the effects of economic sanctions on trade between Afghanistan and Iran. This research will therefore attempt to bridge that gap and contribute to the research on the economic sanctions impact on these two neighboring countries. Moreover, all previous studies have studied the impact of sanctions on all of Iran's trading partners before the United States' unilateral withdrawal from the JCPOA agreement. Even research conducted in the years (2018-19) for sanctions analysis has used the 2016 data. The Iranian economy has experienced a heavy shock after the US unilateral withdrawal from the JCPOA agreement in 2018. Therefore, this research has 3 innovations:

- a. This study uses the least-squares method, which has been completely modified and is one of the best and newest econometric techniques.
- b. This is the first study that examines trade relations between Iran and Afghanistan, two countries that share extensive borders, common language and culture, and a high capacity for cooperation in the fields of trade and economic cooperation.
- c. Updated data has been used for our research analysis.

3. Research Methodology

Different studies have used different techniques to analyze and estimate the impact of economic sanctions on the whole economy, trade or economic growth. The most famous and important techniques are; Consumer Surplus Model, Gravity Model, Offer

Curves, Game Theory Model and the Public Choice Model (smart sanctions). In the current research, the Gravity Model has been used for our research analysis to estimate trade flows between these two neighboring countries in the period of 2004-2018.

3. 1. Introduction of the Gravity Model

This technique was introduced by Jan Tinbergen in 1962. The Gravity Model has been widely used for explaining flows of international trade. This technique specification has demonstrated considerable empirical robustness and explanatory power for describing trade flows, despite its lack of a strong theoretical foundation. As reported by Porojan (2001), in the last decade, gravity models have been employed in numerous studies for analyzing and assessing trade flows. The basis of the model of gravity in economics lies on the fact that bilateral trade between two countries is proportional to size, measured by GDP, and inversely proportional to the geographic distance between them. However, observing the business patterns of the world countries does not always demonstrate this. For example, the United States and China are each other's largest trading partners, even though the two countries are significantly far apart. The Gravity Model is one of the most widely used models in economics due to its empirical power and high flexibility.

3. 2. Derivation of Gravity Equation in International Trade

If we consider two hypothetical countries i and j , in the simplest method based on the model of gravity, trade between the two countries (imports and exports of the two countries) is a function of market size and the distance between countries i and j . The market

size is usually measured in GDP, and the distance between countries i and j is usually measured as the distance between the two countries' capitals or the distance between the two countries' major trading ports. Therefore, the standard, traditional and at the same time simple model of gravity can be written as the following function (Emami & Shabani, 1388 [2009 A.D.], p. 9):

$$(1) \quad T_{ij} = F(GDP_i, GDP_j, DIS_{ij})$$

The amount of imports and exports of the two countries has a direct relationship to the GDP of the two countries and inverse relationship with the distance between the two countries. Accordingly, with the help of the relation of Newton's general gravitational force in physics and using the original model of Tinbergen and Linneman, we can rewrite function (1) as follow:

$$(2) \quad T_{ij} = A \frac{(Y_i Y_j)^\alpha}{D_{ij}^\lambda}$$

T_{ij} is the volume of bilateral trade between countries i and j , D_{ij} is the geographical distance between the two countries. Y_i and Y_j represent the GDP of countries i and j , respectively. 'A' is the normalization constant. Distance between the two countries represents variables, such as distance between the two capitals, distance between two ports, travel time and the transportation cost. The population of the two exporting and importing countries is entered into the equation as an explanatory variable. Accordingly, we can write Equation (2) as follow:

$$(3) \quad T_{ij} = A \frac{(P_i Y_j)^\alpha (P_j Y_i)^\beta}{D_{ij}^\lambda} \quad \text{or}$$

$$T_{ij} = A \frac{(Y_i Y_j)^\alpha (P_i P_j)^\beta}{D_{ij}^\lambda}$$

By taking logarithm on both sides of the equation, we get,

$$(4) \quad \log T_{ij} = A^* + \alpha \log(Y_i \cdot Y_j) \\ + \beta \log(p_i \cdot p_j) - \lambda \log(D_{ij}) + \varepsilon_{ij}$$

In equation (4), A^* is the logarithmic form of A , P_i is the population of country i and P_j is the population of country j . Furthermore, α , β and λ are the estimated parameters of the equation, where ε is the normally distributed error term. As a result, by adding dummy variables for sanction in the model, which is previously used by Helpman and Krugman (1985), the Gravity Model for Iran-Afghanistan trade will be as follows:

$$(5) \quad \ln TRADE_{ijt} = \\ \alpha Z_i + \alpha Z_j + \beta_1 \ln TGDP_{ijt} + \beta_2 \ln RER_{ijt} + \beta_3 \ln POP_{ijt} + \beta_4 EXE + \\ \beta_5 LIM + \beta_6 EXE1 + \beta_7 LIM1$$

Trade is a dependent variable in this model, indicating the size of trade between Iran and Afghanistan in US dollars. The trade data has been extracted from the Iranian customs website and entered into the model in logarithmic form. Z_i and Z_j express the special characteristics of the two countries i and j at each point of time.

TGDP is the product of the GDP of Iran and Afghanistan ($GDPI * GDPAF$), where the GDP of both countries is at a fixed price (2011 prices), which is used in the model in logarithmic form. GDP data for both countries have been extracted from the World Bank (WDI site). This variable indicates the size of the economy and the productive power of each country. It is expected that the more this variable increases, the more the country's exports and imports increase.

POP is the product of the population of Iran and Afghanistan, which indicates the size of the market of the two countries and is the main tool of the generalized Gravity Model. When a country's population increases, its market size increases and the country's exports and imports increase. The data of this variable is obtained from the World Bank (WDI site).

RER indicates the real exchange rate of the desired trading partner (Afghanistan) in Rials, which is obtained from the following formula:

$$(6) \quad RER_{ijt} = \frac{RER_{it}}{RER_{jt}} * \frac{P_{it}}{P_{jt}}$$

In the above-mentioned equation, RER_{it} is the exchange rate of country i in US dollars at time t (here the price of Iranian Rials against US dollars); RER_{jt} indicates the exchange rate of country j in US dollars in time t . This illustrates the price of each unit of Afghanistan's currency (Afghani) against the US dollar. $\frac{P_{it}}{P_{jt}}$ is the price ratio of countries i and j . The RER_{ijt} coefficient is expected to be positive as long as the economic theory holds the inverse relationship between the value of money and the amount of exports. The data of this index (consumer price index) is obtained from the W.D.I. website.

EXE and *LIM* are the strong and weak sanctions imposed against Iran. These sanctions are usually imposed by the United States, the European Union and the United Nations, which are included in the model in the form of dummy variables.

EXEI and *LIMI* have been entered the model in the form of dummy variables for strong and weak sanctions imposed in previous periods against Iran, respectively. The number (1) is used for years in which the sanction was imposed and lasted, otherwise

the number zero (0) is considered. In the periods after the sanction, if the sanction was imposed before, the number (1) is used, otherwise, the number zero (0) is inserted.

3. 3. Model Estimation Methodology

This study uses the fully modified ordinary least square technique to estimate the model by using time series data. In most economics time series variables, there exists a common trend, which tends to move in the same direction. In general, economic variables whose statistical properties, such as mean and variance are a function of time are called non-stationary variables—the trend and seasonality will affect the value of the time series at different times. Such a model with non-stationary variables leads to misleading statistical evidence, called spurious regression. A spurious correlation occurs when a pair of independent series, each of them nonstationary or strongly autoregressive, are found to be apparently related according to standard inference in an OLS regression (Wang & Hafner, 2018).

The non-stationary variables can be made stationary by taking first difference. Nevertheless, it should be noted that the long-run relationship/information of the variables may be lost when we modify them to make stationary, such as by differencing, detrending or filtering (Shrestha & Bhatta, 2018). In general, various statistical methods for co-integration test by Engel and Granger (1987), Stock (1987), Johansen (1988), Park and Phillips (1989 and 1988), Phillips and Hansen (1990), Sims, Stock and Watson (1990) and other techniques have been proposed to manage the non-stationary problems. In the current study, the fully modified OLS (FM-OLS) method developed by Phillips and Hansen (1990) is

used. But before that, to determine the degree of co-integration of variables, a unit root test is performed.

3. 3. 1. Unit Root Test

Most econometric methods are based on the assumption that the time series can be rendered approximately stationary through the use of statistical transformations. Non-stationary time series data lead to poor understanding and forecasting—no logical relationship with each other and the estimated regression will have a high R^2 . Therefore, in order to manage the spurious regression, a unit root test is performed. The results of the unit root test for the variables used in estimating bilateral trade between Iran and Afghanistan are reported in Table 1 below. The table illustrates that the product of population is stationary at level (integrated of order 0, denoted by $I(0)$). The bilateral trade and GDP variables are stationary after taking first difference (integrated of order 1, denoted by $I(1)$).

Table 1. Unit Root Test Results of Variables Used in the Model

Variables	Test	Critical Values			Stationary & Non-Stationary	Integration Order
	Dicky-Fuller Test	10%	5%	1%		
Ltrade	1.66	3.34	3.79	4.8	Non-Stationary	I(1)
D(Ltrade)	3.96***	4.05	3.12	2.71	Stationary	
L(POP₁ * POP_{af})	29.04***	4.89	3.83	3.36	Stationary	I(0)
(GDP₁ * GDP_{af})	2.33	3.34	3.79	4.8	Non-Stationary	I(1)
DL(GDP₁ * GDP_{af})	3.22**	2.71	3.14	4.8	Stationary	

***, ** & * means stationary with a probability of 99%, 95% and 90% respectively.

Source: Research findings

3.3.2. Cointegration Test

In the next step we examine whether a long-run equilibrium relationship exists between the selected variables. A cointegration test was first introduced by Nobel Laureates Robert Engle and Clive Granger in 1987 to determine if there is a correlation between several time series in the long term. Cointegration techniques identify scenarios where there exists two or more non-stationary time series variables in the model are integrated together in a way that they cannot deviate from equilibrium in the long term. Once it is determined that the variables in the model are non-stationary, the only way to infer about the long-run relationship is to employ some form of cointegration technique (Khondker, Bidisha, & Razzaque, 2012).

If two variables, for example x_t and y_t , are both $\sim I(d)$, a linear combination of these two variables such that $u_t = x_t - \theta y_t$ in general, will also be $\sim I(d)$. However, it is an exceptional case if the constant θ yields an outcome where $u_t \sim I(d-a)$ and $a > 0$, then x_t and y_t will be cointegrated. The result of the cointegration test is illustrated in Table 2. The table indicates that the residual of the regression does not have a single root; it can therefore be concluded that there is a long-term relationship (co-integration) between the variables.

Table 2. Engle Granger Test

Engle Granger Test Statistics	Critical Value			Probability
	1%	5%	10%	
4.63	2.75	1.97	1.60	0.0002

Source: Research Findings

4. Empirical Results

As there exists a cointegration relationship between the variables of the model, the long-term coefficients of the model are estimated here. The Fully modified OLS (FMOLS) method is used to estimate the long-run relationship. The long-run estimation result is presented in Table 3.

Table 3. The Model Estimation Shows long-term Relation

Variables	Coefficients	Standard Deviation	T-Statistics	Confidence Level
Strong Sanction (EXT)	0.73954	0.21	3.50	0.0100
Strong Sanction Imposed in Previous Period (EXT1)	0.71270	0.17	3.99	0.0053
Weak Sanction (LIM)	-0.90531	0.30	-2.98	0.0205
Weak Sanction Imposed in Previous Period (LIM1)	1.07855	0.37	2.900	0.0230
Population (TPOP)	15.2018	1.86	8.149	0.0001
Real Gross Domestic Product (RTGDP)	1.86818	1.35	1.38	0.2113
C	-311.160	29.9	-10.41	0.0000

Source: Research Findings

This estimation indicates that with a one percent increase in severe sanctions, bilateral trade between Iran and Afghanistan increased by 0.74% and 0.71%, respectively, during and after the sanctions period. In other words, the implementation of strong sanctions have increased the bilateral trade between Iran and Afghanistan, in a sense that no matter how severe sanctions have been imposed on Iran, the country has increased its foreign trade

with Afghanistan. In general, it can be said that the increase in severe sanctions has increased the overall trade exchange between Afghanistan and Iran both during and after the implementation of the sanctions; but the effect of sanctions in the same period is greater than the effect of sanctions in the next period.

Furthermore, a one percent increase in weak sanctions has reduced trade between Iran and Afghanistan by 0.90531%, while weak sanctions, in the post-sanctions period, increased trade between Afghanistan and Iran by 1.0785%. With a one percent increase in population, trade between the two countries increased by 15.2%. Furthermore, for one percent increase in real GDP, trade between Iran and Afghanistan increased by 1.86%

5. Concluding Remarks

The United States' 42-year-old conflicted relationship with Iran, as well as the support that it has gained from some of its allies to counter Iran while imposing unilateral sanctions on Iran, has led to a significant increase in sanctions against Iran over time. In fact, US-imposed economic sanctions have become a fundamental phenomenon for the Iranian economy, disrupting trade between Iran and its trading partners. In the meantime, to circumvent or reduce the negative effects of these sanctions, Iran has relatively given more importance and has increased foreign trade with countries that have not followed the sanctions policies for various reasons, and maintained friendly relations with Iran. Generally, Iran's trading partners can be divided into two categories:

1. Countries that have increased their trade with Iran during the implementation of sanctions, such as; China, India, Turkey and Afghanistan etc.

2. Countries that have reduced their trade with Iran during the implementation of sanctions, such as; Sweden, Japan, Germany and France etc.

Meanwhile, Afghanistan is a country that has multiplied its trade with Iran several times during and after the imposition of sanctions. In the current research, the effect of economic sanctions on Iran-Afghanistan bilateral trade between the years 2014-2018 was investigated. To better understand the effect of sanctions, this paper used Huffbauer's study and divided sanctions into two categories—strong and weak economic sanctions—and entered them into the model in the form of four dummy variables. The estimation results of the model indicate that there is a direct relationship between sanctions and bilateral trade between Iran and Afghanistan, in a sense that as sanctions increase on Iran, trade between Iran and Afghanistan increases. Imposing any strong sanctions will increase trade between Iran and Afghanistan, both during and after the sanctions. Our results about the positive impact of sanctions are in line with findings of Yang, Askari, Forrer and Teegen (2004). However, this result reveals a contradiction to the study of Shirov, Yantovskii and Potapenko (2015), and Newnham, (2015) who obtained negative impact of sanctions on the economy. While imposing weak sanctions has reduced bilateral trade between Iran and Afghanistan during sanctions period, bilateral trade has increased again in post-sanctions period. The reduction in bilateral trade due to imposition of weak sanctions may imply that weak sanctions have no immediate effect on Iran's foreign trade; Iran and its trading partners will try to maintain their foreign trade in the short term. However, in the long run, some of Iran's trading partners (those who reduced trade with Iran during sanctions period) are gradually reducing trade with Iran. These results are

important especially for policymakers in drafting policies to improve Iran-Afghanistan trade relationships in the future. In line with the empirical findings, it is crucial for the Iranian government to focus on accelerating the efforts to establish trade ties with neighboring countries to provide access to Iranian goods in the neighborhood.

The results also indicated that Iran maintained a surplus in bilateral trade with Afghanistan over the period of 2004-2018. The following practical policies are highly recommended to improve the trade ties between these two neighboring countries having enormous potential to benefit from regional economic integration:

1. Afghanistan is a landlocked country. Its geographic remoteness and lack of access to the open sea has increased transport and transit costs of imported and exported goods, and as a result, the cost of importing and exporting goods has increased. Improved trade between Iran and Afghanistan will not only save the transport cost, but also reduce the travel time due to a short geographical distance and provide a good market for Iranian goods.

2. The creation of a trade agreement that creates certain obligations that are required to be observed by the members in a way that the country who is a member of such a trade agreement can make sanctions completely ineffective (Kazerooni, Asgharpour, & Khezri, 1395 [2016 A.D.]). Therefore, one of the ways to reduce the effect of sanctions is to initiate the creation of a regional alliance and strategic agreements between Iran and Afghanistan, and other powerful economic countries in the region such as China and India. Such regional alliances and trade agreements could greatly reduce the impact of sanctions.

3. Banking and financial sanctions are the most severe sanctions that cannot be circumvented. However, the cooperation of Iranian and Afghan banks and the use of local currencies in bilateral trade can reduce the effect of banking sanctions to some extent. Furthermore, a joint investment of these two countries to create a joint bank with several branches in the two countries can be very effective.

4. Establishment of joint border markets, development of joint commercial markets between these two neighboring countries for joint production with the same brand will help to boost trade and circumvent sanctions, especially regarding agricultural and mineral products.

5. Politics, economics and trade are inextricably linked and strongly influenced by one another. On the other hand, no country has recognized the ruling group in Afghanistan. Therefore, it is necessary for the ruling group in Afghanistan to take serious measures to identify their government and establish economic and political relations with other countries.

6. Iran needs Afghanistan's import market to neutralize the impact of sanctions. On the other hand, Afghanistan also needs Iranian goods, at least in the medium term, which explains the reason for which its trade with Iran has multiplied as sanctions have intensified. It is expected that the new Taliban government, given the deep cultural ties between the two countries, understands the importance of neighboring Iran and therefore not reducing trade with Iran. Recently, Iran and Afghanistan have agreed to facilitate bilateral trade and strengthen economic ties.

7. Afghanistan's efforts to get impunity—sanction waiver—to trade with Iran could also be one way to reduce the impact of

sanctions, as for example, in receiving sanction waivers for investment in the port of Chabahar—a strategically important port for Afghanistan.

Future studies can focus on identifying and ranking the problems caused by economic sanctions on Iran-Afghanistan trade. It is also important to investigate different ways and trade techniques regarding circumventing sanctions to reduce their effects on these two neighboring countries. Besides, this model can also be applied on Iran's other trading partners including Turkey, Pakistan, China, etc.

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