



# Trade Flows of South Korea with MENA Countries

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## Abstract

The purpose of this paper is to empirically analyze the trade flows of South Korea with the Middle East and North African MENA countries, based on the gravity model, and to suggest possible techniques to increase Korean trade by pointing out the essential variables determining trade flows. The gravity model presumes that trade flows between two countries are positively linked to their population and economic size. We analyze pooled Ordinary Least Squares OLS, Fixed effects FE, and Random effects RE estimation methods to examine selected variables' role in Korean-MENA trade growth. The findings show that distance does diminish trade. By analyzing a modified gravity equation of panel data estimations for Korean trade with the MENA region over 28 years, we find that for some regressions, the variables of oil rents of GDP and trade openness have a significant impact on Korean-MENA trade flows.

## Subject Areas

Economics, International Trade, Mena Region, South Korea

## Keywords

International Relations, International Trade, Gravity Model, Gravity Equation, Panel Estimation Data, Pooled Ordinary Least Squares OLS, Fixed Effects FE, Random Effects RE, South Korea, MENA Countries

## 1. Introduction

Trade flows have known significant attention in the literature because of their vital contribution to the overall economy; they impact most countries worldwide [1]. The rapid economic growth in Asia has promoted the narrowing of trade growth between countries. Thus, South Korea has witnessed rapid economic

growth since the 60s, which lead to a closer relationship with Middle Eastern countries [2]. In 2011, Korean companies had many construction projects in the MENA region. However, in Tunisia, Egypt, and Libya, the revolution so-called “Arab Spring” has challenged South Korean and MENA trade [2]. The Arab uprisings were at first started in Tunisia, followed by Egypt, Libya, and Syria, where the governments in many of these countries tried to sustain the new political position but in some other countries, the conflicts among the opposition and the ruling authorities carry on destabilizing the state, limit trade with South Korea.

The MENA countries have faced many challenges starting with the Arab Spring, which impacted the economy and population growth; many countries were affected by this phenomenon [3]. The differentiating attribute of the Arab Spring is its regional nature. During a few weeks of the first protests of Tunisia’s movement, other nations were overpowered in speed sequence: Egypt, Bahrain, Syria, Yemen, and Libya. Five countries representing close to 50 percent of MENA’s total population were entirely implicated in the phenomenon. And other countries were more marginally touched, like Jordan and Oman. Moreover, the Arab Spring has not been confined to the MENA region. But, its effects have gone global.

Moreover, in 2014, the global oil price decline negatively impacted the Gulf Cooperative Council (GCC) countries’ economies. The oil export revenues of four major GCC countries dropped by 46% in 2015. Yet, this decline led to a more economic partnership between South Korean and Middle East countries. Besides, in solving slow economic growth, GCC governments set up economic development plans and established policies to support and promote enterprises as key for diversification [4].

The economic situation between Korea and the Arab countries has expanded in recent years for different reasons. South Korea saw the potential represented by the MENA countries [5]. “As of 2014, more than 80% of South Korea’s imports from the Organization for Economic Cooperation and Development (OECD) are related to energy resources like crude oil and natural gas. And when it comes to the manufacturing of chemicals and petroleum is considered the second largest sector in the same year.” [6] During the Coronavirus pandemic investment growth pursued in the MENA region, 44 start-ups had raised more than \$175 million in April. Given this, we can certainly say that the MENA region is important from a Korean perspective.

Therefore, this study aims to contribute to the emerging discussion of the main factors of trade flows of South Korea with the MENA countries and to complement the findings of the existing empirical studies. Recently, there are considerable challenges in the volume of trade between these countries. And this needs attention from an economic perspective. Thus, this research attempts to explain how trade flows within these countries justify their evolution by providing a clear picture of the intensity of trade flows and a better understanding of

different economic growth indicators. In doing so, ultimately, this paper hopes to foster more dynamic trade relations between these countries. The relationship in terms of trade between these countries has fluctuated over the years. South Korea has developed strategies to gain growth in the MENA region, giving importance to the oil-producing countries and the population volume's reputation.

## 2. Literature Review

South Korea-Arab countries' relationships have been an oversight in the literature over the years, mainly due to South Korean ties with other countries and the importance of intra-trade. Despite Korea's gradually increasing diplomatic role and military engagement in the MENA, the economic relationship has still been highly beneficial for these countries.

In 2010, investment from Korea into the MENA region was just \$330 million, barely 1.42 percent of all Korean investment overseas. Relatively 39.1 percent of assets were invested in the petroleum and petroleum product industries, and nations like Iraq (27.22 percent), Oman (21.62 percent), UAE (19.37 percent), and Bahrain (18.5 percent) were the leading locations. Investment from the MENA to Korea was lower, counting to only \$171 million, 90 percent derived from Saudi Arabia. One of the significant increases behind investment and exports in the Middle East is EPC contracting. Korean contractors first came to the region's heavy civil engineering industry in the 70s around the oil boom. But currently, the MENA region is Korea's most extensive EPC market. As an outcome, South Korea is one of the highest contractors in the area. South Korea's market share in EPC contracts in the GCC states hosts over 50 percent of the contracts in the MENA area. In 2010, the overall amount of Korean EPC contracts in the Middle East was \$47.2 billion, which was over 66 percent of Korea's foreign EPC contracts. The top three partner countries were Kuwait, Emirates, and Saudi Arabia [7].

South Korea's economy keeps stable, increasingly interdependent ties with the GCC countries that go back to at least the 70s. At the time South Korean companies first received contracts for some of the Gulf's first infrastructure companies in the period of the "First Oil Boom." The economic start-out encountered by both areas has approved a new synergy to economic development, mainly premised on the twin pillars of technology transfer and energy. Exports from Korea to the GCC attained \$17.8 billion in 2013, representing 3.2 percent of the country's exports. 50% of the exports to the GCC went to Saudi Arabia, and a third to the UAE. Main export goods count steel products, machinery, electronics, and automobiles [8].

The economic situation between Korea and the Arab countries has expanded in recent years for different reasons. South Korea saw the potential represented by the MENA countries. The importance of imports between these countries; "As of 2014, more than 80% of South Korea's imports from the Organization for

Economic Cooperation and Development (OPEC) are related to energy resources like crude oil and natural gas. And when it comes to the manufacturing of chemicals and petroleum is considered the second largest sector in the same year.” [5]

The concern arguably addressed by the occurrence in 2014 and yet extended till the end of 2017 vary from the relapsing encounter of the last in being severe to menace the existence of the six-country bloc (UAE, Saudi Arabia, Qatar, Kuwait, Bahrain, and Oman). These countries are unified by solid cultural, historical, and social ties, resembling many cultural aspects and religious traditions, and deep-rooted economic and political cooperation. Still, they stand as different groups with exclusive individual particularities.

In preserving good relationships globally, South Korea has strengthened its bilateral and multilateral trade with other countries. In March 2012; South Korea conducted eight FTAs with 45 countries, counting the United States, Singapore, Chile, the European Free Trade Association (EFTA), the Association of South-east Asian Nations (ASEAN), India, the European Union (EU), and Peru. Besides, Korea has signed FTAs with Columbia and Turkey, and these are waiting for effectuation. The nation is promised in FTA-related agreements with New Zealand, Canada, Australia, Mexico, and GCC [9].

Even in periods of the unstable situation of wars and domestic disorder in the area, the growth of the South Korean economy augmented the Middle East’s significance to Seoul due to the rising demand for oil and gas imports from the Gulf. Furthermore, the importance of the MENA economy is also shown in the August 2013 agreement between South Korea and Bahrain to inaugurate a joint committee for encouraging bilateral economic cooperation. The upgrade of economic relations applies as another pace in institutionalizing economic ties between South Korea and the MENA region. It started with Seoul’s decision to analyze an FTA between Korea and the UAE [10]. Moreover, the visit of the Korean president in 2018 to reinforce the bilateral trade relation between Korea and the Emirates showed the importance of MENA’s economy to South Korea, and the prime minister’s visit to the Maghreb countries to promote further collaboration in the region [11]. Moreover, Korea successfully secured 58 B2B memorandums of understanding (MOUs) and agreements with Saudi Arabia and the United Arab Emirates (UAE), surpassing USD 35 billion, as well as UAE’s commitment to \$30 billion in investment [12].

**Table 1** explains the trade between South Korea and the MENA countries from 2014 to 2018.

With the economic problems regarding the recession of oil prices in 2014 that GCC countries are facing, there are affecting the economic cooperation of these countries with South Korea. Since Korea imports over 60% of its oil from GCC countries. More collaboration in different files should be appointed. As pointed out by some authors, economic partnership is an important factor of growth between these countries. In the second half of 2014, the oil export revenues of

**Table 1.** Korea-MENA Trade Statistics 2014-2018 Unit: \$100,000,000.

	Trade Volume					Trade Balance				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
<b>Total</b>	129,166	79,354	60,295	60,295	840	-83,192	-38,512	-26,563	-26,563	-576
<b>Saudi Arabia</b>	44,983	29,043	21,386	21,386	303.0	-28,407	-10,079	-10,098	-10,098	-223.0
<b>UAE</b>	23,406	14,692	12,811	12,811	139.0	-8982	-2538	-1071	-1071	-47.0
<b>Kuwait</b>	18,868	9898	8668	10,769	141.0	-14,916	-8048	-5856	-8443	-115.0
<b>Qatar</b>	26,627	17,419	10,617	11,700	168.0	-24,819	-16,071	-9545	-10,828	-158.0
<b>Oman</b>	5769	3827	2984	2974	35.0	-3425	-1949	-1752	-1692	-21.0
<b>Bahrain</b>	891	686	428	684	8.0	-341	-312	-68	-104	-4.0
<b>Libya</b>	1636	725	1039	925	7.5	150	363	395	-365	0.9
<b>Morocco</b>	545	503	703	462	29.0	71	195	385	88	-11.0
<b>Tunisia</b>	330	235	207	188	5.0	86	133	99	82	1.0
<b>Algeria</b>	3365	1715	1266	1948	2.1	-531	-15	866	528	0.9
<b>Yemen</b>	2714	564	144	132	0.5	-2070	-158	110	46	-0.3
<b>Mauritania</b>	32	47	42	31	1.4	-8	-33	-28	-19	0.4

Source: The Korea International Trade Association (KITA, <https://www.kita.net/>).

four major GCC countries, Kuwait, Qatar, Saudi Arabia, and the UAE, declined. This downfall drove economic affiliation between South Korean and Middle East countries to boost and maintain growth. However, as shown in **Table 1**, the trade volume between South Korea and the MENA region decreased from 2014 to 2018, facing a serious challenge. But the MENA countries are working hard to improve their conditions. In 2016, Some MENA countries created Major Economic Development Plans to improve their economic growth, to maintain good economic relations with Korea [8].

### 3. Research Methodology

To demonstrate the above causal relationship, this research collects information on various factors related to trade between MENA countries and South Korea as GDP, population growth, exchange rate, FDI, trade openness, and oil rents (% of GDP). And this collected information allows this research to conduct a statistical analysis of the causal relationship. More specifically, this study uses panel data covering 1990 to 2018 (although with many missing observations in the MENA region). The Panel data observed over many periods conclude in more suitable information than cross-section data alone. The purposes of this data are: first, panels can apprehend the suitable relationships between determinants over time; and second, panels can examine indistinct trading-partner-pairs' impacts [13]. When individual results associate with the regressors, OLS evaluates that omitting individual results could be biased, thus, the use of the panel data method for examining the gravity model of trade.

### 3.1. Analysis Method

The gravity model has been repeatedly used to analyze trade flows since Tinbergen, followed by several works [14]. “Gravity models are estimated in terms of natural logarithms (denoted ‘ln’) using trade flows or exports from country x to country y.”

In this paper, we will be using the augmented model, other economically controlled variables such as exchange rate, trade openness, FDI, and oil rents of GDP will be used as well. As referred that the gravity equation is the workhorse model of trade [15]. It has been long recognized for its steady empirical success in identifying many different types of flows and determining the trade between countries [16].

As mentioned Tinbergen’s gravity equation below [17]:

$$T_{A,B} \propto \frac{(GDP A)^\alpha (GDP B)^\beta}{(Dist AB)^\zeta}$$

The essential terms of Equation (1) can be expressed in logarithmic form as follows:

$$\ln(I_{ijt}) = \alpha + \beta_1 \ln(Y_{it} \cdot Y_{jt}) + \beta_2 (D_{ijt}) + U_{ijt} \quad (1)$$

In this equation (Equation (1)), “ $I_{ijt}$ ” is the import volume of “ $i$ ” from “ $j$ ” during the period of “ $t$ ”; “ $Y_{it}$ ” and “ $Y_{jt}$ ” are considered economic sizes of “ $i$ ” and “ $j$ ” in terms of GDP; ( $D_{ijt}$ ) is the geographical distance between the two countries. The economic growth of one country will positively influence the bilateral trade between the two. The above equation can again be rewritten into the log-linear form so that it coordinates with the usual regression analysis.

$$\ln(EX)_{ij} = \zeta + \alpha \ln(GDP)_i + \beta \ln(GDP)_j + \gamma \ln(Distw)_{ij} + \varepsilon_{ij} \quad (2)$$

Equation (2): “ $\ln(EX)_{ij}$ ” is the log of export volume of “ $i$ ” to “ $j$ ”, “ $\ln(GDP)_i$ ” and “ $\ln(GDP)_j$ ” are the GDP of the two countries, and  $\ln(Distw)_{ij}$  is the log of the geographical distance. Although many studies have utilized the gravity model, only a few used it to explain the importance of other variables, such as trade openness, governance, and institutions. This study, however, will utilize one of these uncommon variables since, in addition to the essential gravity equation variables, it uses openness, economic growth, population size, FDI, exchange rates, and oil rents of GDP to see how they perform in the gravity equation. Even though studies using such variables do exist, none used them in the same sampling countries for this research. By referring to some equations used before such as:  $\ln(EX)_{ij} = \zeta + \alpha \ln(GDP)_i + \beta \ln(GDP)_j + \gamma \ln(Distw)_{ij} + \varepsilon_{ij}$  [18].

As the econometric description of the gravity model in this study is an augmented gravity model for exports and imports of Korea with the MENA countries, the main equations are as follows:

$$\begin{aligned} \ln(\text{Export Kjt}) = & \alpha_0 + \alpha_1 \text{Real GDP Kt} + \alpha_2 \text{Real GDP jt} \\ & + \alpha_3 \text{Population growth Kt} + \alpha_4 \text{Population growth jt} \\ & + \alpha_5 \text{Distance Kj} + \alpha_6 \text{Oil rent} + \alpha_7 \text{Exchange rate} \\ & + \alpha_8 \text{FDI} + \alpha_9 \text{Trade openness} + \varepsilon_{ijt} \end{aligned} \quad (1)$$

The explanatory variables of Equation (1) are defined as:

$\text{Ln}(\text{Export } Kjt)$  = Logarithm of Korean exports to recipient country  $j$  at year  $t$

Real GDP  $Kt$  = Real GDP growth of Korea at year  $t$

Real GDP  $jt$  = Real GDP growth of recipient country  $j$  at year  $t$

Population growth  $Kt$  = Korean population growth at year  $t$

Population growth  $jt$  = Population growth of recipient country  $j$  at year  $t$

Distance  $Kj$  = Distance between Korea (Capital) and recipient country  $j$  (Capitals)

Oil rent = Oil rents percent of GDP of MENA countries

Exchange rate = Exchange rate: local currency units per U.S. dollar

FDI = Net inflows in the reporting economy from foreign investors, and is divided by GDP

Trade openness = Trade openness index for MENA countries affecting Korean trade

$\alpha_0 - \alpha_9$  = Parameter values

$\varepsilon^{ijt}$  = Error term

Also, the econometric specification of the gravity model for import volumes is written as follows:

$$\begin{aligned} \text{Ln}(\text{Import } Kjt) = & \alpha_0 + \alpha_1 \text{Real GDP } Kt + \alpha_2 \text{Real GDP } jt \\ & + \alpha_3 \text{Population growth } Kt + \alpha_4 \text{Population growth } jt \\ & + \alpha_5 \text{Distance } Kj + \alpha_6 \text{Oil Rent} + \alpha_7 \text{Exchange rate} \\ & + \alpha_8 \text{FDI} + \alpha_9 \text{Trade openness} + \varepsilon^{ijt} \end{aligned} \quad (2)$$

where:  $\text{Ln}(\text{Import } Kjt)$  = Logarithm of Korean imports to recipient country  $j$  at year  $t$

Real GDP  $Kt$  = Real GDP growth of Korea at year  $t$

Real GDP  $jt$  = Real GDP growth of recipient country  $j$  at year  $t$

Population growth  $Kt$  = Korean population growth at year  $t$

Population growth  $jt$  = Population growth of recipient country  $j$  at year  $t$

Distance  $Kj$  = Distance between Korea (capital) and recipient country (capitals)  $j$

Oil rent = Oil rents percent of GDP of MENA countries

Exchange rate = Exchange rate: local currency units per U.S. dollar

FDI = Net inflows in the reporting economy from foreign investors, and is divided by GDP

Trade openness = Trade openness index for MENA countries affecting Korean trade

$\alpha_0 - \alpha_9$  = Parameter values

$\varepsilon^{ijt}$  = Error term

The gravity models have been employed in economics with different methods. In analyzing the trade coalition among the GCC states within the intra-Arab area and the states outside it by employing a gravity model [19]. Some variables were added to the standard gravity model like the area, language, common territories, trade openness, and the Arab nations. These authors demonstrated that

the variable GDP was significant and positively connected to the intra-trade between the Arab areas. In contrast, the bilateral distance between countries has a negative influence on their economic size.

Moreover, by using a gravity model called Stochastic Frontier Gravity model (SFGM) to analyze intra-Arab trade performance for 1998-2015 [20]. The impact of some selected variables on bilateral trade showed that the main determinants of the gravity model, such as real GDP, population size, and distance, have a significant impact on trade volumes among Arab countries.

In another paper the extended gravity model of trade with governance factors observed for the exports of some MENA states, with their 189 trading partners and for all exporters from 1996 to 2013. It pointed out that the findings showed ameliorations in five of the six governance variables that rise exports from MENA countries. But, each of the six governance determinants employed has a significant impact on bilateral trade for the exporters. Also, they indicated the implications of country-pair similitude in governance factors suggesting that a resemblance level of regulatory quality and the rule of law in exporting and importing countries boosts exports from the MENA region [21].

By using the gravity model, [22] it showed that during the period of 2000-2018 the main factors affecting the Egyptian bilateral trade are Egypt's gross domestic product, importer's gross domestic product, the border variable, and the distance between Egypt to the main trading partners.

In analyzing the trade between China and 97 countries, [23] the paper explained that the impact of ASEAN and APEC member countries on Chinese trade. By using an extended gravity model, the findings show the importance of GDP and population growth.

In examining the main patterns of international trade in the countries of Central and Eastern Europe by investigating the gravity model of trade, the results demonstrated that distance between countries and their gross domestic products are still crucial factors that determine trade flows between them [16].

### 3.2. Data

This research utilized primary data for this study. The primary sources of data extracted are from World Development Indicators (World Bank), International Monetary Fund (IMF), Korea Customs and Trade Development Institute (KCTDI), Trading Economics (TE), and The Global Economy.com from 1990 to 2018 due to lack of data of the MENA countries in recent years. Other sources used in this research are articles, journals from the internet, libraries, and statistical bases of data. The distinct theoretical and empirical reviews on openness in different MENA countries were used to facilitate this study's successful finalization. Independent variables were often found in mainstream theories of the gravity model mainly. In contrast, the dependent variables were taken from variables that have mostly been utilized in empirical studies of international trade flows.

This research is mainly based on understating the selected indicators affecting



South Korean trade flows with MENA countries based on a quantitative approach. And the contribution is to collect more information about the MENA region countries interconnecting with South Korea regarding trade and other factors related to the study (GDP, population growth, exchange rate, and openness). The software program for obtaining regressions is known as GRET. <sup>1</sup>And the research methodology aims to explore trade volumes based on four-panel estimations for selected countries in this study. It is applied in fixed effects (FE), Random effects (RE), and pooled ordinary least squares (OLS) techniques.

Furthermore, in this study, the sample is South Korea and its trading partners from the MENA region (Algeria, Egypt, Jordan, Lebanon, Libya, Saudi Arabia, Tunisia, Yemen, Oman, Qatar, United Arab Emirates UAE, Morocco, Iran, Bahrain, Iraq, Kuwait, Sudan, and Syria). South Sudan, Djibouti, and Mauritania were excluded from this study for lack of data (See **Table 2**).

**Table 2.** Data description and sources.

Variables	Proxy	Expected Signs	Sources
Exports Korea/MENA	Lnexports		World integrated trade solution (WITS) (constant 2010 US\$)
Imports Korea/MENA	LnImports		World integrated trade solution (WITS) (constant 2010 US\$)
Real GDP Korea	Real GDPK	+	GDP (constant 2010 US\$) World Bank national accounts data, and OECD National Accounts data files.
Real GDP MENA	Real GDPj	+	GDP (constant 2010 US\$) World Bank national accounts data, and OECD National Accounts data files.
Korean Population growth	Population growth K	+	World Population Prospects: Revision 2019, United Nations Population Division, Population, and Vital Statistics Report, U.S. Census Bureau: International Database, and Secretariat of the Pacific Community: Statistics and Demography Programme, Census reports and other statistical publications, articles from national statistical offices, Eurostat: Demographic Statistics, and United Nations Statistical Division
MENA countries' population growth	Population growth j	+	World Population Prospects: Revision 2019, United Nations Population Division, Population, and Vital Statistics Report, U.S. Census Bureau: International Database, and Secretariat of the Pacific Community: Statistics and Demography Programme, Census reports and other statistical publications, articles from national statistical offices, Eurostat: Demographic Statistics, and United Nations Statistical Division
Distance	DistKj	-	Centre d' Etudes Prospective et d' Information's Internationals (CEPII)'s distance (in kilometers)

<sup>1</sup>Gretl "Gnu Regression, Econometrics and Time-series Library". It is an open-source statistical package. <http://gretl.sourceforge.net/>.

## Continued

FDI	FDIj	+	This variable is used to observe the investment pattern in the MENA countries affecting Korea. It demonstrates net inflows in the reporting economy from foreign investors and is divided by GDP.
Trade Openness	Trade Openness	+	World development indicators
Exchange Rate	Exchange rate	+	Local Currency Units per U.S. Dollar. World Bank national accounts data
Oil Rents	Oil rentsj	+	World Bank

## 4. Findings and Discussion

### 4.1. Findings

The regression **Table 3** on the dependent variable Exports of Korea to the MENA region's countries shows that the controlled variables real GDP growth of Korea and the Korean population growth are statistically significant at a 1% level. Also, for the explanatory variable, oil rents of GDP have a positive sign and are statistically significant at a 5% level, and the variable distance as expected has a negative sign, which means affect negatively Korean exports to the MENA region. The results are consistent with previous studies [24].

The  $R^2$  is .46: about 46% of the dependent variable log Exports' total variability is explained by the explanatory variables considered in this model. Besides, the explanatory variable, oil rents of GDP, has a positive coefficient. It indicates that as the value of the variable oil rents of GDP of MENA countries increases by 2%, the mean of the dependent variable Korean exports to these countries also tends to increase. Also, the coefficient of the MENA countries' population growth, as noted in this regression table (Population growth j), increases by 5%, which means an increase in Korean exports to the MENA countries. On the other hand, the controlled variables' negative coefficients, as shown, reduce the dependent variable.

In the regression **Table 4**, the explanatory variable, Korean population growth, is statistically significant at a 1% level. The other controlled variables population growth of MENA countries and the real GDP of Korea are significant at a 5% level. The coefficient of the variable, oil rents of GDP, has a positive sign and is statistically significant at the 10% level. And as predicted for the variable, distance, it has a negative coefficient confirming the gravity theory [25]. The  $R^2$  is 0.58: the explanatory variables explain about 58% of the total variability of the dependent variable log Imports.

The coefficient of the controlled variable, population growth, in the MENA countries (Population growth j) is positive 0.11, which means an 11% increase in Korea's imports from these countries. And as shown in this table, the explanatory variable, oil rents of GDP, increase by 6% in the Korean imports from these countries.

**Table 5** shows that the controlled variables, Korean real GDP, Korean population growth, and exchange rate ER, are statistically significant at a 1% level. Also, trade openness is statistically significant at the 5% level. And for MENA countries, population growth is significant at the 10% level. The variable distance is omitted in this model explaining that the issue faced by a FE model is that it cannot estimate variables that do not vary across time, such as distance [26]. The positive coefficients of the controlled variables of the MENA countries' population growth, trade openness, and oil rents of GDP increase Korea's exports to these countries. However, the real GDP growth of Korean and MENA countries has negative coefficients, which means decreasing Korean exports with these countries.

When an F-test<sup>2</sup> is performed, we get an F-statistic of 45, which means we can reject the null hypothesis noting that all intercepts are not the same. Since F-test is supposed to be equal to zero, rejecting this hypothesis implies that the fixed effects are non-zero. Also, as observed in the table, the p-value is very small, which means the groups do not have a common intercept [27].

This regression **Table 6** shows that the explanatory variable, Korean population growth, is statistically significant at a 1% level. And the variable distance is omitted. Also, the controlled variable population growth of the MENA countries has a positive sign of 7%, which increases the dependent variable imports of Korea from these countries, and this variable is statistically significant at a 5% level. Moreover, the variable, oil rents of GDP, increase by 2% in Korea's imports from the MENA countries. Besides, trade openness as well increases by 1% in Korean imports.

When an F-test is performed, we get an F-statistic of 47, which shows that we can reject the null hypothesis that groups have a common intercept. We also employed FE models controlling for time-fixed effects for the dependent variables of Korean exports and imports with the MENA countries, as referred by some studies [28].

In this regression **Table 7**, we controlled by time fixed effects, it shows that the controlled variable real GDP growth of Korea is statistically significant at a 1% level. Also, the MENA countries' variable, real GDP growth, has a positive sign and is statistically significant at a 5% level. Moreover, the controlled variables, coefficients of real GDP growth and population growth of the MENA countries, are positive, which means that the dependent variable, exports of Korea, increases when these variables increase. And when the negative coefficients of the controlled variables rise, it decreases the dependent variable, exports of Korea to these MENA countries.

We get an F-statistic of 179, which means that we can reject the null hypothesis. Since the p-value is very small, according to Keum, the FE model can evaluate individual and time-specific effects from time- and individual-variant determinants. However, it cannot identify the individual-specific impacts con-

<sup>2</sup>F statistic test: F-value is for the F-test that compares whether statistical models that have been fitted to data set are appropriate.

cerning the individual-variant but time-invariant variables, such as the distance variable between two trading countries in the gravity model [29].

In **Table 8**, we controlled by time-fixed effects, and the explanatory variable, Korean population growth, is statistically significant at a 1% level. Also, the MENA countries' variable, real GDP growth, has a positive sign and is statistically significant at a 5% level. As mentioned in this regression table, the explanatory variables, Korean real GDP growth, real GDP growth, population growth, trade openness, and oil rents of GDP of MENA countries, have a positive sign, which means, increasing the dependent variable, imports of Korea from these MENA countries. And the negative coefficients indicate that as the independent variables grow, the dependent variable, imports, tends to decrease. We get an F-statistic of 59, which means that we can reject the null hypothesis that the groups have a common intercept.

The GLS regression **Table 9** shows that the controlled variables, Korean population growth, Korean real GDP growth, and the exchange rate of MENA countries, are statistically significant at a 1% level. And the explanatory variable, trade openness, is significant at a 5% level. Also, the MENA countries controlled variables, real GDP growth, and population growth, are significant at a 10% level. As expected for the variable distance, the coefficient has a negative sign. Moreover, the controlled variables with positive coefficients, as noted in this table, increase Korea's exports with the MENA region. For instance, the controlled variable, population growth of the MENA countries (Population growth j), is 0.06, which means a 6% increase in the dependent variable, exports. However, for the variables with negative coefficient signs, the real GDPs of MENA countries decrease exports of Korea with these countries.

When we conduct a Breusch-Pagan test, we get a  $\text{Chi}^2$  of 1974.51 to reject the null hypothesis, which stated that the Variance of the unit-specific error = 0. This test's degrees of freedom reflect that the contrast is based on a comparison of the regression coefficients other than the intercept. Therefore, it is evident that there are some random effects present. However, Breusch-Pagan test has a p-value below 0.05, then the null hypothesis of homoskedasticity is rejected, and heteroskedasticity is assumed. The Hausman test indicates that the RE is not correlated with the other regressors. The resulting  $\text{chi}^2$  is high, which means there is no high correlation between data. And it suggests that the RE estimator is not consistent. Also, the p-value is very significant and small, which means we also reject the hypothesis that GLS estimates are consistent.

This regression **Table 10** indicates that the independent variable, Korean population growth, is statistically significant at a 1% level. And most of the controlled variables are statistically significant. However, the variable, distance, has a negative sign, but it is statistically significant. The coefficient of the variable, population growth of the MENA countries, is positive, which means a 6% increase in this variable; population growth positively affects the dependent varia-

<sup>3</sup>A chi-squared ( $\chi^2$ ) statistic is a test that measures how expectations compare to actual observed data.

ble imports of Korea. Also, the variable, trade openness of the MENA countries, has a positive sign; a 1% increase in this variable increases Korean imports. And the same goes for the coefficient of the explanatory variable oil rents of GDP, which is a 3% increase in Korea's imports as well. When we conduct a Breusch-Pagan test, we get a  $\chi^2$  of 1903.68 to reject the null hypothesis. The Hausman test indicates that the random effect is not correlated with the other regressors. The resulting  $\chi^2$  is high, resulting in that GLS estimates are not consistent.

**Table 3.** Dependent variable: exports of Korea to the MENA countries Pooled OLS.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	t-ratio	p-value	
Constant	16.3067	1.50349	10.85	<0.0001	***
Real GDP $j^4$	-0.00628643	0.00302908	-2.075	0.0569	*
Population growth $j$	0.0506011	0.0418593	1.209	0.2467	
Real GDP $K^5$	-0.0753248	0.00628295	-11.99	<0.0001	***
Population growth $K$	-2.16776	0.199512	-10.87	<0.0001	***
Distance $Kj$	-0.000232028	0.000138719	-1.673	0.1166	
Trade openness	-0.00370409	0.00521337	-0.7105	0.4891	
FDI	-0.0372001	0.0289698	-1.284	0.2200	
Exchange rate	6.30177e-05	2.94603e-05	2.139	0.0505	*
Oil rent	0.0247264	0.0111940	2.209	0.0444	**
Mean dependent var	12.68861	S.D. dependent var	1.495131		
Sum squared resid	495.2892	S.E. of regression	1.108605		
R-squared	0.462222	Adjusted R-squared	0.450212		
F(9, 14)	146.9321	P-value(F)	2.72e-12		
Log-likelihood	-623.5415	Akaike criterion	1267.083		
Schwarz criterion	1307.317	Hannan-Quinn	1282.996		
rho	0.835241	Durbin-Watson	0.294373		

Note: (1) \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , and \* $p < 0.10$ . (2) Time dummies are not reported.

**Table 4.** Dependent variable: imports of Korea from the MENA Countries Pooled OLS.

Used 413 observations Time-series length: minimum 24, maximum 28 Dependent variable: $l\_Imports$	Included 15 cross-sectional units Robust (HAC) <sup>1</sup> standard errors				
	Coefficient	Std. Error	t-ratio	p-value	
Constant	20.6163	3.62980	5.680	<0.0001	***
Real GDP $j$	-0.00285633	0.00511544	-0.5584	0.5854	
Population growth $j$	0.113518	0.0409368	2.773	0.0150	**

<sup>4</sup>Real Gross Domestic Product of the MENA countries.

<sup>5</sup>Real Gross Domestic Product of Korea.

## Continued

Real GDP K	-0.0473825	0.0162624	-2.914	0.0113	**
Population growth K	-2.47155	0.421757	-5.860	<0.0001	***
Distance Kj	-0.000850837	0.000365052	-2.331	0.0352	**
Trade openness	-0.00226948	0.00479335	-0.4735	0.6432	
FDI	-0.0992617	0.0636245	-1.560	0.1410	
Exchange rate	1.04040e-05	3.87932e-05	0.2682	0.7925	
Oil rent	0.0613269	0.0320034	1.916	0.0760	*
Mean dependent var	12.46799	S.D. dependent var	2.763882		
Sum squared resid	1324.556	S.E. of regression	1.812937		
R-squared	0.579144	Adjusted R-squared	0.569745		
F(9, 14)	37.64058	P-value(F)	2.78e-08		
Log-likelihood	-826.6736	Akaike criterion	1673.347		
Schwarz criterion	1713.582	Hannan-Quinn	1689.260		
rho	0.850959	Durbin-Watson	0.299028		

Note: (1) \*\*\*p < 0.01, \*\*p < 0.05, and \*p < 0.10. (2) Time dummies are not reported.

**Table 5.** Dependent variable: exports of Korea to the MENA Countries FE.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	t-ratio	p-value	
Constant	13.5339	0.287801	47.03	<0.0001	***
Real GDP j	-0.00178053	0.00111830	-1.592	0.1337	
Population growth j	0.0699981	0.0375041	1.866	0.0831	*
Real GDP K	-0.0691866	0.00620728	-11.15	<0.0001	***
Population growth K	-1.97542	0.199677	-9.893	<0.0001	***
Trade openness	0.00625462	0.00287765	2.174	0.0474	**
FDI	-0.0150927	0.0105556	-1.430	0.1747	
Exchange rate	2.79452e-05	3.40419e-06	8.209	<0.0001	***
Oil rent	0.00962657	0.00732281	1.315	0.2098	
Mean dependent var	12.68861	S.D. dependent var	1.495131		
Sum squared resid	165.4072	S.E. of regression	0.651246		
LSDV R-squared	0.820403	Within R-squared	0.562755		
Log-likelihood	-397.0664	Akaike criterion	840.1327		
Schwarz criterion	932.6720	Hannan-Quinn	876.7331		
rho	0.592159	Durbin-Watson	0.733075		

Joint test on named regressors -

Test statistic:  $F(8, 14) = 11000.2$

with p-value =  $P(F(8, 14) > 11000.2) = 3.09015e-025$

Robust test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: Welch  $F(14, 151.1) = 45.2053$  with p-value =  $P(F(14, 151.1) > 45.2053) = 8.98742e-047$

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time dummies are not reported.

**Table 6.** Dependent variable: imports of Korea from the MENA Countries FE.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	t-ratio	p-value	
Constant	12.2008	0.425261	28.69	<0.0001	***
Real GDP j	-0.00149631	0.00254191	-0.5887	0.5655	
Population growth j	0.0712812	0.0287953	2.475	0.0267	**
Real GDP K	-0.0318989	0.0150471	-2.120	0.0524	*
Population growth K	-1.94596	0.310121	-6.275	<0.0001	***
Trade openness	0.0133320	0.00668396	1.995	0.0659	*
FDI	-0.00797392	0.0206714	-0.3857	0.7055	
Exchange rate	1.23134e-05	5.72137e-06	2.152	0.0493	**
Oil rent	0.0273165	0.0188463	1.449	0.1692	
Mean dependent var	12.46799	S.D. dependent var		2.763882	
Sum squared resid	431.0795	S.E. of regression		1.051348	
LSDV R-squared	0.863031	Within R-squared		0.362852	
Log-likelihood	-594.8691	Akaike criterion		1235.738	
Schwarz criterion	1328.277	Hannan-Quinn		1272.339	
rho	0.619211	Durbin-Watson		0.743037	

Joint test on named regressors -

Test statistic:  $F(8, 14) = 34359.9$  with p-value =  $P(F(8, 14) > 34359.9) = 1.06628e-028$

Robust test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: Welch  $F(14, 150.7) = 47.2151$  with p-value =  $P(F(14, 150.7) > 47.2151) = 7.71887e-048$

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time dummies are not reported.

**Table 7.** Dependent variable: exports of Korea to the MENA countries FE controlling for the time fixed effects.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	t-ratio	p-value	
Constant	14.5919	0.269782	54.09	<0.0001	***
Real GDP j	0.00369738	0.00136855	2.702	0.0172	**
Population growth j	0.0377885	0.0280697	1.346	0.1996	
Real GDP K	-0.361096	0.0564786	-6.394	<0.0001	***
Population growth K	-0.0332702	0.703068	-0.04732	0.9629	
Trade openness	-5.97223e-05	0.00162924	-0.03666	0.9713	
FDI	-0.0197591	0.0109307	-1.808	0.0922	*
Exchange rate	4.06240e-06	4.64129e-06	0.8753	0.3962	
Oil rent	-0.00524016	0.00633397	-0.8273	0.4219	

Mean dependent var	12.68861	S.D. dependent var	1.495131
Sum squared resid	51.40070	S.E. of regression	0.375265
LSDV R-squared	0.944190	Within R-squared	0.864125
Log-likelihood	-155.7178	Akaike criterion	407.4356
Schwarz criterion	600.5611	Hannan-Quinn	483.8189
rho	0.529853	Durbin-Watson	0.857970

Joint test on named regressors -

Test statistic:  $F(8, 14) = 204.664$  with p-value =  $P(F(8, 14) > 204.664) = 3.69466e-013$

Robust test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: Welch  $F(14, 150.7) = 179.173$  with p-value =  $P(F(14, 150.7) > 179.173) = 2.71757e-086$

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time effects reported as dummy variables.

**Table 8.** Dependent variable: imports of Korea from the MENA countries FE controlling for time fixed effects.

Used 413 observations Time-series length: minimum 24, maximum 28		Included 15 cross-sectional units Robust (HAC) standard errors			
	Coefficient	Std. Error	t-ratio	p-value	
Constant	13.5944	0.591162	23.00	<0.0001	***
Real GDP j	0.00504797	0.00183913	2.745	0.0158	**
Population growth j	0.0480551	0.0298844	1.608	0.1301	
Real GDP K	0.0250596	0.0746745	0.3356	0.7422	
Population Growth K	-3.10235	0.656759	-4.724	0.0003	***
Trade openness	0.00515041	0.00472338	1.090	0.2939	
FDI	-0.00209812	0.0175826	-0.1193	0.9067	
Exchange rate	-2.37110e-05	1.50092e-05	-1.580	0.1365	
Oil rent	0.00721362	0.0158013	0.4565	0.6550	

Mean dependent var	12.46799	S.D. dependent var	2.763882
Sum squared resid	283.2496	S.E. of regression	0.880924
LSDV R-squared	0.910002	Within R-squared	0.581349
Log-likelihood	-508.1465	Akaike criterion	1112.293
Schwarz criterion	1305.419	Hannan-Quinn	1188.676
rho	0.631732	Durbin-Watson	0.716985

Joint test on named regressors -

Test statistic:  $F(8, 14) = 14.2667$  with p-value =  $P(F(8, 14) > 14.2667) = 1.65098e-005$

Robust test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: Welch  $F(14, 150.7) = 58.6742$  with p-value =  $P(F(14, 150.7) > 58.6742) = 1.21911e-053$

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time effects reported as dummy variables.



**Table 9.** Dependent variable: exports of Korea to the MENA countries RE-GLS.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	z	p-value	
Constant	15.3187	1.82462	8.396	<0.0001	***
Real GDP j	-0.00196252	0.00113743	-1.725	0.0845	*
Population growth j	0.0686094	0.0366369	1.873	0.0611	*
Real GDP K	-0.0695861	0.00621127	-11.20	<0.0001	***
Population growth K	-1.97931	0.199347	-9.929	<0.0001	***
Trade openness	0.00591481	0.00266609	2.219	0.0265	**
FDI	-0.0159668	0.0106855	-1.494	0.1351	
Exchange rate	2.94844e-05	2.90244e-06	10.16	<0.0001	***
Oil rent	0.0108560	0.00711595	1.526	0.1271	
Distance Kj	-0.000208987	0.000181685	-1.150	0.2500	
Mean dependent var	12.68861	S.D. dependent var		1.495131	
Sum squared resid	600.2705	S.E. of regression		1.218941	
Log-likelihood	-663.2387	Akaike criterion		1346.477	
Schwarz criterion	1386.712	Hannan-Quinn		1362.391	
rho	0.592159	Durbin-Watson		0.733075	

“Between” variance = 1.65328

“Within” variance = 0.424121 mean theta = 0.903847

Joint test on named regressors -

Asymptotic test statistic: Chi-square (9) = 83950.8 with p-value = 0

Breusch-Pagan test - Null hypothesis: Variance of the unit-specific error = 0

Asymptotic test statistic: Chi-square (1) = 1974.51 with p-value = 0

Hausman test - Null hypothesis: GLS estimates are consistent

Asymptotic test statistic: Chi-square (8)<sup>6</sup> = 363.583 with p-value = 1.13935e-073

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time dummies are not reported.

**Table 10.** Dependent variable: imports of Korea from the MENA countries RE-GLS.

Used 413 observations Time-series length: minimum 24, maximum 28	Included 15 cross-sectional units Robust (HAC) standard errors				
	Coefficient	Std. Error	z	p-value	
Constant	19.5470	2.75656	7.091	<0.0001	***
Real GDP j	-0.00192226	0.00277682	-0.6923	0.4888	
Population growth j	0.0694970	0.0278950	2.491	0.0127	**
Real GDP K	-0.0332141	0.0148196	-2.241	0.0250	**
Population growth K	-1.95715	0.307876	-6.357	<0.0001	***
Trade openness	0.0124891	0.00600154	2.081	0.0374	**

<sup>6</sup>The degrees of freedom (often abbreviated as **df** or **d**) tell you how many numbers in your grid are actually independent.

**Continued**

FDI	-0.0116210	0.0204477	-0.5683	0.5698	
Exchange rate	1.42236e-05	5.54426e-06	2.565	0.0103	**
Oil rent	0.0313804	0.0186560	1.682	0.0926	*
Distance Kj	-0.000863486	0.000309992	-2.786	0.0053	***
Mean dependent var	12.46799	S.D. dependent var		2.763882	
Sum squared resid	1673.844	S.E. of regression		2.035480	
Log-likelihood	-875.0040	Akaike criterion		1770.008	
Schwarz criterion	1810.242	Hannan-Quinn		1785.921	
rho	0.619211	Durbin-Watson		0.743037	

“Between” variance = 2.75076

“Within” variance = 1.10533 mean theta = 0.879974

Joint test on named regressors -

Asymptotic test statistic: Chi-square (9) = 4408.29 with p-value = 0

Breusch-Pagan test - Null hypothesis: Variance of the unit-specific error = 0

Asymptotic test statistic: Chi-square (1) = 1903.68 with p-value = 0

Hausman test - Null hypothesis: GLS estimates are consistent

Asymptotic test statistic: Chi-square (8) = 290.698 with p-value = 3.92505e-058

Note: (1) \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.10. (2) Time dummies are not reported.

## 4.2. Discussion

In this study, the FE estimator presumes an unobserved heterogeneous factor that is constant across time and impacts each country/period of the panel like the variable distance in our model. On the other hand, the RE model appoints no correlation between the individual impacts and the regressors, supposing that the unobserved heterogeneous unit is precisely exogenous. When the null hypothesis has zero correlation, the RE model is more consistent. Albeit, if the null is rejected, only the FE model offers accurate estimators [24].

The FE model is selected if there is a correlation between individual effects and explanatory variables [30]. And the regression model can control the impact of time effects from controlled variables to estimate the net impact of explanatory variables on trade flows' dependent variables. Therefore, two tests are looked at after running a RE model: The Breusch-Pagan Test for heteroskedasticity of the unit-specific errors and the Hausman Test for consistency of the GLS estimates. The Breusch Pagan test analyzes whether pooled OLS estimation is better or the Random/Fixed Effect technique. The null hypothesis is that pooled estimates are acceptable, and the alternative hypothesis is that random effect technique estimates are appropriate. If the p-value is low, an alternative hypothesis is accepted [31].

The Hausman test presents a method for testing the RE model's adequacy [32]. If the null hypothesis is rejected, the model is inconsistent. But, it is essential to mention that this outcome does not require that the FE model is appropriate. So, If the Hausman test cannot demonstrate a considerable divergence

( $p > 0.05$ ), it does not accordingly show that the RE estimator is free from bias. Usually, in many studies, the correlation between the covariates and unit effects is not precisely zero. This paper has employed the Hausman test to check whether fixed or random effects are more applied to evaluation [33]. And other studies tried to choose between fixed or random effect models [34].

The results of the three methods employed in this research show that some of the controlled variables are correlated and positively affect Korea's trade volumes with MENA countries. As indicated by the gravity theory, the GDP growth and population size are significant and affect trade flows, and distance in all cases is negative. Therefore, the hypotheses in the gravity model are used to support the evidence of the trade volumes relationship of the MENA countries with Korea, driven mostly by the real GDP and the distance. The results found by using the method pooled OLS shows the importance of population growth of the MENA countries' interacting positively with Korean trade flows. For instance, for the dependent variables, the controlled variable, Korean population growth, is statistically significant. The variable, distance, does not turn out to be significant as expected, which is to confirm the hypotheses of the gravity model. However, the first hypothesis in this study, Korean and the MENA countries' GDPs have a significant impact on Korean trade flows with the MENA region, is rejected.

The FE model without time-fixed effects designates that the determinants of Korean real GDP, Korean population growth, and the exchange rate of MENA countries interact positively with Korean exports. And the method FE with controlling for time-fixed effects shows the importance of Korea's real GDP growth for exports.

Moreover, for the RE technique used in this study GLS, shows that the controlled variables of Korean population growth, real GDP growth of Korea, and the exchange rate are statistically significant. And for most controlled variables used in this method, they are significant. The variable distance has a negative coefficient sign as confirmed in different studies. The result of the Hausman test in the GLS models shows that the null hypothesis is rejected, which aims that the FE model can be accepted as an alternative, persistent with earlier works of utilizing fixed effects [35].

In the RE specification, there is also bias within the coefficient to evaluate if the covariates are correlated with the unit effects. It doesn't show any correlation among the covariates and the unit effects explain that FE should be preferred. However, in a study, the authors preferred to employ the RE model to the FE model following previous works [36].

## 5. Conclusions

In the age of globalization, international trade plays a vital role in any country's development process. In this regard, existing studies have widely examined the bilateral trade relationship between many countries. Some scholars have provided substantial theoretical support for the gravity model of trade. Regardless of all the existing and extensively accepted modifications of the gravity model, we

should choose an appropriate model for this study. This paper focused on South Korea, which is considered one of the Asian Tigers, and its trading partners in the MENA region. Meanwhile, Korea has faced many opportunities as well as challenges when participating in global trade. Moreover, this study tried to establish a research framework for a comparative study on the impact of Korea's intensification of economic linkage with the MENA countries.

The trade structure of Korea is very different from the MENA countries. To better understand the relationship of Korean trade flows with these countries, this study goes beyond previous literature by using MENA region states' interactions with Korea. As a result, we found that the distance between Korea and its trading partners in the MENA region does affect the bilateral trade flows. As shown in the regression models, the variable distance is negative and decreases trade flows, which is consistent with what was found in other studies [25]. Moreover, according to this study, the population size of MENA countries explains the growth of trade volumes. Other controlled variables seem to affect trade flows as well. However, this study failed to identify that the GDP growth of Korea and MENA countries increases Korean trade flows.

The new economic alliance between South Korea and the MENA countries should be considered durable and from a long-term perspective. Therefore, it can create solid, stable, and sustained mutual economic gains. Korea-MENA economic cooperation should seek regions that engage in the future potential of both economies. This work can be followed up by other researchers who wish to examine further study in this matter.

Based on all estimation results, this study would first suggest that the policy-makers emphasize the importance of bilateral trade volumes of Korea with the MENA countries, which could increase the economic growth across all countries. Nevertheless, the research results on MENA countries suggest that we need further studies to find the potential variables that improve trade volume growth. Hence, researchers who aim to analyze trade growth in this area are suggested to classify countries by similar income per capita to find significant findings in these countries or add more countries. Also, adding variables such as culture, language, corruption, and degree of democracy would give an interesting result to better understand trade patterns. This study also suggests that academic researchers who aim to follow these techniques should take coherent and consistent data for analysis to include more countries. If there were more consistent data on the MENA countries, the estimation results of this study could have been improved. Such problems were especially common for some of the MENA countries, where inadequate social infrastructure, political instability, and such problems prevent the collection and reporting of such statistics which incites a need for future researchers to revise the specific method for gathering data.

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## Conflicts of Interest

The author declares no conflicts of interest.

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