

# Impact of the Association Agreement with the EU on Imports into Tunisia an Estimation of the Gravity Model

Jihene Yemmen, Mohamed Miras Marzouki

Department of Economics and Management Sciences, Manar University (FESGT Campus), Tunis, Tunisia  
Email: jihene.yemmen@isgb.ucar.tn

**How to cite this paper:** Yemmen, J., & Marzouki, M. M. (2024). Impact of the Association Agreement with the EU on Imports into Tunisia an Estimation of the Gravity Model. *Modern Economy*, 15, 103-119.

<https://doi.org/10.4236/me.2024.152006>

**Received:** November 18, 2023

**Accepted:** February 25, 2024

**Published:** February 28, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

The paper aims to provide a rational and objective assessment of the impact of trade integration between Tunisia and the European Union on imports of industrial products, following the 1995 Association Agreement. In this study, we adopt a multi-step approach. After an analysis of the stylized facts, a gravity model is applied and estimated in several variants to assess the determinants of trade. The results obtained are used to calculate creation and diversion of trade between Tunisia and the European Union. We achieved the following main results: coefficients of the traditional variables of the gravity model have generally expected signs; customs tariffs, transport costs which are measured by distance, good governance, tend to influence the development of bilateral trade flows. The free zone-trade between Tunisia and the EU has not been favorable for Tunisia and has a negative impact on the Tunisian economy because the effects of trade diversion are more important than trade creation effects. The findings from of this study may prompt policymakers to open up to other markets and consider diversifying them. They may also lead to the establishment of a stand-by arrangement, the revision of the 1995 Association Agreement and above all, the use of the WTO safeguard clause as an emergency measure to cope with this rapid increase in imports, particularly from certain trading partners, and to avoid traffic detour to the benefit of European products and to the detriment of products from the rest of the world. This article presents for the first time a quantification of the creation value and trade detour at constant price in Tunisia using an in-depth empirical analysis, and thus contributes to the existing literature studying the impact of the Association Agreement between Tunisia and the EU.

## Keywords

Tunisia-EU Integration, Association Agreement 1995, Trade Creation,

## 1. Introduction

International economic integration is a complex process of cooperation and diffusion of national economies of various countries, aimed at creating a unified economic organism. Economic integration generally refers to the creation of a free trade area, a customs union, a common market or an economic union. The majority of integration programs in developing countries have encountered problems that, in some cases, have led to their total failure and, more often, to a re-evaluation of the integration process. The European Union (EU) is an example of the most developed international economic integration association. Like many developing countries, Tunisia has adopted reforms to facilitate the integration of its economy into the global market. From 1986 to 1995, many economic measures involving trade liberalization have been undertaken. In 1986, Tunisia adopted the structural adjustment program (SAP). In 1989, it joined the General Agreement (GATT) and the World Trade Organization (WTO) in 1994. In 1994, the General Multilateral Agreement on Tariffs and Trade stipulated that bound duties on agricultural imports and domestic agricultural subsidies should be phased out. In 1995, the bilateral partnership agreement signed with the European Union provided for the complete elimination of tariff barriers on industrial products from the European Union over a period of twelve years. The elimination of tariffs under the agreement was completed in 2008, leading to the creation of a free trade zone for industrial products. In October 2015, the European Union began negotiations in Tunis on a comprehensive and deep free trade agreement (CAFTA). This project aims to broaden and consolidate their economic cooperation. CAFTA covers such diverse areas as trade in services, investment, government procurement, technical standards, customs procedures and trade facilitation. The Association Agreement between Tunisia and the EU has never been evaluated by the Tunisian state. There has been no assessment of the impact of liberalization in the industrial sector. The purpose of this article is to provide a rational and objective assessment of the impact of trade integration between Tunisia and the European Union on imports of industrial products, following the 1995 Association Agreement. Firstly, we will analyze the impact of integration on imports between Tunisia and the EU, comparing two situations: the first real situation of liberalization and the second fictitious situation of non-liberalization. Secondly, we will calculate the effects of trade creation and trade diversion. The value of imports in the liberalization situation is given in the foreign trade statistics. As for the value of imports in the fictitious situation of non-liberalization, this can be simulated using a gravity model. However, to ensure that, the simulated values are comparable with the real data, we will estimate the real data. In this way, the effect of creation and detour can be calcu-

lated. Our results will be presented and interpreted in relation to the typology of trade creation and trade diversion. The article is organized as follows: a literature review summarizing the main studies on trade creation and detour following trade liberalization. A literature review summarized the main studies on trade creation and detour following trade liberalization. We will then present the data and details of the variables, how they are measured, their sources and the methodology we have followed. Next, we will carry out an empirical study to assess the impact of integration on imports between Tunisia and the EU. We will compare the two situations; the first integration situation and the second non integration situation, and we will then calculate the creation and detour effects. Finally we will present and discuss our results.

## 2. Literature Review

Trade creation and trade diversion are two important concepts in the field of international trade that are often discussed in the context of trade liberalization. Here's a literature review summarizing key studies on trade creation and trade diversion following trade liberalization.

Jacob Viner (1950) highlighted out in his book "The Economics of Customs Unions" that the formation of a customs union (a form of trade liberalization) could lead to trade creation by diverting trade from high-cost external sources to lower-cost internal sources. He also warned against the risk of trade detour, when trade flows shift from more efficient third countries to less efficient member countries.

On the other hand, Balassa (1961), in his book "Trade Creation and Trade Diversion in the European Common Market", examined the trade effects of the European Economic Community (EEC) and found evidence of both trade creation and trade detour. He found that trade creation dominated in the early stages of integration, as members reduced tariffs and expanded trade among themselves. However, as the EEC expanded and external tariffs were imposed, trade diversion effects became more prominent, diverting trade away from non-member countries.

Moreover, Shujiro, Misa (2014) in his study "Trade Creation and Diversion Effects of Regional Trade Agreements: A Product-Level Analysis" used detailed product-level data to analyze the trade effects of regional trade agreements (RTAs). The findings suggested that RTAs generally lead to trade creation, as member countries increase their trade with each other. However, trade diversion was also observed, indicating that RTAs may redirect trade away from more efficient non-member countries.

Ingo Borchert et al. (2015) in their study "Trade Creation, Diversion, and Losses in the European Union: A Comprehensive Empirical Analysis" provided a comprehensive empirical analysis of the trade effects of the EU. The findings indicated that the EU has generated significant trade creation effects, leading to increased trade between member countries. However, trade diversion effects

were also observed, especially for less-developed member countries, suggesting a need for policies to address potential inequalities.

Fukunari Kimura and Ayako Obashi (2018) compared in their study “Trade Creation and Diversion Effects of Preferential Trade Agreements: A Comparative Study of the ASEAN-China and ASEAN-Korea Free Trade Areas” the trade effects of the ASEAN-China Free Trade Area (ACFTA) and the ASEAN-Korea Free Trade Area (AKFTA). The findings showed that both agreements led to trade creation effects, with member countries increasing their trade within the respective RTAs. However, trade diversion effects were also observed, highlighting the importance of considering the distributional impacts of preferential trade agreements.

Overall, the literature suggests that trade liberalization, whether in the form of customs unions, regional trade agreements, or preferential trade agreements, can lead to trade creation by facilitating increased trade flows between member countries. However, trade diversion effects are also possible, indicating the need for careful analysis and policy considerations to ensure the overall welfare gains from trade liberalization.

### 3. Data and Methodology

#### 3.1. Data Sources

This study analyzes the impact of the 1995 association agreement established between Tunisia and the European Union on Tunisian imports over the 1995-2020. The year 2020 is a limit year for our research since we do not have data on tariffs applied after this date.

The data for Import extracted from UNCTAD stat database (UNCTAD). The Data on GDP, distance and language are from the center for research and expertise on the world economy (CEPII). Data on exchange rates come from the International Financial Statistics (IFS) database. Data on governance indicators come from Worldwide Governance Indicators (WGI), while data on tariffs applied to products from EU countries ( $j$ ) to Tunisia countries ( $i$ ) come from the Trade Analysis and Information System (TRAINS) database.

Details of the respective variables, how they are measured, their sources and summary statistics are presented in **Table 1**.

#### 3.2. Econometric Model

The gravity model is an economic model used to explain and predict bilateral trade flows between countries. It is based on the principle that the volume of trade between two countries is directly related to their economic size (measured by GDP or income), and inversely related to the distance between them (Caney, 2013).

In this case, the gravity equation is as follows:

$$M_{ij} = K \times Y_i \times Y_j$$

$M_{ij}$ : bilateral trade flows between the two countries  $i$  and  $j$

**Table 1.** Definitions and data sources.

Variables	Definitions	Notations	Sources
Gross Domestic Product	Real gross domestic product is an indicator of the level of economic activity.	GDP	Center for Research and Expertise on The World Economy (CEPII).
Distance	The distance (in km) between two countries	DIST	Center for Research and Expertise on the World Economy (CEPII).
Bilateral Real Exchange Rate	The uncertain real exchange rate of currency of <i>i</i> expressed in that of <i>j</i>	RER	International Financial Statistics (IFS)
Language	Is a dummy variable which takes the value 1 if the two countries share the same language and 0 otherwise.	Comlang	Center for Research and Expertise on the World Economy (CEPII).
Governance	Global Governance Indicator	GGI	Worldwide Governance Indicators (WGI)
The tariff variable	Tariffs applied to products from EU countries ( <i>j</i> ) to Tunisia ( <i>i</i> ).	Tariffs applied	Database TRAINS (Trade Analysis and Information System)

Source: compiled by the author.

$Y_i$  and  $Y_j$ : the GDP of countries *i* and *j* respectively;

$D_{ij}$ : the distance between the two countries; and  $K$ : a constant.

To analyze the Association Agreement, the gravity model has the particularity of integrating geographical, historical and cultural proximity into bilateral trade (Baier & Bergstrand 2009).

This model can be adapted to the specific characteristics of Euro-Tunisian trade relations, explaining trade between industrialized and developing countries.

Our econometric analysis consists in assessing the impact of industrial product trade liberalization on Tunisia's bilateral trade with the EU. To do this, we have chosen to analyze this effect on imports of industrial products.

We will estimate the first real liberalization situation using a gravitational equation that introduces imports of Tunisian industrial products marked "i" from EU countries marked "j" as the dependent variable.

We then integrate all the independent variables affecting trade between Tunisia and the EU countries.

The estimated severity equation covers a twenty-five year period (from 1995 to 2020) for 28 EU countries. The data are annual, and the variables in the gravity equation are expressed in logarithms. Thus, our basic gravity equation is written as follows:

$$\begin{aligned} \text{Log}(M)_{ijt} = & \alpha_0 + \alpha_1 \text{Log}(\text{GDP})_{it} + \alpha_2 \text{Log}(\text{GDP})_{jt} + \alpha_3 \text{Log}(\text{Dist})_{ij} \\ & + \alpha_4 \text{Log}(\text{RER})_{ijt} + \alpha_5 \text{GGI}_{it} + \alpha_6 \text{GGI}_{jt} + \alpha_7 \text{Tinteg}_{ijt} \\ & + \beta_1 \text{Comlang}_{ij} + \beta_2 \text{dd}_{ij} + \varepsilon_{ijt} \end{aligned} \quad (1)$$

with:  $i$  = Tunisia (fixed),  $j$  = EU countries; ( $j = 1, \dots, 27$ ),  $\alpha_0$ : model constant,  $M_{ijt}$ : Imports from country  $j$  in millions of dollars per year (constant 2010 US),  $\text{GDP}_i$ : Tunisia's real GDP;  $\text{GDP}_j$ : EU countries' real GDP;  $\text{DIST}_{ij}$ : distance in kilometers separating the two capitals of countries  $i$  and  $j$ ;  $\text{RER}_{ijt}$ : real exchange rate between the currencies of countries  $i$  and  $j$ ;  $\text{GGI}_i$ : global governance indicator for Tunisia, this is an arithmetic average (of the six governance indicators);  $\text{GGI}_j$ : global governance indicator for EU countries, this is an arithmetic average of the six governance indicators;  $\text{Tinteg}_{ijt}$ : rates applied to products from country ( $j$ ) to country ( $i$ );  $\text{Comlang}_{ij}$ : binary variable equal to 1 if the two countries share a common language and 0 otherwise;  $\text{dd}_{ij}$ : binary variable which takes 1 when the tariff rate is applied to industrial products and 0 otherwise;  $\varepsilon_{ijt}$ : error term

Import data from UNCTAD stat database (UNCTAD).

Data on GDP, distance and language are from the center for research and expertise on the world economy (CEPII).

Data on exchange rates come from the International Financial Statistics (IFS) database.

Data on governance indicators come from Worldwide Governance Indicators (WGI), while data on tariffs applied to products from EU countries ( $j$ ) to Tunisia countries ( $i$ ) come from the Trade Analysis and Information System (TRAINS) database.

To simulate the fictitious situation of non-liberalization, we will use the same gravity model, estimating the impact of tariff barriers maintained by Tunisia on the volume of imports from the EU.

To do this, we introduce the tariffs applied by Tunisia to industrial imports from the rest of the world and apply them to EU countries.

Data on tariffs ( $\text{Tijnoninteg}$ ) applied to products from European Union countries ( $j$ ) to Tunisia ( $i$ ). From the TRAINS database.

$$\begin{aligned} \text{Log}(M)_{ijt} = & \alpha_0 + \alpha_1 \text{Log}(\text{GDP})_{it} + \alpha_2 \text{Log}(\text{GDP})_{jt} + \alpha_3 \text{Log}(\text{Dist})_{ij} \\ & + \alpha_4 \text{Log}(\text{RER})_{ijt} + \alpha_5 \text{GGI}_{it} + \alpha_6 \text{GGI}_{jt} + \alpha_7 \text{Tijnoninteg}_{ijt} \\ & + \beta_1 \text{Comlang}_{ij} + \varepsilon_{ijt} \end{aligned} \quad (2)$$

### 3.3. Methodology

Our econometric analysis consists in assessing the impact of industrial product trade liberalization on Tunisia's bilateral trade with the EU. We will analyze the impact of integration on imports between Tunisia and the EU, comparing two situations: the first real situation of liberalization and the second fictitious situation of non-liberalization. Secondly, we will calculate the effects of trade creation and trade diversion.

To do this, we have chosen to analyze this effect on imports of industrial

products. The most popular approach to estimating the gravity model using panel data is to first make it linear by taking logarithms and then estimating the resulting log-linear model by least squares (Santos Silva & Tenreyro, 2006). There are two methods of estimation: fixed-effects estimation and random-effects estimation.

We will perform the Hausman Test to determine which of the two methods is more appropriate (Thomas, 2018).

The Hausman Test is a statistical test used to determine the appropriate model specification for panel data analysis. It helps in choosing between fixed effects (FE) and random effects (RE) models by examining the correlation between the explanatory variables and the unobserved individual effects.

The null hypothesis is that the FE model is the appropriate specification, while the alternative hypothesis is that the RE model is preferred.

The Husman’s test show that the test statistic is larger than the critical value, so we reject the null hypothesis and conclude that the random effects model is appropriate. The estimation method used is Generalized Least Squares (GLS).

Test: Ho: difference in coefficients not systematic

$$\text{chi2}(4) = (b - B)' \left[ (V_b - V_B)^{-1} \right] (b - B) = 7.80$$

Prob > chi2 = 0.2990.

( $V_b - V_B$  is not positive definite).

## 4. Results and Discussions

### 4.1. Estimated Results of the Real Situation of Liberalization

The Descriptive statistics of the data used can be shown as follows (Table 2).

The interpretation of the results of the estimations carried out using the Generalized Least Squares (GLS) method on our sample. The results are presented in (Table 3).

The results for model 1 showed that eight out of nine variables are statistically significant.

**Table 2.** Descriptive statistics of the data used.

Variable	Obs	Mean	Std. Dev	Min	Max
<b>lnmij</b>	574	10.34855	2.555743	0.4774698	15.2728
<b>lnGDPi</b>	588	24.27271	0.2396638	23.82192	24.59755
<b>lnGDPj</b>	588	24.91472	1.625692	22.43922	28.94434
<b>lndisij</b>	588	7.349961	0.4178873	5.992794	7.936789
<b>rerij</b>	588	1.257052	0.7219285	0.0035338	2.659555
<b>GGIi</b>	560	-0.099375	0.1006723	-0.2992015	0.0268295
<b>GGIj</b>	559	1.053255	0.5304041	-0.3101784	1.985402
<b>Tinteg ij</b>	448	12.722	13.94148	0	31.58339

Source: The author’s computation using Stata 14.

**Table 3.** Estimation results for the gravity model of the free trade situation.

	Dependent variable: Mij				
	(1)	(2)	(3)	(4)	(5)
Log GDPi	0.58 (0.000)*	1.00 (0.000)*	-	-	-
Log GDPj	1.41 (0.000)*	1.31 (0.000)*	1.48 (0.000)*	-	-
Log Distij	-1.55 (0.000)	-1.94 (0.000)*	-1.55 (0.000)*	-1.81 (0.032)	-1.83 (0.076)
Comlangij	0.88 (0.32)	0.60 (0.204)	0.74 (0.111)	0.86 (0.449)	0.81 (0.562)
Log RERij	0.25 (0.069)	0.11 (0.439)	0.36 (0.009)	1.04 (0.000)*	0.87 (0.000)*
GGIi	-	-	-1.22 (0.001)*	-	-
GGIj	-	1.01 (0.000)*	-	1.78 (0.000)*	1.68 (0.000)*
Ddij	-	-	-	0.43 (0.000)*	-
Tinteg ij	-	-	-	-	-0.01 (0.000)*
const	-29.81 (0.000)*	-35.14 (0.000)*	-17.388 (0.000)*	20.079 (0.001)*	21.064 (0.006)
B. Pagan T chibar2 (01)	1530.02	1406.65	1448.18	4113.85	2429.87
Prob > chi- bar2	(0.000)*	(0.000)*	(0.000)*	(0.000)*	(0.000)*
R2	0.84	0.84	0.83	0.20	0.19

Source: The author's computation using Stata 14. Notes: \*, \*\*, \*\*\*significance respectively at 1%, 5% and 10%.

The coefficients of the explanatory variables have been found positive and very statistically significant in most cases at the 1% level.

The impact of Tunisia's GDP (GDPi) on imports is positive and highly significant at the 1% threshold. A 1% increase in Tunisia's GDP leads to a 1% increase in imports. This suggests that economic growth and increased income levels in Tunisia lead to higher demand for imported goods and services. Our findings agree with the results of (Zestos, 2002).

The impact of partner countries' GDP (GDPj) on Tunisia's imports is positive and highly significant at the 1% threshold. A 1% increase in partner countries' GDP (GDPj) leads to a 1.48% increase in imports. This result indicates that Tunisia's imports are strongly influenced by the economic performance of its part-



ner countries. When the economies of partner countries are expanding, this is likely to stimulate demand for goods and services, leading to an increase in imports. The results came in line with previous literature (Alimi, 2010).

The geographical distance variable shows that the latter has a highly significant negative impact on Tunisia's bilateral imports at the 1% threshold. This result indicates that geographical distance has an effect on trade between the two partners: If the distance between the two partner countries is long, transport costs will be high and raw material prices will be higher, thus reducing considerably imports. These results are therefore in line with those found in the literature by (Limao & Venables, 2001; Kimura & Lee, 2006; Lennon, 2009).

According to our estimates, the coefficient of the estimated exchange rate (RER) positively and significantly affects imports, in addition, this result might suggest that Trade Agreements between Tunisia and the UE facilitate the import of industrial goods with lower or zero tariffs. These agreements can encourage businesses in Tunisia to import more EU products. This result can also be explained by Tunisia's dependence on imports. Tunisia could be heavily dependent on industrial products from the European Union to meet domestic demand and support its industries. Even with a depreciated currency, imports are still necessary to meet the needs of the Tunisian market.

The introduction of an institutional variable, namely Tunisia's Global governance indicator (GGI), allows us to detect the effect of the quality of economic policy in Tunisia on imports. Tunisia's overall governance indicator (GGIi) has a negative and significant coefficient. This result highlights the importance of the effect of governance on Tunisia's bilateral trade. Indeed, unfavorable governance characterized by corruption, political instability, weak institutions, can deter foreign investors, create trade barriers and lead to a decline in imports.

With regard to the indicator of global governance indicator of partner countries (GGIj), we noted a positive and significant sign at the 1% threshold. An improvement in this indicator of 1 score point would lead to a 178% increase in Tunisian imports. Thus, an improvement in the quality of governance in our partner countries would translate into an increase in the value of our imports. The governance variable, capturing perceptions of governance and exerting a significant impact on sustainable growth and economic development, thus acts positively on trade creation. Good governance helps improve trade flows. The better the quality of institutions and political factors, the greater the volume of trade.

The binary variable, (ddij) which captures the effect of the complete dismantling of tariff barriers on imports of industrial products from European Union countries in 2008, has the expected sign. It is positive and significant, showing that the complete removal of all tariffs on manufactured goods leads to an increase in imports. As tariffs fall, imports rise. According to our estimates, a 1% increase in the elimination of customs duties generates a 43 point increase in the percentage of imports.

The tariff variable (Tijntég), applied to imports of industrial products from European Union countries, is negative and significant, showing that the gradual dismantling of tariff barriers up to 2008 (when tariffs were completely eliminated) has not yet had the expected impact on import volumes. Even if tariffs have been reduced, they still represent barriers that limit trade. This can be explained by the tariffs applied to imports of sensitive products with a locally produced equivalent (list 4). In fact, the reduction in protection for these products, essentially final consumer goods, began in 2000 and was dismantled over 8 years. Clearly, dismantling has not yet had any effect on this category of imports.

As for the common language variable, it has no significant effect, which shows that common language is not a factor influencing trade. In fact, of the 28 countries belonging to the EU, Tunisia shares a common language only with France, Luxembourg and Belgium.

#### 4.2. Estimation Results for the Fictitious Non-Liberalization Situation

The Descriptive statistics of the data used can be shown as follows (Table 4).

The interpretation of the results of the estimations carried out using the Generalized Least Squares (GLS) method on our sample. The results are presented in (Table 5).

The coefficients of the explanatory variables have the expected sign and are significant in most cases at the 1% level.

Application of the random-effects model shows that the impact of Tunisia's GDP (GDPi) on imports is positive and significant: an increase in Tunisia's GDP leads to an expansion in its wealth, and then to growth in its import demand.

In other words, a 1% increase in Tunisia's GDP leads to a 1.54% increase in imports.

The impact of partner countries' GDP (GDPj) on Tunisia's imports is positive and significant. This shows that it has a positive impact on import volumes. A 1% improvement in GDPj would therefore increase imports by 1.41%.

**Table 4.** Descriptive statistics of the data used.

Variable	Obs	Mean	Std. Dev	Min	Max
lnmij	574	10.34855	2.555743	0.4774698	15.2728
lnGDPi	588	24.27271	0.2396638	23.82192	24.59755
lnGDPj	588	24.91472	1.625692	22.43922	28.94434
lndisij	588	7.349961	0.4178873	5.992794	7.936789
rerij	588	1.257052	0.7219285	0.0035338	2.659555
GGIi	560	-0.099375	0.1006723	-0.2992015	0.0268295
GGIj	559	1.053255	0.5304041	-0.3101784	1.985402
tijnonintgj	420	26.02267	3.793313	19.31	30.99

Source: The author's computation using Stata 14.

**Table 5.** Results of fictitious situation estimates.

	Dependent variable: $M_{ij}$			
	(1)	(2)	(3)	(4)
<b>Log GDPi</b>	0.58 (0.000)*	-	1.54 (0.000)*	-
<b>Log GDPj</b>	1.41 (0.000)*	1.41 (0.000)*	-	-
<b>Log Distij</b>	-1.55 (0.000)*	-1.55 (0.000)*	-1.91 (0.031)	-1.78 (0.089)
<b>Comlangij</b>	0.88 (0.32)	0.74 (0.111)	1.13 (0.346)	0.67 (0.63)
<b>Log RERij</b>	0.25 (0.069)	0.36 (0.009)	0.51 (0.010)	1.19 (0.000)*
<b>GGIi</b>	-	-1.22 (0.001)*	-	-
<b>GGIj</b>	-	-	1.78 (0.000)*	-
<b>Tijninteg</b>	-	-	-	-0.04 (0.000)*
<b>const</b>	-29.81 (0.000)*	-17.38 (0.000)*	-15.82 (0.046)	21.18 (0.006)
<b>B. Pagan T chi- bar2 (01)</b>	1530.02 (0.000)*	1448.18 (0.000)*	4181.71 (0.000)*	2072.67 (0.000)*
<b>Prob &gt; chibar2</b>				
<b>R2</b>	0.84	0.83	0.23	0.18

Source: The author's computation using Stata 14.

The results of the gravity model, concerning the geographical distance variable, show that the latter has a negative and significant effect on Tunisia's bilateral imports at the 1% threshold. In other words, a 1% distance between the two partner countries leads to a 1.55% drop in imports. These results are in line with those found in the literature (Nordås et al., 2006). This leads to the conclusion that geographical distance reflects transport costs, which are considered an obstacle to trade (Disdier & HEAD, 2008).

For the common language variable, it has no significant effect, showing that common language is not a factor influencing trade.

According to our estimates, the estimated exchange rate coefficient positively and significantly affects imports. These results imply that exchange rate flexibility between partner countries affects their bilateral trade.

The introduction of an institutional variable, namely Tunisia's Global governance indicator (GGI), makes it possible to detect the effect of the quality of economic policy in Tunisia on imports.

The indicator of Tunisia's Global governance indicator (GGI) has a negative and significant coefficient; poor governance would reduce Tunisia's imports.

As for the global governance indicator for partner countries (GGIj), we noted a positive and significant sign at the 1% threshold.

An improvement in this indicator of 1 score point would lead to a 178% increase in Tunisian imports. Thus, an improvement in the quality of governance in our partner countries would translate into an increase in the value of our imports.

The governance variable, capturing perceptions of governance and exerting a significant impact on sustainable growth and economic development, thus acts positively on trade creation. Good governance contributes to improved trade flows. The better the quality of institutions and political factors, the greater the volume of trade.

The tariff variable, applied to imports (Tijnonintég) of industrial products from European Union countries, has the expected sign. It is negative and significant, showing that tariff barriers considerably reduce trade.

Tariff protection slows down trade: as tariffs rise, imports fall. When tariffs rise by 1%, the result is an increase in the price of imported goods, and a consequent reduction in imports of 4%; this has a negative influence on trade between the two partners.

### 4.3. Impact of Integration: Effects of Trade Creation and Trade Diversion

After estimating the first real liberalization situation and simulating the second fictitious non-liberalization situation, we will calculate the variation between these two situations to find  $\Delta M$  (Value of imports in real liberalization situation – Value of imports in fictitious non-liberalization situation), so that the creation and detour effects can be calculated.

To calculate the impact of integration on imports in Millions of Dollars, we use the following formulas:

$\Delta M = \text{Value of imports in a situation of integration} - \text{Value of imports in a (1) situation of non-integration.}$

Impact of integration = trade creation effects – trade detour effects (2).

The results are presented in (Table 6).

Simulations carried out by comparing effective customs duties with theoretical customs duties estimated in the absence of the agreement, show an increase in imports of industrial products.

Imports resulting from progressive de-protection over the period (1995-2008) has increased from 218.995 million in 1995 to 350.826 million in 2008, when tariffs were completely cancelled. This represents a growth rate of 37.57%.

Whether or not to set up a free trade zone depends on a comparison between the creation effects and the detour effects, and on which effect predominates.

Trade creation results in an increase in welfare, mainly due to the reduction in tariffs, and therefore costs, and an increase in consumer surplus.

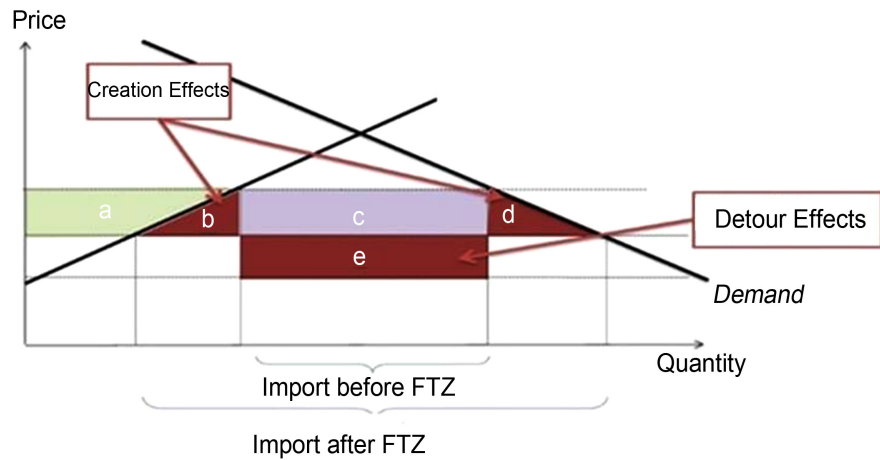
Trade detour, on the other hand, occurs when part of the trade is diverted from the rest of the world to the partner country, with imports in this case costing more.

**Table 6.**  $\Delta M$  Variation in imports in Millions of dollars (at constant prices).

Year	Value of imports in real liberalization situation (MD)	Value of imports in fictitious non-liberalization situation (MD)	( $\Delta M$ ) (MD)
1995	7,423,180	7204,185	218,995
1996	7,316,113	7100,276	215,836
1997	7,111,203	6901,411	209,791
1998	7,683,842	7457,157	226,685
1999	7,189,279	6977,184	212,094
2000	6,802,072	6601,401	200,671
2001	7,570,809	7347,458	223,350
2002	7,246,902	7033,107	213,794
2003	8,142,876	7902,649	240,227
2004	8,943,448	8679,603	263,845
2005	8,495,751	8245,113	250,637
2006	9,026,407	8760,114	266,292
2007	11,017,204	10692,180	325,024
2008	11,891,794	11540,968	350,826
2009	10,412,333	10105,153	307,179
2010	10,698,789	10383,158	315,630
2011	10,200,279	9899,355	300,923
2012	9,109,359	8840,619	268,739
2013	8,899,973	8637,410	262,562
2014	8,400,904	8153,064	247,839
2015	6,672,005	6475,171	196,834
2016	6,652,359	6364,251	288,108
2017	7,840,359	7552,004	288,355
2018	5,579,967	5398,697	181,279
2019	6,978,785	6798,598	180,187
2020	7,538,503	7427,106	111,397

Source: Author's calculations.

In **Figure 1**, the consumption gains generated by the union through trade creation effects in the sense of J. Viner correspond to the area of the triangle, while the trade detour effect is represented by the area of the rectangle **Figure 1**.



**Figure 1.** Calculation of trade creation and detour effects (according to [Viner, 1950](#)).

Calculation of trade creation and detour effects (according to [Viner, 1950](#)).

With:

Pt: Tunisian market price and  $P_t = P^*(1 + t)$ ;

Mt: corresponding import quantity;

Pu: EU market price;

Mu: corresponding import quantity on the Tunisian market;

P\*: International price;

The Creation Effect and the Diversion Effect can be evaluated as follows:

$$\text{Creation effect} = \text{Triangle area} = 1/2(P_t - P_u)(M_u - M_t)$$

Knowing that  $(M_u - M_t)$ , represents the increase in imports of a product due to integration compared to the non-integration situation in which we have assumed that Tunisia has maintained its tariff protection and which we have named  $\Delta M_i$ .

$\Delta M_i = (\text{Value of imports in an integrated situation} - \text{Value of imports in a non-integrated situation})$

With

$P_t = P^*(1 + t)$  and  $P_u = P^*(1 + t_u)$ , where “t” and “tu” refer to the tariffs applicable in Tunisia and the EU.

By expanding the expression, the Creation Effect becomes:

$$\begin{aligned} \text{Creation effect} &= 1/2[(P^*(1 + t) - P^*(1 + t_u))(M_u - M_t)] = 1/2P^*(t - t_u)\Delta M_i \\ &= 1/2(t - t_u)P^*\Delta M_i \end{aligned}$$

Ultimately, the creation effect is the difference in tariff rates  $(t - t_u)$  applied between Tunisia and the EU for specific products and the increase in the value of imports  $P^*\Delta M_i$ , due to liberalization with the EU. The Diversion Effect is represented by the area of the rectangle.

It can be expressed as follows:

$$\begin{aligned} \text{Detour effect} &= (P_u - P^*)M_t = [P^*(1 + t_u) - P^*]M_t = [P^* + P^*t_u - P^*]M_t \\ &= P^*t_uM_t \end{aligned}$$

$$\text{Detour effect} = t_uP^*M_t$$

Consequently, the effect of detour is equal to the tariff rate applied by the EU multiplied by the value of the volume of initial imports shown in graph 1. Both quantities of statistical data are available to fully evaluate the detour effect.

Import impact = Creation effects – Diversion effects

Import impact =  $1/2(t - t_u) P_i \Delta M_i - t_u P_i M_{ti}$

Impact of integration =  $1/2[\Delta M_i * (t - t_u)] - [(M_{ti} * t_u)]$

To calculate the impact of integration, we differentiate between creation effects and detour effects:

Integration impact =  $1/2[\Delta M_i(t - t_u)] - [(vt * t_u)]$

The results show that the free-trade area between Tunisia and the EU has not been favorable for Tunisia, and has a negative impact on the Tunisian economy, as trade detour effects are greater than trade creation effects. Import losses are due to imports of European products via Tunisia at EU prices, and imports from other parts of the world at lower international prices. Due to tax exemptions, European products enter the Tunisian market at the expense of cheaper products from other parts of the world.

There are several authors and economists who have voiced criticism of integration agreements, claiming that they can lead to trade detour. Criticism often comes from different perspectives, including protectionism, international political economy and economic analysis. Here are some of the authors who have tackled this subject.

Joan Robinson: British economist, Joan Robinson contributed to political economy and criticized trade policies and agreements which, in her view, could lead to economic distortions.

Raúl Prebisch: Argentine economist, Prebisch developed the theory of economic dependence. He pointed out that developing countries could experience trade detour due to the unequal economic structures resulting from integration agreements.

Dani Rodrik: A Turkish-American economist, Rodrik has worked on the political aspects of economic integration and raised concerns about the possibility of trade detour in certain circumstances.

Jagdish Bhagwati: Although Bhagwati is often associated with free trade, he has also highlighted some concerns about specific forms of economic integration that could lead to distortions.

It's important to note that opinions on integration agreements and their effects vary among economists, and there are also arguments in favor of such agreements as instruments for promoting trade and economic growth. Views may also evolve according to specific economic contexts and global market conditions.

## 5. Conclusion

Free trade with the European Union has brought gains and losses to Tunisia. The impact of liberalization has been determined by expressions that enable it to be clearly evaluated.

The main objective of this study was to examine the impact of trade integration between Tunisia and the European Union on imports of industrial products, following the 1995 Association Agreement. The role of GDP, bilateral real exchange rate, governance, tariff variable, distance and language were also studied as control variables affecting trade between Tunisia and EU countries.

Although a few studies have examined the impact of trade integration between Tunisia and the EU on imports of industrial products, no study has quantified the value of traffic creation and detour at constant prices in Tunisia. To do this, we compared two situations: the first real situation of liberalization and the second fictitious situation of non-liberalization. But to ensure that the simulated values are comparable with the real data, we estimated the real data. We constructed a tariff variable to simulate the fictitious situation of non-liberalization, by estimating the impact of tariff barriers maintained by Tunisia on the volume of imports from the EU. We introduced the tariffs applied by Tunisia to industrial imports from the rest of the world, and applied them to EU countries. In this way, the creation and detour effect was calculated.

The 1995 Association Agreement between Tunisia and the EU has had a negative impact on the Tunisian economy, since the trade detour effects outweigh the trade creation effects. As for import losses, these stem from Tunisia importing European products at EU prices, instead of importing from other parts of the world at lower international prices. Due to tariff exemptions, European products have entered the Tunisian market to the detriment of cheaper products from other parts of the world.

The extent of the loss resulting from Tunisia's imports of European origin depends on the difference between the EU market price and the international price of a particular product. The Association Agreement only favors imports, which have been the source of the trade detour effect in favor of European products and to the detriment of products from the rest of the world, aggravating Tunisia's external imbalances.

It's worth noting that the impact of the 1995 agreement has not been uniform across all sectors and regions within Tunisia. Some industries and regions benefited more than others, and challenges such as adjustment costs, market competition, and the need for further reforms were also observed. Nevertheless, the Association Agreement has been a crucial milestone in Tunisia's trade and economic relations with the EU, shaping its economic trajectory and promoting integration with the European market.

Ideally, it is essential to combat traffic detour through better enforcement of laws and regulations, enhanced international cooperation and the promotion of a healthy and fair business climate. This would maximize the benefits of traffic creation while reducing the adverse effects of traffic detour.

### **Conflicts of Interest**

The authors declare no conflicts of interest regarding the publication of this paper.



## References

- Alimi, N. (2010). *Accord de Libre Echange et Synchronisation des Cycles Economiques: cas de la Tunisie et de l'union européenne*. Le Maghreb face aux défis de l'ouverture en méditerranée.
- Baier, S. L., & Bergstrand, J. H. (2009). Bonus Vetus OLS: A Simple Method for Approximating International Trade-Cost Effects Using the Gravity Equation. *Journal of International Economics*, 77, 77-85. <https://doi.org/10.1016/j.jinteco.2008.10.004>
- Balassa, B. (1961). Trade Creation and Trade Diversion in the European Common Market: An Appraisal of the Evidence. *The Economic Journal*, 77, 1-21. <https://doi.org/10.2307/2229344>
- Borchert, I., Gootiiz, B., & Mattoo, A. (2015). *Trade Creation, Diversion, and Losses in the European Union: A Comprehensive Empirical Analysis*. The World Bank.
- Caney, T. (2013). *The Gravity Equation in International Trade: An Explanation*. Working Paper 19285, NBER Working Paper Series.
- Disdier, A. C., & Head, K. (2008). The Puzzling Persistence of the Distance Effect on Bilateral Trade. *Review of Economics and Statistics*, 90, 37-41. <https://doi.org/10.1162/rest.90.1.37>
- Fukunari, K., & Ayako, O. (2018). *Trade Creation and Diversion Effects of Preferential Trade Agreements: A Comparative Study of the ASEAN-China and ASEAN-Korea Free Trade Areas*. Working Papers, East Asian Bureau of Economic Research.
- Kimura, F., & Lee, H. (2006). The Gravity Equation in International Trade in Services. *Review of World Economies*, 142, 92-121. <https://doi.org/10.1007/s10290-006-0058-8>
- Lennon, C. (2009). *Trade in Services and Trade in Goods: Differences and Complementarities*. WIIW Working Paper No. 53, The Vienna Institute for International Economic Studies.
- Limao, N., & Venables, A. J. (2001). Infrastructure, Geographical Disadvantage and Transport Costs. *The World Bank Economic Review*, 15, 451-479. <https://doi.org/10.1093/wber/15.3.451>
- Nordås, H. K., Pinali, E., & Grosso, M. G. (2006). *Logistics and Time as a Trade Barrier*. OECD Trade Policy Working Papers No. 35.
- Santos Silva, J. M. C., & Tenreyro, S. (2006). The Log of Gravity. *Review of Economics and Statistics*, 88, 641-658. <https://doi.org/10.1162/rest.88.4.641>
- Shujiro, U., & Misa, O. (2014). Trade Creation and Diversion Effects of Regional Trade Agreements: A Product-level Analysis. *The World Economy*, 37, 267-289. <https://doi.org/10.1111/twec.12099>
- Thomas, C. (2018). The Gravity Equation in International Trade: An Explanation. *Journal of Political Economy*, 126, 150-177. <https://doi.org/10.1086/694292>
- Viner, J. (1950). *The Customs Union Issue*. Carnegie Endowment for International Peace.
- Zestos, G. (2002). Trade and GDP Growth: Causal Relations in the United States and Canada. *Southern Economic Journal*, 68, 859-874. <https://doi.org/10.1002/j.2325-8012.2002.tb00462.x>