CBJ Working Paper

Jordan's Trade Flow Amid Regional Political Tensions[*]

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June 2022

Abstract

Jordan has been affected negatively by many political tensions in the region during the last decade. This study aims to analyze the effects of policy tensions on the Jordanian trade by adopting an Augmented Gravity Model for the period (2001-2019), using Feasible Generalized Least Square (FGLS), and Seemingly Unrelated Regression (SUR) weights applied on panel data. The study found out that Gravity Model and Helpman theory can be applied on the Jordanian trade flows case, while Linder hypothesis was not applicable on the Jordanian case. The Main finding of the study reveals that there was a significant effect of policy tensions on the Jordanian exports and imports. It is estimated that the loss in exports and imports during 2010-2019 is about JD 5.0 billion (USD 7.0 billion) and JD 1.8 billion (USD 2.5 billion), respectively. Accordingly, the loss in net export as a result of regional political tensions was estimated to be around JD 3.2 billion (USD 4.5 billion). Moreover, during 2020, Jordan expected loss from the repercussions of coronavirus and the closure of boundaries was around to JD 632 million (USD 891 million) on exports, while decrease on imports was much higher around JD 1.6 billion (USD 2.3 billion). Accordingly, net export in 2020 was estimated to witness an improvement by around JD 1.0 billion (USD 1.4 billion).

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[*] Supervised and approved to publish by the committee of Editing board at the Research Department, headed by Dr. Nedal E. Azzam, and members Dr. Rajeh A. Alkhdour, Dr. Mohammad A. Khreisat, and Dr. Talal Alhammouri.

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1. Introduction

Trade is said to be an engine of development as it improves the allocation of production factors such as raw materials, and allows for the transfer of knowhow, technology and other spillovers. Besides, it encourages investment especially for small economies, as trade allow firms to target larger external markets as main destination for their products and services, while enjoying facilities and other accessibilities provided by the hosting country (Trofimov, 2000).

For that, many countries and international institutions have put the goal of ensuring smooth free trade flow as one of their primary objectives, by strengthening bilateral relationships and providing an impetus for a greater world economic integration and cooperation (UNCTAD, 2008).

However, there are many obstacles that affect trade among countries, such as different income levels, consumption patterns, infrastructure, physical distance, transportation costs and other logistics-specific challenges. Efficient and cost-effective transport and logistics services are becoming ever more important catalysts for development and deeper regional integration (Gordillo, Darwin, 2010). Nevertheless, political tensions have been identified recently as one of the main impediments affecting trade flows, especially for Arab region (Sidamor, Lemtaouch, Bensouici, 2016).

The Jordanian foreign trade indicators fluctuated over the last years, due to many domestic and external reasons. Accordingly, it is important to examine the most determinants of Jordanian foreign trade to help in boosting its role in Jordan's economy, and most importantly to examine the political tension affects Jordan's exports.

This study aims to analyze the effects of policy tensions on the Jordanian trade flow by adopting an Augmanted Gravity Model , using Feasible Generalized Least Square (FGLS), and cross-section Seemingly Unrelated Regression (SUR) weights applied on panel data.

Following (Linder, 1961) and (Helpman, 1987), we use total exports as the dependent variable to analyze the patterns of Jordan's trade flows with its partners using Feasible Generalized Least Square (FGLS) and Seemingly Unrelated Regression (SUR) weights applied on panel data for the period (2001-2020). The data were collected annually. Data on partners GDP and GDP per capita were obtained from World Economic Outlook Database. Exports and imports data for all countries in the study were obtained from Central bank of Jordan database.

This study covers Jordan's top 13 trade partners in the region. These countries include Syria, Egypt, Lebanon, Iraq, Turkey, Tunisia, and Gulf Cooperation Council countries (GCC) as a group, which include six countries. In addition to the United States which included in the study as it has a big bortion of bilateral trade with Jordan with many trade agreement.

The study is structured as follows: section two considers the theoretical background, while section 3 presents the previous related studies. Section four describes foreign trade flows between Jordan and the main trading partners, while section five shows the data and the methodology used in this research. In section six the empirical results are presented. Section seven presents the estimation of Jordan's exports loss. Concluding remarks are given in Section eight.

2.   Theoretical Background

The Gravity Model is based on Newton's Law of Gravity, which states that "every particle attracts every other particle in the universe with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers" (Sage Publications, 2010).

Initially, the Gravity Model was perceived as an empirical model, without any theoretical foundation, but the adoption of the Gravity Model to elucidate patterns of trade has been seen by economists as a considerable development on prior theoretical models (Gauto, 2012).

The Gravity Model has been widely employed in international trade research for the last four decades because of its significant empirical robustness as well as, its explanatory power. Since gravity models have been introduced by Walter Isard six decades ago, they have been employed to evaluate trade policy in general, and to analyze the effects of trade agreements on international trade in particular (Kepaptsoglou, 2010).

The use of Gravity law in modern economics was an attempt to understand the pattern of trade in a globalized world by (Tinbergen, 1962), who did the first econometric study of trade flows based on the Gravity equation, for which he gave only intuitive justification, and he proposed that the scale of bilateral trade flows between two countries can be approximated by applying the Gravity equation (Chaney, 2011).

Many economists then contributed to the development of the model, such as, Linnemann (1966) who added more variables and went further toward a theoretical justification in terms of a Walrasian general equilibrium system. And Leamer (1974) who used both the Gravity equation and the Heckscher-Ohlin model to motivate explanatory variables in a regression analysis of trade flows, but he did not integrate the two approaches theoretically. While Anderson (1979) considered as the first economists who attempted to derive the Gravity equation from models that assumed product differentiation, in the first, he assuming Cobb-

Douglas preferences and then constant-elasticity-of-substitution (CES) preferences (Deardorff, 1998).

The general form of Gravity Model equation in international trade can be expressed as (Chaney, 2011):

$$T_{i,j} = F \ \frac{GDP_i * GDP_j}{Dist_{i,j}} \ \text{.. (1)}$$

Where:

$T_{i,j}$: Denotes the value of trade (exports or imports) between countries i and j at time t.

GDP_i : Nominal GDP of country i.

GDP_j : Nominal GDP of country j.

$Dist_{ij}$: Distance between i and j.

F : Constant of proportionality.

The equation can also be converted into linear form for the purposes of econometric analysis by using logarithms, as follows:

$$\log(T_{i,j}) = \alpha + \beta_1 \log(GDP_i) + \beta2 \log(GDP_j) + \beta3 \log(Dist_{i,j}) + \varepsilon_i$$

Such that α represents the natural logarithm of F, and the coefficients of the independent variables $(\beta_1, \beta_2, \beta_3)$ represent the elasticity. The signal coefficients of the economies size (β_1, β_2) are expected to be positive, while the signal coefficient of distance between the two countries (β_3) is expected to be negative.

According to this law, the trade flow between any two states is determined by their current GDP and the distance between them, the economic proximity is determined by trade costs, the more the distance the greater the trade costs. Therefore, the economic size attracts countries to trade with each other while greater distances weaken the attractiveness (Boughanmi, 2008).

The model is flexible to include a range of relevant variables, such as cultural, language, and political differences between trading nations. Accordingly, the Gravity Model is now seen as the workhorse of trade theory, and especially in terms of forecasting the impact of changes in trade policy on trade costs (Anderson and Wincoop, 2001).

Also one of the famous theories to analyze the trade flows is Linder hypothesis (Endowments Similarity Model), which proposed by Staffan Burenstam Linder (1961), as a background as it explained the demand side of international trade flows based on the similarity of per capita income between countries (Bukhari, et al, 2005), where countries with high national income per capita will demand quality industrial products, while countries with low national income per capita will demand low quality goods. Accordingly, high income countries are expected to trade more with high income countries and vice versa (Ebru and Oskonbaeva, 2018).

Another famous theory in this regard is the Helpman's theorem which suggested that bigger and more similar countries tend to trade more intensively with each other than smaller and differentiated ones. The Helpman theorem is based mainly on trade with differentiated products, under the assumptions that both trading countries are fully specialized in their outputs, and tastes in both countries are identical and homothetic. Many economists then contributed to the development of the model, such as, Debaere (2005) who adopted a similar approach on determinants of the volume of trade based on the framework of Helpman (1987). He focused on the estimated parameters on the relative country size for the developed and less developed countries to claim that increased similarity in country size was more important for the determination of bilateral trade within the developed group than among less developed countries (Helpman, 1981). The Debaere transformation of Helpman theory is throughout a similarity index:

$$1 - \left[\frac{Y_i}{Y_i + Y_j}\right]^2 - \left[\frac{Y_j}{Y_i + Y_j}\right]^2 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(2)}$$

Where:

Y_i : GDP country i.

Y_j : GDP country j.

3. Literature Review

Bayoumi & Eichengreen (1997) analyzed Gravity Model. Both incorporated interactions of Regional Trade Agreements (RTAs) with dummy variables, they observed several European RTAs over a forty-year period and found that the strongest evidence of trade creation was during the 1960s. They also found an evidence of a reduction in European trade with the rest of the world.

Soloaga and Winters (2001) also applied a Gravity Model to annual imports data for 58 countries to quantify the effects of Preferential Trade Agreements (PTAs) on trade. They estimated their model on single and pooled three-year cross-sectional data, and found no indication that 'new regionalism' boosted intra-bloc trade significantly. They also found trade diversion only for the EU and EFTA.

De (2007) finds that trade in Asia is gaining high momentum, partly because of low level of trade costs. The author confirmed that the reduction of tariff and transport costs by 10 percent, each would increase bilateral trade by about 2 and 6 percent, respectively. Similarly, Khan and Kalirajan (2011) employed Gravity Model to investigate the effect of trade costs in Pakistan. The study includes bilateral exchange rates and tariff rate in addition to the traditional variables of the Gravity Model. Their findings confirmed that the growth of exports in Pakistan between 1994 and 2004 was mainly due to the reduction of trade costs in its partner countries.

In addition to, (El-Sayed, 2012) used descriptive analysis and Gravity Model to analyze trade flows between Egypt and some economic blocs. Where the study confine to ASEAN Free Trade Area (AFTA), Common Market for Eastern and Southern Africa (COMESA) and EU as major trade partner for Egypt. The study used log-linear form to estimate bilateral import flows among some economic blocs over average 2008-2010. The study found the Egyptian bilateral trade with AFTA was increased about 1% by increased of GDP of the partner countries by about 1% (equivalent). While the trade volume bilateral Egyptian with COMESA and EU were estimated about 1.1% and 1% respectively, indicating the importance of EU as major trade partner for Egypt. The distance variable was statistically significant and corresponding with economic logic in influencing the volume of Egyptian trade bilateral only in framework AFTA, where increasing the distance between Egypt and its trading partners within the framework of AFTA was estimated about 1% would lead to a reduction of the flow of the bilateral trade by about 1.9%. The variable GDP per capita and border variable are not significant in the case of the three agreements. Based on the results, the study recommends continuing to increase the volume of foreign trade, in addition to reducing the constraints faced by Intra-Arab trade.

Similarly, Suresh and Aswal (2014) have studied the determinants of India's manufactured exports to developing countries and developed countries using an Augmented Gravity Model. Their findings confirmed that India's exports were explained by total GDP, GDP similarity and difference in per capita income. Moreover, it was found that trade costs as well as distance, had more negatively affected India's exports to north than the southern market as proximity to the southern market was crucial.

The Refaat and Sabry (2015) study aimed to empirically analyze foreign trade using the gravity model for seven Arab countries, namely: Jordan, Lebanon, Libya, Saudi Arabia, Sudan, Syria, and the UAE. The study concluded that the increase in Egypt's GDP and the GDP of the Arab countries concerned in the study leads to an increase in merchandise exports to Egypt. In addition, the results indicated that the increase in the geographical distance between the Arab countries and Egypt leads to a decline in exports.

Souad Awn Allah (2018), aimed to identify the various variables that effect on export flow in Algerian, using the gravity model in order to know the different factors and determinants which effect on Algerian's exports with their trading partners. The study found a positive relationship between exports and all the explanatory variables represented in GDP, per capita GDP, population, trade agreements, language and geographical borders between Algerian and their trading partners.

Whitten, et al., (2020) have studied how the political relations affect international trade. Evidence from China's twelve trading partners. they suggest that the political relationship is a key determinant of collective emotions of consumers and trading companies and consequently the interactions between importers and exporters. they hypothesize that warmer relations lead to larger increases (or smaller decreases) in trade while cooler relations have the opposite effect. Based on monthly data of China and her twelve trading partners from 1981 to 2019, this study provided an empirical investigation into the association between political relationship and bilateral trade flows. the results showed that shocks to relations are highly persistent and frequently cause changes in trade. However, relations themselves are little influenced by changes in trade, changes that show little persistence.

4. Modeling Foreign Trade Flows Between Jordan and the Main Trading Partners

4.1 Foreign Trade Relations of Jordan

Although Arab region is considered an economically diverse region, its countries enjoy a common heritage, shared religion, culture, and language. These reasons have assisted creating regional Arab integration that helped in strengthening the economic competitiveness, throughout strong and stable inter and intra-regional trade flows. The Arab intra-regional trade performance has been negatively affected by political tensions. The yearly growth rate of intra-regional exports was -14.0 percent between 2013 and 2016, while the growth rate of intra-regional imports was -18.5 percent during the same period (Economic Statistics Bulletin of Arab Countries, AMF 2018). During the last decade, Jordan, as many other countries, has been

affected by political tension in the reagion, as intra-regional exports and imports between Jordan and Arab region have decreased significantly. In 2018 Jordan's contribution of intra-regional exports was about 2.5 percent compared with 3.1 percent in 2013, while Jordan's contribution of intra-regional imports was about 4.8 percent compared with 5.6 percent in 2013 . However, in 2019 Jordan's contribution of intra-regional exports has been decreased to reach 2.4 percent, while Jordan's contribution of intra-regional imports in 2019 maintain the same level as in 2018 at 4.8 percent.

Figure 1: Arab Countries Exports as a Share of Total Intra-Regional Exports
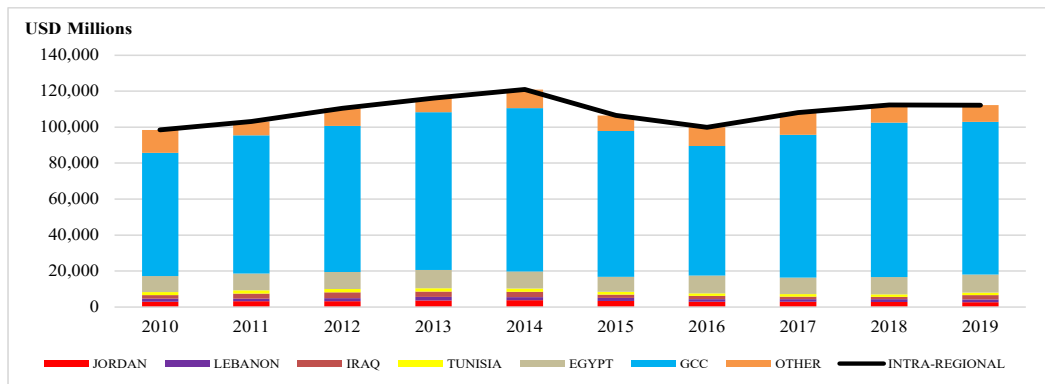
Source: Arab Monetary Fund, the Joint Arab Economic Report, different editions.

Figure 2: Arab Countries Imports as a Share of Total Intra-Regional Imports
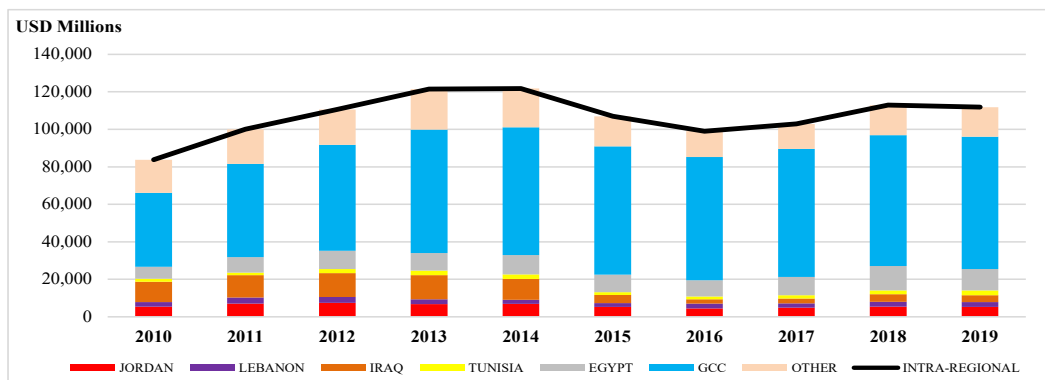
Source: Arab Monetary Fund, the Joint Arab Economic Report, different editions.

4.2 Regional Political Tensions

Jordan's economy continues to suffer from exogenous shocks. These include regional unrest, especially in neighboring countries like Syria, Iraq, Egypt, and Gulf Cooperation Council GCC countries, in addition to energy supply problems (Deauville Partnership Ministerial Meeting October 10, 2013 Washington DC).

ISIS roused a geopolitical escalation in the region during 2014 to 2017, exploiting the armed conflict in Syria and the precariousness in Iraq. The border area, which hosts roads connecting Baghdad to Damascus and Amman, has also witnessed conflicts, and due to security fears and no safe alternative routes, starting from April 2015 Jordan closed its border crossing with Syria, which is one of its most substantial trade routes. The damage was excessive to the import-reliant Jordan economy, and heavily impacted exports particularly of fruits and vegetables until the borders were reopened on 14 October 2018. Moreover the closure of the Jordanian-Iraqi border caused a weakness of the commercial movement or stopped it completely, affecting the Jordanian exports negatively, until the borders were reopened in August 2017 through a back-to-back freight shipping mechanism (Abudayyeh, 2018). The armed conflict in Syria has caused an expansive flow of Syrian refugees into wide range of countries. Currently, Jordan is hosting over 1.3 million Syrians, 655 thousand of them are registered refugees (Jordan Response Plan for the Syrian Crisis 2018 - 2020). Fulfilling the necessities of the newly arrived refugees has drained Jordan's resources and has had large consequences on Jordanian society (Alshoubaki, Harris, 2018).

Another political tension affects the region was in 2017, when Saudi Arabia, UAE, Bahrain, Egypt announced the closure of its shared airspace, sea, and land border with Qatar. The other Gulf Cooperation Council members denied Qatar use of their airspace and ports (BBC, 2018). This had its impact on the Jordanian exports to Qatar. On the other hand, Yemen's civil war began in 2015, where a coalition of Gulf states led by Saudi Arabia launched a campaign of economic isolation and air strikes against the Houthi, make regional trade worse.

4.3 Jordan's Exports

Jordan's exports have been negatively affected by various external shocks during the last decade. The Global financial crisis (2008-2009), the Arab spring (2011), the Syrian civil war (2011), the conflict in Iraq (2014), the GCC political tension with Yemen and Qatar, and more recently COVID-19 pandamic, have decelerated trade flows at a regional and global level. Jordan was affected directly and indirectly with those shocks, as they led to the closure of its borders with key export markets (Iraq and Syria), a massive inflow of refugees, a disruption of the supply chain and energy supply, difficulty and costly of obtaining production inputs, and decline demand in global markets.

Jordanian exports averaged JD 5,486 million from 2008 until 2020. As a percent of GDP, total exports has been fluctuating but always within a range. On average for the whole period (2008-2020), the exports to GDP ratio was 23 percent.

Figure 3 illustrates total exports which registered a sharp decline of 20 percent in 2009 to reach JD 4,526 million, about 26 percent of GDP, as the global financial crisis has weakened the external demand on Jordanian exports. During the period (2010-2014), the difficult external environment after the "Arab spring" adversely affected the trade routes between Jordan and its neighboring countries; Iraq and Syria, which contributed in decreasing the exports to those countries and other export destinations such as Lebanon, Europe, Turkey and Central Asia. Moreover, the deepening instability in the region, in addition to the appreciation of the U.S. dollar against other currencies adversely impacted exports in 2015 and 2016 as it decreased by 7 percent and 4 percent, respectively, to account for 20 percent and 19 percent of GDP in 2015 and 2016 respectively.

Thereafter, Jordan has tried to mitigate these losses in exports, by resorting to alternative but more expensive routes such as Aqaba Port or by air, longer route to Iraq through Albasrah (Iraq-Kuwait borders) as well as searching new markets, within the region and in Africa. This had helped Jordan to lessen the decrease in the relative importance of exports in GDP, as the exports decrease from 35 percent of GDP in 2008 to 19 percent of GDP in 2019.

The COVID-19 pandemic had adversely impacted Jordanian exports, following the deterioration of both global demand, international transportation and travel across the world, in addition to the closures measures, which led to a sharp decline in total exports of 5 percent in 2020, to reach JD 5,639 million, about 18 percent of GDP

Figure 3: Jordan's Exports as a Percent of GDP
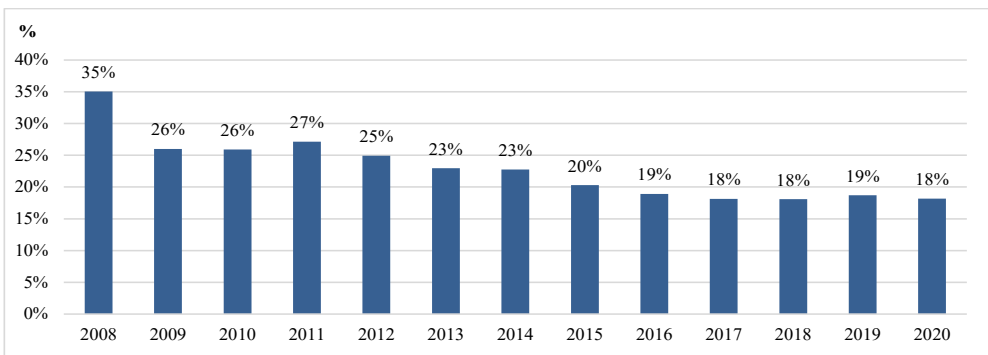
Source: Central Bank of Jordan and Department of Statistics, Jordan.

The composition of the Jordanian domestic exports by commodity has remained relatively stable over time. The most important categories of exports are clothes which represented in 2020 about 23.0 percent of Jordanian exports, followed by crude materials (potash and

phosphates) with a share of 14.0 percent. Food (which mostly consists of fruits and vegetables) represent 13.8 percent of exports, followed by pharmaceutical products 8.4 percent of the Jordanian exports.

As for the largest trading partners of Jordan, the United States, Saudi Arabia, India, Iraq, Kuwait, the United Arab Emirates, China, and Palastine represent the main destinations of Jordanian exports in 2020.

Prior to the escalation of violence and resultant border closures, Jordan enjoyed a fruitful trade relationship with both Iraq and Syria. Exports to Iraq, was accounted for 18 percent of Jordan's total exports in 2013, have declined by more than 50 percent since the closing of the Iraqi-Jordanian border to reach about 7.3 percent of Jordan's total exports in 2017. Similarly, in 2011, Jordan's exports to Syria constituted 4 percent of total exports, falling to a value equivalent to just 0.71 percent of total exports in 2019.

4.4 Jordan's Imports

Jordan has one of the smallest economies in the Middle East, and its lack of natural resources, and therefore it heavily dependent on imports across a range of industry sectors. This in turn means that the country maintains significant trade deficits, imports are three times greater than exports. Jordanian imports averaged JD 13,570.6 million from 2008 until 2020. As a percent of GDP, imports has been fluctuating but always within a range. On average for the whole period under consideration (2008-2020), the imports to GDP ratio was 56 percent.

Figure 4 illustrates total imports as a percent of GDP which registered a sharp decline of 16.2 percent in 2009 to reach JD 10,107.7 million, about 58 percent of GDP, owing to the repercussions of the global financial crisis.

The period (2010-2014) witnessed an increase in imports which averaged JD 14,234.3 million or 62.7 percent of GDP, it was mainly driven by the rise in the imports of crude oil and petroleum products due to the increase in its prices in the international markets, and to offset the decline in the Egyptian gas flows used to generate electrical power.

However, as a consequence of the harsher economic conditions and the drop in international oil prices, Jordanian imports suffered a significant decline. Imports declined by

10.7 percent and 5.6 percent in 2015 and 2016, respectively. In 2017, imports rose slightly by 6.0 percent, and declined again during the period 2018-2020.

The economic contraction caused by the COVID-19 pandemic, accompanied with a decline of aggregate domestic demand, had led to lessen Jordan's imports of goods and services during 2020 by 10.1 percent, to reach JD 12,235.4 million or 39.4 percent of GDP.

**Figure 4: Jordan's Imports of Goods and Services as a Percent of GDP**
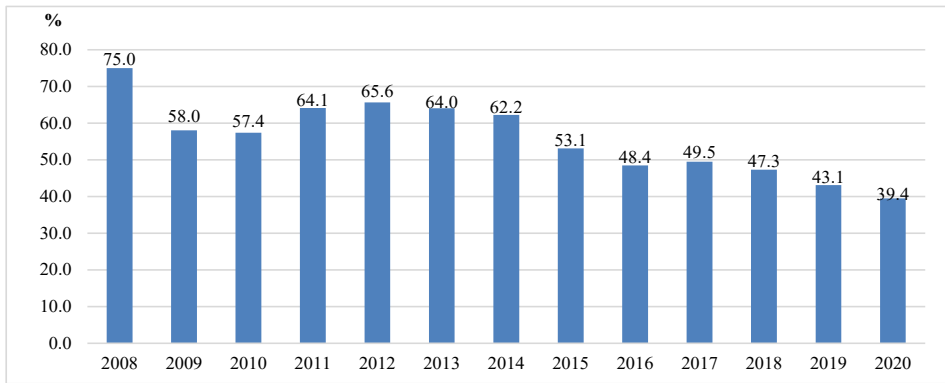
Source: Central Bank of Jordan and Department of Statistics, Jordan.

Jordan's main imports are machinery and transport equipment, fuels, food, manufactured chemicals and electrical machines. As for Jordan's main import partners they are Saudi Arabia, China, Germany, the United States, the UAE, Egypt, Turkey, and Italy.

4.5 Jordan's Trade Balance

Jordan encounters a permanent trade deficit as the kigdom's imports exceed its exports. As illustrated in figure 6, the trade deficit increased from JD 6,428 million in 2008 to JD 6,596 million in 2020 and averaged, as a percentage to GDP, 33.0 percent during 2008-2020. This deficit is mainly driven by an increase in international prices of commodities, particularly fuel products, which is translated into a rise in the imports bill. In addition to the growing social and political unrest in the region and the difficult challenges faced by the trade movements as a result of the COVID-19 pandamic.

Figure 5: Jordan's Trade Deficit as a Percent of GDP
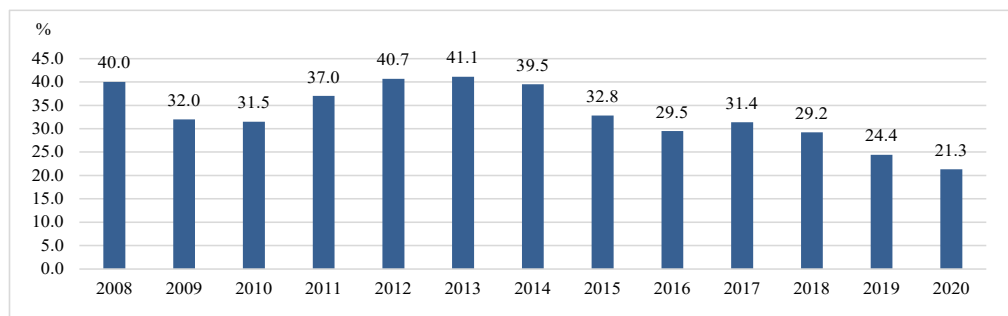
Source: Central Bank of Jordan and Department of Statistics, Jordan.

5. Data Sources and Methodology

5.1 Data and Sample Size

This study covers Jordan's top 13 trade partners. For simplicity, the study chose countries that exports covers about 54 percent in 2019 of its total exports. While imports covers about 37 percent in 2019 of its total imports . These countries include Syria, Egypt, Lebanon, Iraq, Turkey, Tunisia, the United States and Gulf Cooperation Council countries (GCC) as a group, which include six countries. noting that the study includes United States due to it has a big bortion of bilateral trade with Jordan with many trade agreement.

The data were collected for the period of 2001 to 2020 annually. Data on partners GDP and GDP per capita were obtained from World Economic Outlook Database. Exports and imports data for all countries in the study were obtained from Central bank of Jordan database.

5.2 Methodology

Based on the basic form of the Gravity Model, trade flows ($T_{i,j}$), and in our case, exports and import flows are affected by the distance between countries ($Dist_{i,j}$), and the interaction of the countries' economic sizes (GDP_i and GDP_j). The static general basic Gravity Model that is applied in this paper has the following log linear form:

$$\log(T_{i,j}) = \alpha + \beta_1 \log(GDP_{i,t}) + \beta_2 \log(GDP_{j,t}) + \beta3 \log(Dist_{i,j}) + \varepsilon_i \ldots(3)$$

To account for other factors that may influence export and import activities, other variables have been added to the basic model to form the Augmented Gravity equation; the most important one is a dummy variable to account for the political tension.

5.2.1   Augmented Gravity Model

The Augmented Gravity Model for this paper used to analyze the patterns of Jordan's trade flows with its partners, using $\log(E_{i,j,t})$ denote to total exports (including re-export) and $\log(I_{i,j,t})$ denote to total import as a dependent variable each one has an independent equation as follows:

$$\log(E_{i,j,t}) = \alpha_1 + \beta_1 \log(GDP_{i,t}) + \beta_2 \log(GDP_{j,t}) + \beta_3 \log(Dist_{j,i,t}) + \beta_4 (Bord_{j,i,t}) + \beta_5 (RFE_{j,i,t}) + \beta_6 (PT_{i,t}) + \beta_7 \log(SIMI_{i,j,t}) + \varepsilon_{1i,t} \ldots(4)$$

$$\log(I_{i,j,t}) = \alpha_2 + \beta_8 \log(GDP_{i,t}) + \beta_9 \log(GDP_{j,t}) + \beta_{10} \log(Dist_{j,i,t}) + \beta_{11} (Bord_{j,i,t}) + \beta_{12} (RFE_{j,i,t}) + \beta_{13} (PT_{i,t}) + \beta_{14} \log(SIMI_{i,j,t}) + \beta_{15}(Oil_{i,j,t}) + v_{2i,t} \ldots(5)$$

Where:

$E_{i,j,t}$: The value of exports between Jordan and country i during the period t, it measured by the total exports in thousands of JD dinar.

$I_{i,j,t}$: The value of imports between Jordan and country i during the period t, it measured by the total exports in thousands of JD dinar.

$GDP_{i,t}$: Gross domestic product of Jordan in period t, at the current prices in thousands of US dollars.

$GDP_{j,t}$: Gross domestic product of country j in period t, at the current prices in thousands of US dollars.

$Dist_{i,j,t}$: The distance between Jordan and its partners in thousands of Kilometers.

$Bord_{i,j,t}$: Dummy variable that takes a value of unity if country i share a border with Jordan.

$PT_{i,t}$: Dummy variable that is used to capture the effect of political tensions in country i for the period t.

$RFE_{i,j,t}$: Similarity index, measured by **Relative Factor Endowment**, which is used as a proxy of Linder hypothesis and captured through a variable measures the degree of similarity between the per capita income level, and it is calculated as the difference in the levels of per capita GDP of Jordan and each trading partner in the study (Bukhari and others, 2005).

$SIMI_{i,j,t}$: Similarity index, measured by **Absolute Factor Endowment**, building on Debaere transformation of Helpman's theorem (1987), and captured through a variable that measures the degree of similarity between the GDP, and it is calculated as formula as in Debaere (2005).

Oil_t : The price of oil during the period t, it measured by the average oil prices of US dollars.

$\varepsilon_{i,t}$: Error term.

6. Empirical evidence and results

In order to estimate trade effects and trade relationships for a particular time period in both a time-series and cross-section context, a panel data set was used.

several experimental techniques have been employed to conduct an appropriate panel data regression. In particular, the study has tested unit-root to investigate stationary. Unit root test in panel data has been developed by two generations: Cross-sectional independence (CSI) and Cross-sectional dependence (CSD). In panel unit root test under CSI, the data is independent and identically distributed (i.i.d.) across individuals. But in CSD, that have non standard limit distributions (Barbieri, 2005). This study used Levin, Lin and Chu (LLC),(2002) and Im, Pesaran and Shin (IPS),(2003) to test unit root under CSI. Those tests have a heterogeneous serial correlation structure of the errors in model specification and individual linear trend. In addition, more relevant for panel of moderate size and superconsistency of the estimators (Barbieri, 2005).

LLC test are represent by hypothesis test, which state that the null hypothesis is nonstationary and we can not rejected at 5% level for all variables. But in alternative hypothesis all variables are stationary. The results of LLC are presented in table (1), it shows that all variables are stationary which integrated in level I(0), and IPS test support the results as all variables are I(0).

Table 1: Panel unit root tests.

Variables	Levin, Lin and Chu	
	Statistic	Prob.
$Log(Export_{i,t})$	-2.67	0.004
$Log(Import_{j,t})$	-6.75	0.000
$Log(GDP_{i,t})$	-3.518	0.002
$Log(GDP_{j,t})$	-5.729	0.000
$Log(Sim_{i,j,t})$	-2.530	0.006
GDP per capita ratio$_{i,j,t}$	-2.300	0.010
$Oil_{i,t}$	-2.318	0.010

Source: prepared by the researchers

To incorporate the special characteristic of the cross-sections in the analysis, the study has examined the use of the Fixed and Random effect on the panel data, in addition to the Hausman test (HT), which determines the more appropriate model through if there is a correlation between the error terms and the regressors (endogenous regressors). Also it can compared models gives consistent and efficient results and the other consistent, but inefficient.

The general form of Panel equation:

$$y_{i,t} = \alpha_i + \beta' x_{i,t} + u_{i,t}$$

$y_{i,t}$: dependent variable

$x_{i,t}$: Vector of independent variable

α_i: intercept

β: parameters

u_i: error terms

The general form of Hausman test statistic:

$$H = \left[\hat{\beta}_{RE} - \hat{\beta}_{FE}\right]' \left[\text{Var}(\hat{\beta}_{RE}) - \text{Var}(\hat{\beta}_{FE})\right]^{-1} (\hat{\beta}_{RE} - \hat{\beta}_{FE}) \qquad - \chi^2(df)$$

Where:

$\hat{\beta}_{RE}$:parameters in random effects

$\hat{\beta}_{FE}$:parameters in fixed effects

$-\chi^2$: chi square distribution

Hausman test statistic under the hypothesis:

$$H_0: (random\ effects\ model\ is\ appropriate)$$

$$H_1: (fixed\ effects\ model\ is\ appropriate)$$

Based on above hypothesis, while state that the null hypothesis is random effects and Alternative hypothesis is fixed effects. which means that we rejected at 5% level to run fixed effect otherwise will run random effects. The results of (HT) statistic are presented in table (2). However, the study found that we can not reject null hypothesis, so we used random effects analysis for both Export and Import.

Equations	Hausman test	
	Chi-Sq. d.f.	Prob.
Export	6	0.99
Import	6	0.99

Source: prepared by the researchers

It is well known that panel data methodology very often suffer from heteroskedasticity. For that the study used likelihood ratio tests to test for the presence of multiplicative heteroskedasticity within OLS framework, and it showed the presence of such problem.

Testing for this error violation is especially important since the presence of heteroskedasticity not only leads to inconsistent maximum likelihood estimates but also to unreliable inferences from hypothesis tests. Thus, FGLS (cross-sections SUR weights) was applied to the model. In addition, FGLS is BLUE estimator which is consistent and efficient under random effects and inconsistent under fixed effects.

6.1.1   Estimation Results and Discussion

The empirical results show that most variables were consistent with the economic theory. Domestic NGDP of Jordan and distance were found to have the expected sign and they are statistically significant determinants of Jordan's exports and imports based on estimated models.

The coefficient of the similarity index which is measured by absolute factor endowment (SIMIij) has been positive and statistically significant in both export and import, suggesting that Jordan trade more with similar economic structure. Based on previous studies, this coefficient tends to be positive when a country trade homogeneous goods, as in Jordan case. SIMij coefficient positive sign is consistent with Helpman's results and, more generally, consistent with the Gravity equation.

Table 3: Gravity Model Estimation on Jordan's Export Flows From 2001-2019

Panel EGLS (Cross-section SUR) Dependent Variable: ln (EXPORT) Sample: 2001 2019				
Variables	**Export Equation**		**Import Equation**	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**
$Log(GDP_{i,t})$	0.48	0.00	0.33	0.00
$Log(GDP_{j,t})$	0.28	0.00	0.14	0.00
$Log(Dist_{i,j,t})$	-0.44	0.01	-1.05	0.00
$Log(SIMI_{i,j,t})$	0.89	0.04	2.49	0.00
$Bord_{i,j,t}$	1.32	0.00	2.04	0.00
$PT_{i,j,t}$	-0.11	0.02	-0.04	0.00
$RFE_{i,j,t}$	0.07	0.00	0.04	0.00
$Oil_{i,t}$	-	-	0.0009	0.00
C	-	-	15.63	0.00
R-squared	**0.98**		**0.99**	

Note: j subscript for Jordan, i subscript for Jordan's trade partners.

Source: prepared by the researchers

On the other side, the study found that the coefficient of the similarity index, measured by relative factor endowment ($RFE_{i,j}$) and defined as the difference in per capita GDP, has been found positive and statistically significant. This means that the more the difference in income between Jordan and its trade partner countries, the more Jordan trade to those countries, which indicates that the Linder hypothesis does not apply on the Jordan's case.

The results show also that oil prices ($Oil_{i,t}$) has been a significant determinant of Jordan imports flows. The study found out that Jordan's trade flows are largely affected by openness or closure of cross borders with its neighboring countries. This result is consistent with the findings of (Frankel, 1997) study.

The results also show that political tensions have strong negative impact on Jordan's exports and import flows, the result is statistically significant, similar to the results in (Fuchs and Klann, 2013) and (Davis and Meunier, 2016). It indicates that the political tensions in trade partners have decreased Jordan's trade flows to those countries.
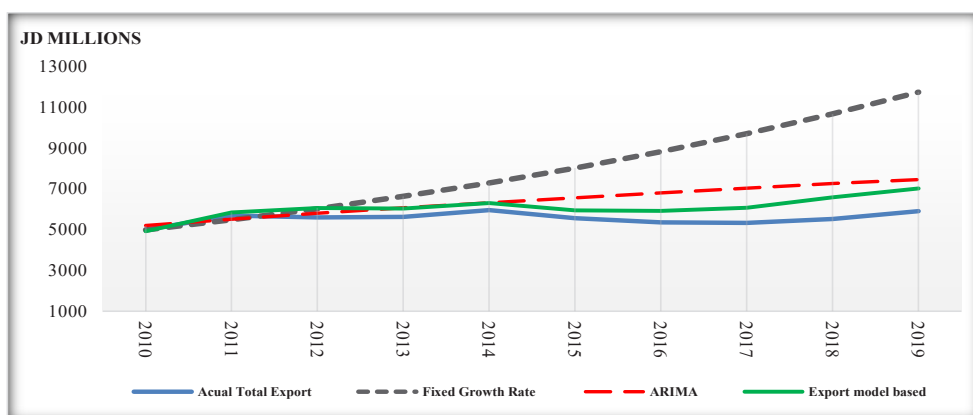
7. An Estimation of Jordan's Exports Loss

The study intends to estimate the trade loss which came as consequence of the political tension in the region. So, it reglect the loss just with the country sample, and does not take into account the switching trading markets. So, it could be more or less in total trade. In order to estimate the loss on exports and imports, a potential (long term trend) has been estimated using three different methods:

- Simple calculation, based on a fixed growth rate of the average total exports and total import growth for the last four years prior to the estimation period.

- Simple statistical method, using ARIMA model smoothed by HP Filter.

- Model based estimation, using the Augmented Gravity Model constructed in this study, **after eliminating the political tension (PT) from the equation to estimate the potential Jordanian's exports and imports if there were no political tensions in the region.**
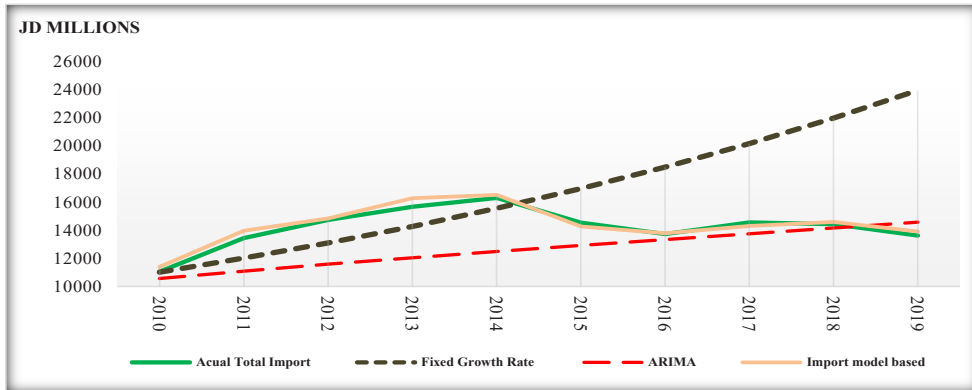
The results of the above-mentioned methods can be summarized in figures 6 and 7 as follow:

Figure 6: Exports Analyses under the Three Methods

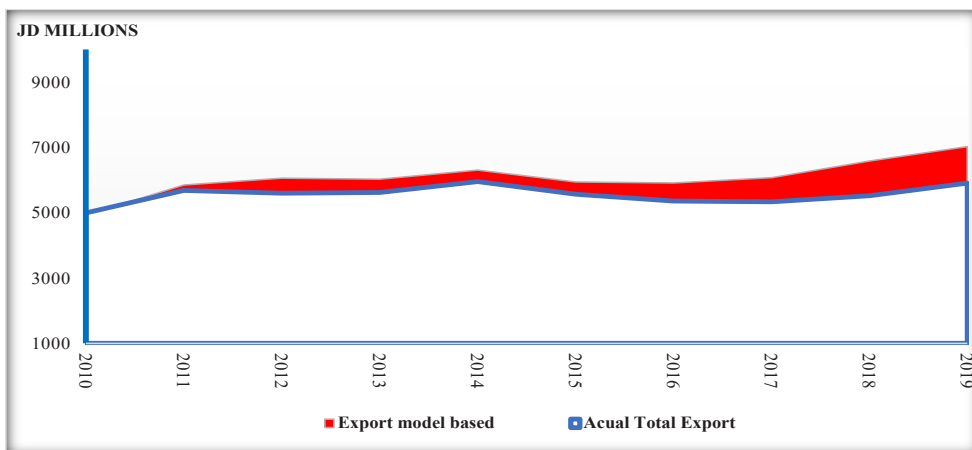Source: prepared by the researchers

Figure 7: Imports Analyses under the Three Methods


JD MILLIONS

Source: prepared by the researchers

Based on the above illustration, it is obvious that the fixed growth estimation seems to overestimate Jordan's exports and imports losses, while the ARIMA model estimation is close to the export model but very different from the import model. Accordingly, the estimation of Gravity Model was chosen. Figures 8 and 9 shows the loss area between the estimated potential total exports and the actual total exports, and potential total imports and the actual total imports respectively for Jordan.

Figure 8: The Estimation of the Total Loss in Exports as a Result of the Political Tension

JD MILLIONS

Source: prepared by the researchers

Figure 9: The Estimation of the Total decrease in Imports as a Result of the Political Tension
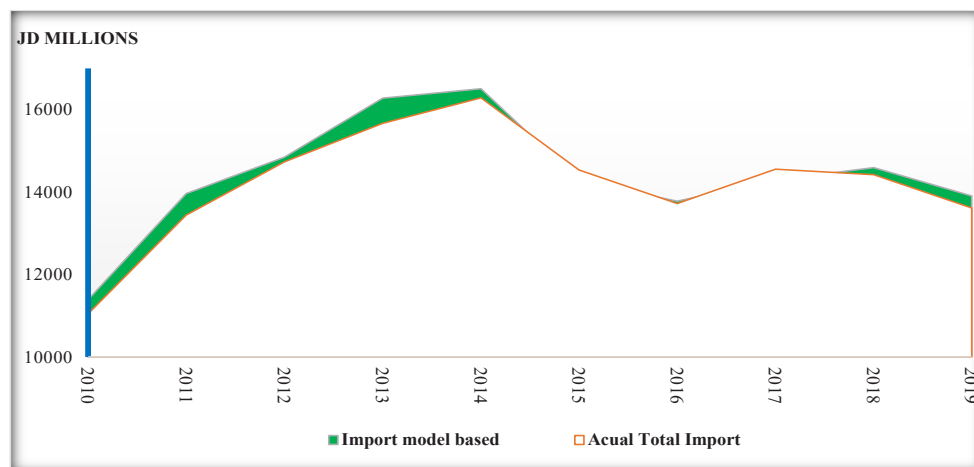
Source: prepared by the researchers

Based on the above figures, the loss in exports as a result of regional political tensions during 2010-2019 (the red shaded area in the chart above) was estimated to be around JD 5 billion (USD 7 billion). In the same direction, the decrease of imports (the green shaded area in the chart above) was expected to be around JD 1.8 billion (USD 2.5 billion). Accordingly, the direct effect of the political turmoil in the region has contributed significantly to a loss of JD 3.2 billion (USD 4.5 billion) in the value of Jordanian net exports during 2010-2019.

Noting that, Figures 10 and 11 illustrates the regional countries exports and imports ratio, it indicates that, thirteen countries accounted for 54 percent of total exports in 2019, compared to 55 percent in 2018. The ratio has been fluctuating but always within a range. On average for the whole period (2001-2019), the regional countries exports to total exports ratio was 53%. While the regional countries imports ratio, accounted for 37 percent of total imports in 2019, compared to 38 percent in 2018. On average for the whole period (2001-2019), the regional countries imports to total imports ratio was 39%.

Therefore, ARIMAX was used to estimate total exports and total imports loss for 2020, with the world ouput gap being the explanatory variable for export and domestic output gap for import, and by eliminating the impact of PT and COVID-19. Based on our estimation, during 2020, Jordan expected loss from the repercussions of coronavirus and the closure of boundaries was around to JD 632 million (USD 891 million) on export, while loss on import was much higher around JD 1.6 billion (USD 2.3 billion). Accordingly, net export in 2020 was estimated to witness an improvement by around JD 1.0 billion (USD 1.4 billion).

8. Conclusion

The aim of this study is to analysis the effect of the political tension on the Jordanian trade flow by adapting Augmented Gravity Model using Feasible Generalized Least Square (FGLS) and cross-sections Seemingly Unrelated Regression (SUR) weights applied on panel data. The study uses annual data for the period 2001-2020 for Jordan's most important trading partners, focusing especially on the regional countries experiencing political tensions: (Syria, Iraq, Lebanon, Gulf Cooperation Council countries (GCC), Egypt, Tunisia, Turkey and USA). The study used to explain bilateral trade flows (export and import flows), in addition to basic Gravity Model variables (GDPi, GDPj and distance), the RFE (per-capita GDP differences), similarity index, and two dummy variables to account for sharing a land Border and Political tensions.

The empirical results show that all variables and the expected sign of the variables were consistent with the economic theory. The findings show that Jordan's trade (export and import flows) is positively determined by NGDP of Jordan, and negatively with distance. In the same direction, Jordan's trade flows were largely affected by common borders measured by a dummy variable.

The political tension dummy variable was negative and statistically significant, indicating that Jordan's exports and imports flows negatively affected by the different political tensions in the region. This result is similar to the results in (Fuchs and Klann, 2013) and (Davis and Meunier, 2016), and it indicates that the political tension between Jordan and its trading partner will decrease Jordan's export and import.

Figure 10: The regional countries exports
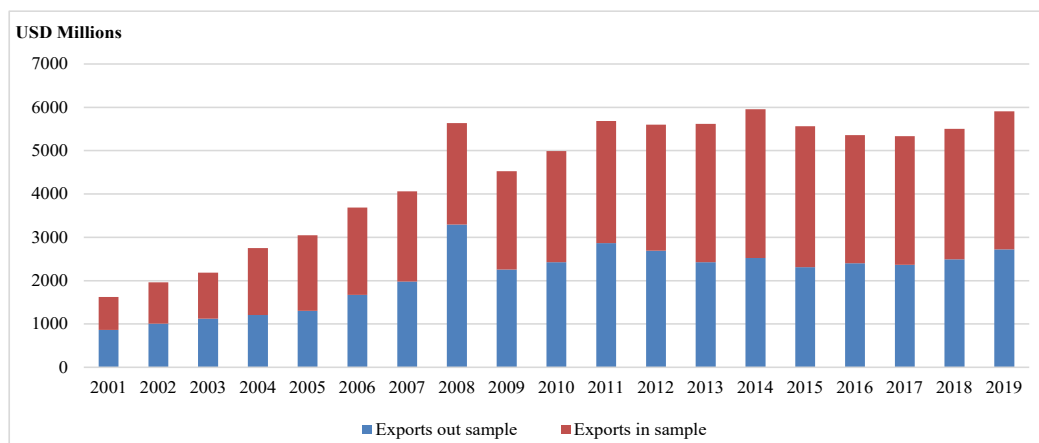
Source: calculated by researchers based on Central Bank of Jordan database

Figure 11: The regional countries imports
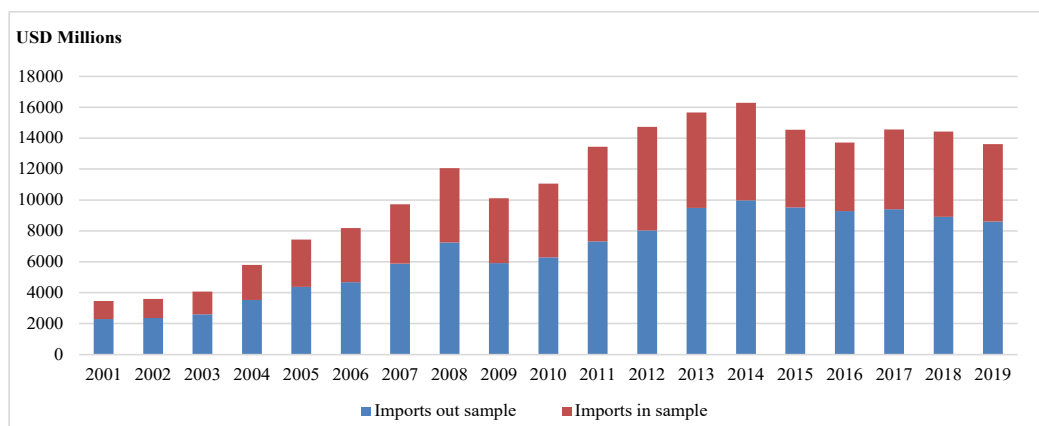
Source: calculated by researchers based on Central Bank of Jordan database

During 2020, Jordan experienced unprecedented economic challenges due to the COVID-19 outbreak. The outbreak of the virus and measures to contain it both locally and globally have taken a heavy toll on our economy. Interruptions to domestic activity and global supply chains have coupled with reduced tourism, remittances, and export receipts to adversely affect Jordanian incomes.

Therefore, ARIMAX was used to estimate total exports and total imports loss for 2020, with the world ouput gap being the explanatory variable for export and domestic output gap for import, and by eliminating the impact of PT and COVID-19. Based on our estimation, during 2020, Jordan expected loss from the repercussions of coronavirus and the closure of boundaries was around to JD 632 million (USD 891 million) on export, while loss on import was much higher around JD 1.6 billion (USD 2.3 billion). Accordingly, net export in 2020 was estimated to witness an improvement by around JD 1.0 billion (USD 1.4 billion).

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The empirical results show that all variables and the expected sign of the variables were consistent with the economic theory. The findings show that Jordan's trade (export and import flows) is positively determined by NGDP of Jordan, and negatively with distance. In the same direction, Jordan's trade flows were largely affected by common borders measured by a dummy variable.

The political tension dummy variable was negative and statistically significant, indicating that Jordan's exports and imports flows negatively affected by the different political tensions in the region. This result is similar to the results in (Fuchs and Klann, 2013) and (Davis and Meunier, 2016), and it indicates that the political tension between Jordan and its trading partner will decrease Jordan's export and import.

In order to estimate the loss of Jordan's exports and imports, a potential (long term trend) has been estimated based on the Augmented Gravity Model after eliminating the PT dummy variable from the equation and calculating the gap with the actual figures.

The direct effect of the political turmoil in the region has contributed significantly to a loss of JD 5 billion (USD 7 billion) in the value of Jordanian exports during 2010-2019, and JD 1.8 billion (USD 2.5 billion) in the value of Jordanian imports. Accordingly, the loss in net export as a result of regional political tensions was estimated to be around JD 3.2 (USD 4.5 billion).

Furthermore, by eliminating the impact of PT and COVID-19, during 2020, Jordan expected loss from the repercussions of coronavirus and the closure of boundaries was around to JD 632 million (USD 891 million) on export, while decrease on import was much higher around JD 1.6 billion (USD 2.3 billion). Accordingly, net export in 2020 was estimated to witness an improvement by around JD 1.0 billion (USD 1.4 billion).

Moreover, the study found that Linder hypothesis measured by relative factor endowment (the degree of similarity between per capita income level), which is calculated as the difference between per capita GDP in Jordan and each trading partner, is statistically significant but has a positive sign, which is contrary to the Linder hypothesis, (i.e the more the difference in per capita the more the Jordanian trade flows will be from that country).

The similarity index measured by absolute factor endowment has been positive and statistically significant suggesting that Jordan trade is related more with similar economic structure. This positive sign is consistent with Helpman's theory results and more generally, consistent with the Gravity equation.

تأثير التوترات السياسية في المنطقة على التدفقات التجارية في الأردن

إعداد

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حزيران 2022

الملخص

هدفت هذه الدراسة لتحليل أثر هذه التوترات السياسية الدراسة التي شهدتها المنطقة خلال العقد الماضي، وجاءت هذه على التجارة الأردنية من خلال الاعتماد على نموذج الجاذبية الموسع (Augmented Gravity Model) للفترة (2001-2019)، وذلك باستخدام طريقة المربعات الصغرى المعممة الممكنة (FGLS)، وأسلوب انحدار العلاقات غير المرتبطة ظاهرياً (SUR) المطبقة على السلاسل الزمنية المقطعية، حيث وجدت الدراسة أنه يمكن تطبيق نموذج الجاذبية ونظرية Helpman على الحالة الأردنية لتدفق التجارة، في حين وجدت أن فرضية Linder لا تنطبق على الحالة الأردنية. كما أظهرت النتائج الرئيسية للدراسة وجود تأثير كبير للتوترات السياسية على التجارة الأردنية، حيث يقدّر أن الخسائر في الصادرات والمستوردات خلال (2010-2019) بلغت حوالي 5.0 مليار دينار (7.0 مليار دولار) و1.8 مليار دينار (2.5 مليار دولار) على التوالي، لتبلغ الخسارة في صافي الصادرات ما مقداره 3.2 مليار دينار (4.5 مليار دولار). أما خلال عام 2020 فإن الخسارة المتوقعة نتيجة أزمة كورونا وما صاحبها من اغلاق للحدود تقدر بنحو 632 مليون دينار أردني (891 مليون دولار) للصادرات، و1.6 مليار دينار (2.3 مليار دولار) للمستوردات، لتبلغ خسارة صافي الصادرات نحو 1.0 مليار دينار (1.4 مليار دولار).

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