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TRADE BALANCE AND THE COVID-19 PANDEMIC: THE CASE OF JORDAN

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ABSTRACT

This research aimed to study the main determinants of trade deficit in the Jordanian economy for the quarterly periods from 2009 to 2021. Specifically, the study examined the effects of the COVID-19 pandemic on trade balance, in addition to other variables. The methodology for this study used Ordinary Least Square (OLS) method which, after applying the necessary diagnostic tests, was verified as the appropriate method. The main result of this paper shows that the COVID-19 pandemic reduced the trade balance, as expected. However, this result is statistically insignificant since the pandemic would improve the growth of the trade balance (TD) from the imports side but would worsen it from the exports side. The results also found that foreign investment was significant in affecting the trade balance. The implication of these results is that the Jordanian economy is vulnerable to outside shocks due to its openness. The government should adopt export-oriented policy to ensure the sustainability of the trade balance.

Contribution/Originality: This research contributes by examining the main determinants of trade deficit in Jordan. The paper explores the impact of the COVID-19 pandemic, in addition to other variables like investment flow and real exchange rate, on the position of the trade balance for the Jordanian economy.

1. INTRODUCTION

Jordan suffers from a persistent deficit in its trade balance. Data published by the Central Bank of Jordan shows that the average annual rate of the deficit as a percentage of the Gross Domestic Product (GDP) is about 26% during the study period between 2009 to 2021. During the study period, the value of exports grew at an annual average percent of 3.5%, while the value of imports grew at an annual average percent of 4.1%. These developments caused the ever-present deficit in the trade balance to deteriorate even more. The trade deficit also expanded by an annual average growth of 5.1% between 2009 and 2021, from 4448.8 million Jordanian dinar in 2009 to 7009.2 million Jordanian dinar in 2021

Transactions of the trade balance are usually the biggest part of a current account. All investors keep an eye on the movements of these accounts, which indicate the true financial position and health of the economy. In many cases, a big percentage of trade deficit to GDP could devaluate the local currency. Economic theory suggests a number of economic variables that would have an impact on trade balance. These variables include foreign direct investment, real GDP, government expenditures, and movements in the foreign exchange market, as well as other factors. The importance of this study is twofold. First, it will determine the variables that cause the persistent deficit in the Jordanian trade balance. Second, it will incorporate the effect of the COVID-19 pandemic in the model to examine its actual effect on the trade balance in Jordan. The pandemic affected all economic activities around the

world. The question we would like to answer is to what extent the pandemic has affected the Jordanian trade balance.

Despite the strong connection between economic growth and trade deficit, the subject of the determinants of trade deficit has not been studied sufficiently in Jordan. Knowing these determinants, it became even more important after the start of the COVID-19 pandemic in 2020. Accordingly, themajo0r objective of this paper was to supplement the existing literature of the determinants of trade deficit.

The rest of this paper is organized into five parts. Part 2 presents a brief discussion about the sustainability of the trade balance. Part 3 discusses empirical literature related to the determinants of trade balance. Part 4 explains the methodology of this paper. Part 5 includes more specifics on the methodology and details the results of the empirical model. Finally, part 6 presents the concluding remarks.

2. SUSTAINABILITY OF THE TRADE BALANCE

Economic policies have much impact on trade balance. These trading policies could cause the imbalances in the trade balance. Countries now are more open to trade than before especially when most countries of the world joined the World Trade Organization (WTO). Besides, world economies are heavily dependent on different goods imported from the outside, like raw materials or intermediate goods or even final goods. An important step in this regard is to keep the position of the trade balance sustainable so the country continues getting the needed goods from outside. This requires adoption of exports-oriented strategy to ensure that the trade balance reaches the sustainability level.

Most economists accept the idea that when markets are open for international trade, this will open many opportunities for common benefits for all trading partners. Bown, Crowley, McCulloch, and Nakajima (2005) mentioned that the United States had sped up the steps toward the launch of the WTO because the WTO chiefly aimed is to remove all barriers to free trade like quotas and tariffs. Bown et al. (2005) also noted that the introduction of the WTO resulted in a quick growth of the United States' bilateral trade deficit with China. One main reason for that huge deficit is attributed to the impacts of the continuous process of Yuan depreciation. Bown et al. (2005) viewed the trade deficit with China as instable, and, therefore, they examined the possible effects of increasing the protection policies directed toward some imported products from China. Their evaluation for applying the protection trade policy on some imported goods from China was promising in order to create a balance with the bilateral trade with China and at the end to reach the sustainability in the trade balance.

On the same side, there were some attempts to test the Warren Buffett's proposal. The proposal suggested that importers had to get some certificates that allowed them to import goods proportional to the amount they usually brought to the United States market. These certificates would be sold to importers in an organized market by the exporters who would get them from the government. The idea behind these certificates was clear: to bring some balance and sustainability to the United States trade balance. One attempt to study the effects of these certificates was done by Papadimitriou, Hannsgen, and Zezza (2008). They discussed that some issues might arise if the Buffett proposal is applied. These issues included the possibility of volatility in the prices of these documents and the possible revenge by the trading associates. Another possible problem would be the increase in imports prices. According to authors estimations, these increases were expected to be around 9%. As a result, the deficit in the current account would go down by 2% of GDP. It was clear that the authors accepted such a plan that would bring some sustainability to the trade balance and to the current account. But they proposed some amendments on the original proposal by allowing these certificates to be sold at an auction, rather than giving them as gifts to the exporters.

What about the sustainability of trade balance in China? Yin and Hamori (2011) recommend that, despite the co-integration between exports and imports for the Chinese economy, the intertemporal external constraints might

be violated. Therefore, the surplus in the trade balance of the Chinese economy could not be viewed as sustainable in the future.

Another study, Bolkol (2017), examined the sustainability of trade balance for the Turkish economy. The study tested the sustainability of the Turkish trade deficit by using the co-integration technique. The results proved a long run co-integration relationship between imports and exports. In order to test the sustainability of this relationship and for causality directions, the Vector Error Correction Model (VECM) was tested. The findings showed that trade balance in Turkey was unsustainable. One of the reasons for this unsustainability was seen in the test results of VECM, which concluded that any disturbances that happen to the importing side, they could not be modified in the next period.

In short, one of the main conditions for sustainability is the long-run cointegration relationship between imports and exports. Cointegration between imports and exports means that any deficit in the trade balance is only a short-term case and it will reach the sustainability in the long-run (Perera & Verma, 2008). If it happens that the trade deficit is unsustainable, it could be attributed to the types of economic policies that are implemented by policy makers. In brief, these economics policies are ineffective and unsuccessful.

3. LITERATURE REVIEW

Much of the literature that studied the determinants of the trade balance has suggested different models or different methodologies and different variables to explain the behaviour of deficits or surpluses in the trade balance. This section comprises two main parts. The first part discusses the literature that found trade balance is affected by its determinants while the second part examines the research papers that found no or weak relationship between trade deficit and its determinants.

3.1. Literature with Strong Impact of the Determinants on Trade Balance

Ng, Har, and Tan (2008) examined the association between trade balance and a number of its determinants in Malaysia during the period 1955 - 2006. The methodology applied included the cointegration test, Granger test, and the VECM. The findings of the paper show that foreign income is affecting trade deficit negatively. In addition, real exchange rate affects trade deficit significantly. Yeshineh (2016) studied the relationship between trade deficit and a number of its determinants in Ethiopia for the period 1970 - 2011. The independent variables of the empirical model included: domestic income, money supply, foreign income of the top trading partners, government budget deficit, and exchange rate. The study employed a number of techniques to achieve its goals: variance decomposition, the impulse response functions, and the Auto-Regressive Distributed Lag (ARDL) model. The results proved a long run relationship between trade deficit and the independent variables. In addition, both domestic income and government budget deficit was seen exerting strong effect on the trade deficit.

Taşseven, Saracel, and Yılmaz (2019) tested the factors affecting trade deficit in Turkey during the period from 1998 to 2018. The explanatory variables of the model included: foreign GDP (presented by the GDP of the European Union), exchange rate and the prices of crude oil. The methodology used for estimating the model was the ARDL. The results of this paper proved the existence of the cointegration relationship between trade deficit and those factors affect this relationship. The findings also proved that any appreciation of the exchange rate or any rise in prices of the crude oil reduced the trade deficit significantly.

Keho (2021) tested a few variables affecting trade balance in West African Economic and Monetary Union over the period 1975 - 2017, a long-time span. The methodology adopted involved employing Fully Modified OLS and Dynamic OLS. The study concluded that trade deficit was negatively related to both foreign and domestic GDP.

Laksono and Saudi (2020) studied the Indonesian trade balance for the period 1980–2015. The explanatory variables were exports, imports, exchange rate, and GDP. These variables explained 55% of the movements of the trade balance. In addition, it was noted that all explanatory factors inversely affected the trade deficit. Alhanom

(2016) examined those factors affecting the Jordanian trade balance for the period 1970-2010, using the ARDL model. The results of the study show that real exchange rate has an insignificant impact on trade deficit. However, foreign and domestic GDP seem to be vital factors influencing the trade deficit in Jordan.

Kiliç, Balan, and Kurt (2015) analyzed the trade balance behavior for the G-20 countries during the period 1996-2012. The focus was mainly on the 2008 Global Economic Crisis, crude oil prices, and real effective exchange rates. The paper used the panel data method. Results showed that the exchange rate and crude oil prices were vital factors in affecting the trade deficit. In addition, the 2008 Global Economic Crisis had a significant negative effect on the trade deficit of these countries.

Shawa and Shen (2013) examined the key factors that determined the trade deficit in Tanzania for the period 1980-2012. They employed a model that included a number of variables that theoretically would affect trade balance. The model was estimated using the OLS method. The results revealed that the following variables would exert much impact on the trade deficit: trade openness, the availability of natural resources, inflation, government expenditure, household consumption, and foreign investment. The authors suggested that the importance of the variables warranted more attention from policy makers.

Waliullah, Kakar, Kakar, and Wakeel (2010) studied a number of economic variables that would affect trade balance in Pakistan, during the time span from 1970 to 2005. The following variables were believed to affect the trade balance: domestic GDP, exchange rate, and monetary aggregates. Their results showed that GDP and money supply would affect trade balance significantly. Conversely, real exchange was not a major factor impacting trade balance. In addition, Muhammad (2010) studied the same case for Pakistan, except using the period of 1975-2008. The methodology involved using VECM. The results showed that foreign investment and the exchange rate had substantial impacts on the trade balance.

Duasa (2007) studied the relationship between trade deficit and a number of economic factors in Malaysia. Using the ARDL model, the study's results proved the significant effect of GDP and the supply of money on trade deficit. Likewise, Singh (2002) also studied the development of trade balance in the Indian economy. The results revealed that foreign GDP exerted an insignificant impact on trade deficit. In addition, results showed that domestic GDP and exchange rate had highly significant effects on the trade deficit.

3.2. Literature with Weak Impact of the Determinants on Trade Balance

Bonga (2018) explored the development trade deficit in Zimbabwe for the period 1980 to 2017. This study examined the connection between the trade deficit and the factors that were mainly affecting it, especially exports and imports. The study employed the Augmented Dickey Fuller test, the cointegration technique, the Granger causality test, and the VECM to its model. The results found that the relation causality was bidirectional between exports and imports. Though cointegration test proved the relationship between imports and exports, VECM showed the nonexistence of a relationship in the long-run proving that the trade deficit was unsustainable. This suggests that enhancement in the export policy is important to any economy.

Awan and Mukhtar (2019) studied the causes and effects of trade deficit in Pakistan for the period 1980 - 2017. They claimed that the huge increase in the trade deficit might have bad impact on the sustainability of trade balance. They built a model in which trade deficit is the dependent variable. The explanatory variables were: foreign investment, income and the volume of trade. The methodology used included ARDL and VECM. The results showed that foreign investment was positively affecting trade balance. Alternatively, the impact of domestic income was inconclusive. Hamori (2008) tested the relationship between trade deficit and the terms of trade for G-7 countries for the period 1971 to 2003. The paper presented a simple model in which trade balance was a function of terms of trade. The methodology of this paper comprised a panel of unit root and cointegration. The findings of the paper proved no cointegration relationship between the two variables. This indicates that the decline in the terms of trade is not associated with any enhancement in the trade balance of G-7 countries. Finally, and as a last step, in the

national accounting system, we hypothesized that trade deficit was the main part of the current account. So, it would be reasonable to check some literature on this subject. Kang and Shambaugh (2016) studied the developments of the current account deficits in some European countries with the focus on the trade balance. It was noticed that all countries entered the financial crisis in 2008 suffered from huge sizes of deficit in their current account. The paper found that solving and slowing down these deficits was difficult and painful for these economies. It could be concluded that the huge deficit in the current account was a good indicator to predict the decline in GDP after the emergence of the crisis. Most economies achieved good progress in reducing the deficits, by applying some steps like: lowering the prices in order to achieve better competitiveness. Also, some countries tried hard to move some of the output from the non-tradable sector to the tradable one. This step helped these economies to enhance the trade deficit and as a result the current account.

4. METHODOLOGY

The current study examined quarterly data for the period 2009 - 2021. The aim was to analyze the impact of the COVID-19 crisis on the trade deficit in Jordan. The model included the independent variables that controlled the total effect on trade balance. These variables included: real GDP, foreign investment flows, and real exchange rate. Data was collected from the website of the Central Bank of Jordan (www.cbj.gov.jo). The model formulated was as follows:

$$TD = f(TD\_lag, RGDPG, RER, FLOW, COVID) \quad (1)$$

where, *TD* is the growth of trade balance, and *TD_lag* is the lag of trade balance. RGDPG is the growth of real Gross Domestic Production, *RER* is the growth of the real exchange rate, and *FLOW* is investment flows (direct and portfolio). *COVID* is a dummy variable that represents the COVID-19 pandemic period. This variable equal 0 for the periods before 2020, and it equals 1 in 2020 and the following period.

The next step was to test whether the variables of the model had a co-integration relationship or not. This phase was implemented if the variables were found to be nonstationary. To test this relationship, we employed the Johnson test for cointegration. If the variables were found to be stationary at the level, then the Ordinary Least Square (OLS) was an appropriate method of estimation (Seddighi, Lawler, & Katos, 2000). However, if the variables were stationary at the first difference, the cointegration test would be considered. The Augmented Dickey Fuller (ADF) test was implemented to test for stationarity of the variables (Dickey & Fuller, 1979).

5. ESTIMATION AND RESULTS

5.1. Unit Root Test

The paper used the ADF technique to determine whether the variables of the model are stationary or not. If the variable shows constant mean and constant variance, then it mostly indicates that the variable is stationary. However, if one or both of those conditions are not fulfilled, then the time series is considered nonstationary. In case of running a regression of nonstationary variables gives results that are spurious, even though the value of R^2, the explanatory power of the model, is high. If one variable seems to be nonstationary at the level, it is recommended to find the first difference and then check for stationarity of variables.

Table 1. Unit root test results.

Variables	Augmented Dickey Fuller (ADF) Test (at level)			
	t-statistic	Critical value (5%)	Critical value (10%)	Stationary (Yes/No)
RERG	-4.893	-2.921	-2.599	Yes
RGDPG	-2.767	-2.925	-2.601	Yes
FLOW	-6.756	-2.920	-2.598	Yes
TB	-3.577	-2.920	-2.598	Yes

Table 1 shows the results of ADF test. The variables appear in table are: real exchange rate growth (RERG), real gross domestic product growth (RGDPG), investment flows (FLOW), and trade balance (TD). The null hypothesis of the test stipulates that the time series has a unit root, or is nonstationary. The alternative hypothesis indicates that the time series of the variable is stationary. The results of the ADF shows that all variables (real exchange rate growth, real GDP growth, flow, and trade balance) are stationary at their levels. These findings suggest to test whether the variables of the model are cointegrated or not. According to Seddighi et al. (2000) no need to implement the cointegration technique when the variables were found to be stationary, and the OLS method proves to be an appropriate one.

The empirical model to be estimated in this paper has the following form:

$$TD_t = a_0 + a_1 TD\_lag_t + a_2 RERG_t + a_3 RGDPG_t + a_4 log(FLOW_t) + a_5 COVID_t + e_t \quad (2)$$

Where, *e* is the error term, *log* is the natural logarithm, and *t* is the time index.

The results for the empirical model appear in Table 2:

Table 2. Results of the empirical model.

Variables	Coefficient	t-Statistic
Constant	0.845***	3.377
TB_lag	0.733***	9.472
RGDPG	0.002	1.657
RERG	-0.013	-1.299
FLOW	0.010*	1.833
COVID	-0.009	-0.399
$R^2 = 0.6976$		

Note: ***, * indicate significance at 1%, 10%, respectively.

The variables appear in table are: the lag of the trade balance (TD_lag), real gross domestic product growth (RGDPG), real exchange rate growth (RERG), investment flows (FLOW), and a dummy variable that represents the COVID-19 pandemic period (COVID). The results of the empirical model indicate that the variable (*TB_lag*) is significant at 1%, as expected. The growth of the real gross domestic product (*RGDP*) has the expected sign, meaning that we expect higher income to cause a country to increase its purchases from outside the country. This behavior obviously causes the trade balance to increase. However, these results are statistically insignificant. This may indicate that the variable is working in the other direction. Specifically, increasing local income might increase the demand for domestic products, causing the value of imports to decrease.

The real exchange rate coefficient has also the expected positive sign. Specifically, a decline in the exchange rate of the local currency would cause a decrease in the trade balance. However, this result was also statistically insignificant. One possible explanation could be attributed to the main component of the real exchange rate formula; the nominal exchange. Specifically, it was found that the nominal exchange rate was fixed during the whole study period.

The results showed that the variable *FLOW* has a positive and significant effect on the trade balance. Generally speaking, when *FLOW* rises, trade deficit will rise too. This result is consistent with the theory of this subject. The theory indicates that increasing *FLOW* typically is accompanied with higher rates of openness to trade and larger amounts of import operations.

Finally, the variable *COVID* also has the expected negative sign. The COVID-19 pandemic caused a global recession throughout the whole world staring in 2020. Millions of employees lost their jobs and thousands of firms shut down. Therefore, it was natural to assume that the trade deficit would decrease, due to the decrease in imports for consumption and production purposes. However, this result was statistically insignificant. This result was attributed to the fact that while the pandemic should improve the trade balance from the imports side, it worsened it from the exports side. Domestic exports would go down, due the difficulties in transportation and due to the closures around the world.

5.2. Diagnostic Tests

The estimated empirical model was checked to ensure that it was statistically robust. This study tested the following statistical issues: serial correlation, heteroscedasticity, functional form misspecification, and normality. If none of the mentioned biases appeared in the results, we assumed that the model provided satisfactory outcomes and further analyses were accepted. The outcomes of the different Diagnostic Tests are reported in Table 3.

Table 3. Results of the diagnostic tests.

Detecting for	Using Test	Null hypothesis (H0)	F-statistic	Result
Serial Correlation	Breusch-Godfrey test	No serial correlation	0.505	Cannot reject H0
Heteroskedasticity	Breusch-Pagan-Godfrey Test	Homoskedasticity	0.094	Cannot reject H0
Model misspecification	Ramsey RESET Test	The model is correctly specified	2.108	Cannot reject H0
Normality	Jarque-Bera test	data is normally distributed	1.437 (J-B stat.)	Cannot reject H0

To check for *Serial Correlation*, the Breusch-Godfrey test (Godfrey, 1978) was applied. The null hypothesis of this test states that there is no serial correlation. The results appear in Table 2, showed that the F-statistic is insignificant. This means the null hypothesis cannot be rejected and the model does not include serial correlation problem.

The Breusch-Pagan-Godfrey Test was used to detect for *heteroskedasticity* of errors in the regression (Breusch & Pagan, 1979). The null hypothesis is that error variances in the regression are homoscedastic. The results of *heteroskedasticity* test appear in Table 3 show that the calculated F-statistic is insignificant. This means the null hypothesis cannot be rejected, and errors are homoscedastic.

The next step was testing for *model misspecification*, using the Ramsey RESET Test (Ramsey, 1969). This test helps detect incorrect functional forms and omitted variables. The null hypothesis states that the model is correctly specified. The result of the test appears in Table 3 and shows that the probability of the F-statistic is higher than the significance level. This indicates the rejection of the null hypothesis is impossible indicating that the model is correctly specified and needs no further adjustments. The Jarque-Bera test was also used (Jarque & Bera, 1980) next to check the normality of the residuals. The null hypothesis assumes the residuals of the model are distributed normally. The value of the Jarque-Bera is calculated as 1.4366 and appears in Table 3. Accordingly, the null hypothesis cannot be rejected, indicating normal distribution of the data. The findings of the diagnostic tests prove that the results of this paper's empirical model are valid and can be highly trusted.

6. CONCLUSION

This study investigated the relationship between trade deficit in Jordan and its determinants for the quarterly periods spanning 2009 to 2021. The study included the following determinants: growth of real GDP, foreign investment, real exchange rate, and a dummy variable that represented the COVID-19 pandemic. The researcher determined that the OLS method was an appropriate method for this case study. In addition, the paper applied the necessary diagnostic tests to check for the possible following problems like, serial correlation, heteroskedasticity, model misspecification and normality. The results of these test showed that the findings of the empirical model were accepted and trusted.

The main result of the empirical model proved that the pandemic did not significantly affect trade balance. This unexpected result was attributed to the fact the pandemic affected both sides of the trade deficit, exports and imports. The factors real exchange rate and *RGDP* growth gave the expected signs but they were found statistically insignificant. However, foreign investment was the variable found to be significant among the

detriments of trade balance. This result indicated that the Jordanian economy is vulnerable to outside shocks due to its openness. Finally, the results suggest the government adopts export-oriented policy to ensure the sustainability of the trade balance.

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