



FREE TRADE AGREEMENT BETWEEN TUNISIA AND THE EUROPEAN UNION, DO INSTITUTIONS MATTER?: AN EMPIRICAL VALIDATION BY A GRAVITY MODEL

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Abstract

Tunisia has signed a free trade agreement with the European Union in 1996, which provides for the reduction of tariff barriers between Tunisia and the EU. In this article, we aim to know and test whether the similarity of the institutional framework has to stimulate international trade between Tunisia and the European Union. In this context, we built a variable called “Institutional distance” to valid the institutional dimension of international trade, near borders effects reported in the literature. To this end, a gravity model was used initially (Tunisia and 21 European countries). Secondly, the estimate shows the existence of spatial autocorrelation. The latter has been corrected using spatial econometrics. The results show that the geographical distance remains more important than the institutions in this type of agreement between north and south shores of the Mediterranean.

1. INTRODUCTION

Economic interdependence among nations has increased dramatically after the second half of the twentieth century. Many analyzes have been proposed to better circumscribe this process using different approaches. Globalization that promotes the free flow of goods and services certainly implies a reduction in trade costs. This decrease mainly due to multiple technological innovations reduced economic distance between potential partners. Thereby opening policies adopted by governments have largely favored the development of international economic relations. This period is, in fact, marked by a major trade liberalization process aimed at reducing the barriers erected during the two world wars. This process culminated at the multilateral level through reduction of tariff barriers under rounds of GATT and then the WTO and the various free trade agreements.

Classical trade theory attempted to explain bilateral trade in terms of differences in relative factor endowments between countries. Therefore, trade between two countries is generally inversely proportional to the similarity of factor endowments. We will prove the relativity of

this theory Based on the gravitational approach. This is the new theory of international trade (Helpman & Krugman, 1985). The tool used here to empirically understand both the institutions and the problems of international and regional, is the equation of gravity. We assume that when countries decide to open their borders to trade flows, institutional distance or gap governance intervene in one way or another in the development of trade between countries. Indeed, most studies emphasize the geographical proximity as obstacles to trade development. Therefore, the purpose of this article is to demonstrate that the physical border is hardly a defining border trade. This is the institutional border matters too. Therefore, we distinguish between geographic distance and institutional distance. To answer this question, a modified gravity model will be used to accommodate this distance. Furthermore, the assessment of institutional distance posed a problem. This refers to good institutional quality. Thereafter, we build a usable application on our modified gravity model. Finally, results and possible interpretations.

2. INTERNATIONAL TRADE AND BORDER EFFECT

To assess the impact of borders on trade, it is necessary to compare the trade observed in practice between two geographical entities with that which would exist in a fully integrated economy, that is to say without borders. To this end, economists rely on the gravity model. The advantage of this model is to give a key role to geography as a determinant of the density of economic ties between the countries and to include the border as an explanatory factor. The theoretical contributions on border effects show that both take into account the difference in economic size and geographic distance, trade within a given is greater than that observed with an external partner geographical unit.

Several studies directly focus on the countries of the European Union suggest relatively high border effects in spite of the economic integration process.

The institutional environment, in particular, the impact of the legal quality differential between trading partners, is the latest border effects justification. More effective institutions in a country are of low quality, the more risks involved in case of opportunistic behavior are high for partner countries to exchange. Indeed, transaction costs increase because of the uncertainty of the economic environment in general. Therefore, respect for property rights and contract enforcement are key objectives of the framework of formal institutions. This brings us to the concept of governance. However, good governance also requires neutral economic policies. Non adequate policies induce macroeconomic instability. This argument is quite extensible in international trade. If institutions affect the development of trade, this brings a further argument between governance and economic performance. However, if this explanation helps to understand the domestic ties observed in trade between the countries of different levels of development, it seems irrelevant to justify the magnitude of border effects affecting trade countries with a different level of development and institutions quality. Turrini and Van Ypersele (2002) suggest a second explanation based on existing intrinsic differences in legal frameworks and not on quality: They can play even between countries with the some level of development.

3. INSTITUTIONAL QUALITY AND ECONOMIC PERFORMANCE: GOVERNANCE MATTERS

Several authors have attempted to empirically justify the existence of border effects. Explanations are provided contradictory. Border effects may have different origins. The relevance of proposed justifications is based in part on the samples chosen: it would be even more robust than they allow to simultaneously testing different explanations. Intuitively, we thought that formal trade (tariff and non-tariff) barriers are factors explaining border effects. However, several studies show a minimal influence of these formal barriers. Other studies come to emphasize the role played by business networks and social networks in the emergence of border effects.

Since the early 1990s, the concept of governance has become of major importance. It is now recognized as a key component of growth and development. Today measuring governance strengthens further directions of state policy influences the pattern of international relations and stimulates research in economics and political science. Indeed, indicators of governance have led to a better understanding of the causes and consequences of bad governance. They helped to put pressure on governments to act.

The term "governance" is of French origin. It was equivalent to the term of government. In the 14th century, thinking about the state and the power has led to a distinction between the terms government and governance. The government refers to the power of the state and its hierarchy, while governance is how to adequately manage public affairs independently of the question of power. It is synonymous with a healthy development management.

The Commission of the European Communities defines governance as follows: "governance is about the rules, processes and behavior by which interests are articulated, resources are generated and power is exercised in a society. The way, in which public services operate, public resources are managed and public regulatory powers are exercised is the major issue to be addressed in this context."

Regarding the United Nations Program for Development "governance can be seen as the exercise of economic, political and administrative authority to manage a country's affairs at all levels. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and they mediate their disputes. Good governance is characterized by the participation and accountability. It is also characterized by efficiency and equity. It ensures the primacy of human rights.

For the World Bank, governance means the ability of the state to provide the institutions providing support to commercial activities and good governance by the successful delivery of such institutions. Good governance includes the creation, protection and enforcement of property rights, a regulatory system to competitive, sound macroeconomic policies that create a stable environment for market activities. Good governance also means the absence of corruption, to the extent that it can alter the policy objectives and weaken the legitimacy of public institutions.

4. THE GRAVITY MODEL

4.1. Historical overview

[McCallum \(1995\)](#) is the first to attack the belief that borders count. To confirm the idea, the author compares the bilateral trade between Canadian provinces with the American States. However, it must be the most important advancement in recent years, in terms of the gravity model for [Anderson and Van Wincoop \(2003\)](#). The authors criticized McCallum by lack of theoretical basis of the model. According to them, this model does not allow for comparative analysis.

The gravity models derive its name or legitimacy from the Newtonian theory of gravitation, which states that two bodies are attracted proportionately due to their mass and inversely as the square of the distance between them. In physics, a body is defined as a point mass with no spatial extension, which recalls the traditional theory of international trade where countries are perceived as entities without dimension.

Therefore, it seems reasonable that economic entities may be similar, too, with body attracting and repelling in space while being subjected to the effects of size and distance. The mathematical formulation of this idea is as follows:

Two mass particles M_i and M_j separated by a distance D_{ij} are attracted by a force F_{ij} :

$$F_{ij} = G \cdot \frac{M_i M_j}{D_{ij}^2}$$

G : The constant of gravitation.

By analogy, like gravitation aggregates of matter, human activity aggregates firms and households to give rise to agglomeration of different sizes and compositions. These agglomerations exchange flows of goods, people and information. It is no surprise that in the 19th century appeared the idea of social physics implementing the possibility of humans to "interact" with each other. The first application of social physics has tried to explain the intensity of migration depending on the size of nations (cities or regions) and the distance that separates them. Finally, this idea has been explored by the author Tinbergen (1962) in the case of international trade. Flows are normally expressed by exports and imports from countries whose size is measured by gross domestic product (GDP). Despite the initial absence of any theoretical basis, the gravitational approach has been found to surprisingly rich and empirical relevance that is rarely found in the social sciences.

The gravity model presupposes certain characteristics deemed to space activities and also their relative position in space. It presupposes that geographical proximity is a major cause of international trade between countries. Yet, according to a widespread belief, a component of international integration in the post-war years was precisely the end of the tyranny of distance. It seems, however, that the transfer costs remain high especially internationally.

4.2. Gravity and bilateral trade

In the basic version of the gravity model, bilateral trade flows are positively related to the size of each partner and negatively affected by the level of transfer costs. The size of the country is often aggregated by GDP and cost of transfers by the distance (measured by the distance as the crow flies, the great circle method) between them.

By appointing Y_i the country's GDP (i), Y_j the country's GDP (j), X_{ij} the amount of exports of (i) to (j) and d_{ij} the distance between them, we will have:

$$X_{ij} = G \frac{Y_i^\alpha Y_j^\beta}{d_{ij}^\delta}$$

Where G , α , β , δ are parameters that better estimated rather than assign a predetermined value. The parameter δ is an indicator of the sensitivity of trade relative to the distance between countries. A high value means that geographical proximity is crucial to development of bilateral trade, while a low value indicates that proximity is of similar intensity between near and distant partners (no effect of distance).

The parameters of the model are generally estimated by taking logarithms, which leads to the following linear relation:

$$\text{LOG}(X_{ij}) = \text{LOG}(G) + \alpha \text{LOG}(Y_i) + \beta \text{LOG}(Y_j) - \delta \text{LOG}(d_{ij}) + \varepsilon_{ij}$$

ε_{ij} : Error terme.

In a world where distance has no effect on the intensity of trade, the parameter δ approaches zero.

4.3. Gravity model modified

We assume in the following, that the interaction between the countries does not take place only on the basis of the physical distance between them, but also on the similarity of the quality of institutions and the mode of governance.

$$X_{ij} = f(Y_i, Y_j, RD_{ij}, ID_{ij})$$

Formally we can write the model:

$$X_{ij} = G \frac{Y_i^\alpha Y_j^\beta e^{\varepsilon_{ij}}}{RD_{ij}^\delta ID_{ij}^\eta} \dots\dots\dots (1)$$

With Y_i the country's GDP (i), Y_j the country's GDP (j), X_{ij} the amount of exports of (i) to (j), RD_{ij} the actual distance between them and ID_{ij} the institutional distance between the two countries (i) and (j), G is a constant.

The parameters α, β, δ and η are estimable parameters.

From equation (1) we can take the logarithm to make it linear. Therefore, it becomes:

$$LOG(X_{ij}) = LOG(G) + \alpha LOG(Y_i) + \beta LOG(Y_j) - \delta LOG(RD_{ij}) - \eta LOG(ID_{ij}) + \varepsilon_{ij}$$

LOG value (G) will be a constant. ε_{ij} An error term normally distributed.

The transfer costs are represented by the actual distance. λ and η and are the elasticities of trade flows to the real and institutional distances. If these two parameters are statistically significant, it means that the geographical and institutional proximity matter both in the determination of trade flows between countries.

However, the variable institutional distance ID_{ij} present some problems in its assessment. In most cases, institutional quality is aggregated by some governance indicators developed by international bodies such as the World Bank or the Freedom House. Also, a very important, but generally ignored point regarding the consideration of spatial dependence between different observations. Trade, by construction, is a process through which flows between two countries are not independent of flows between these two countries and others. Thus the standard assumption of independence of observations does not take, since it is necessary to consider the existence of a spatial correlation in a similar manner to the serial correlation through time series. In fact, in the presence of spatial dependence, the OLS results are both biased and inconsistent.

5. INTEGRATION OF INSTITUTIONS IN INTERNATIONAL TRADE: THE INSTITUTIONAL DISTANCE

We proceed to the construction of institutional distance, which will be included in the gravity model defined above. Moreover, the econometric model that we identified in the first section of this article will be applied to a sample of countries or regions. Therefore, the classical econometric tool, such as processing time series will be ineffective. The observations of spatial data are characterized by neighborhood relationships. In addition, they are characterized by two major effects: the spatial autocorrelation which refers to the lack of independence between geographic observations, and spatial heterogeneity is related to the differentiation and behavior of the variables in the space.

5.1. Construction of institutional distance

We develop a measure of institutional distance. This method of calculation is based on the work of the authors [Kogut and Singh \(1988\)](#). This composite index was sometimes criticized because of the difficulty of interpretation. However, it may reflect the difference in the institutional framework between countries. It was used for the first time, to measure cultural distance, which refers to certain dimensions of culture. The author [Hofstede \(1980\)](#). Who was the first to speak of a cultural distance and were subsequently, [Kogut and Singh \(1988\)](#) who developed a

composite index of the cultural distance. The advantage of this index is that it overcomes the problem of a retrospective evaluation. However, some limitations are addressed to this index.

In order to build the institutional distance, we relied on the indicators of governance of the [World Bank \(2009\)](#) for some quality dimensions of the structure of governance. The information gathered from twenty-five different sources and produced by eighteen international organizations. This database covers 199 countries and territories for the years 1996, 1998, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009. This database provides indicators to organize and summarize data reflecting views of thousands of players worldwide, including respondents polled by questionnaires on households and businesses, experts from non-governmental organizations, public sector institutions, and business information providers. These indicators are aggregated by a set of indicators which are six. These indicators of governance include:

-The Process through which those who govern are selected and replaced. He is certified by the "Governance Policy" which is measured by two indicators:

5.2. Expression and accountability

It measures the political, civil and human rights. As an example of free and fair elections, the influence of the military in politics and media independence. It also shows the freedom of association and the press.

5.3. Political stability and non-violence and terrorism

The likelihood that threats of violence against governments or destabilization by unconstitutional means sees the probability of reversal, including terrorism.

- The Capacity those who govern to formulate and implement public policies, and to provide public services to citizens. This is the "Economic Governance". It can be measured by the following two indicators:

5.4. Government efficiency

Measuring the competence of the bureaucracy and the quality of public service delivery. Moreover, it measures the capacity of the civil service and its independence from political pressures and the quality of policy formulation.

5.5. Quality regulations

Measuring the incidence of market-unfriendly policies. In other words, it measures the ability of the government to provide policies and regulations that enable the private sector to develop and encourage the development.

- Respect accorded by those who govern and the governed to institutions that govern the interactions between them. This is the "Institutional Governance." It is measured by the last two governance indicators of [Kaufmann \(2009\)](#).

5.6. Rule of law

Measures the extent to which different agents have confidence in the rules of society and respect, including how many are perceived offenses, the effectiveness and predictability of the judiciary and the enforceability of contracts, including the quality of enforcement of contracts and property rights as well as the likelihood of crime and violence.

5.7. Control of corruption

Measures the perceptions about corruption, generally defined as the exercise of public power for private gain, including both major and minor forms of corruption and elite capture and interests of the state.

These indices range from -2.5 to 2.5. The higher the index value, the higher is the good quality of institutions.

Before building the institutional distance, which is a composite indicator of the gap in governance between the countries in the sample, we wanted to get a closer look, the individual evolution of each of the six governance indicators for Tunisia 1996 to 2009.

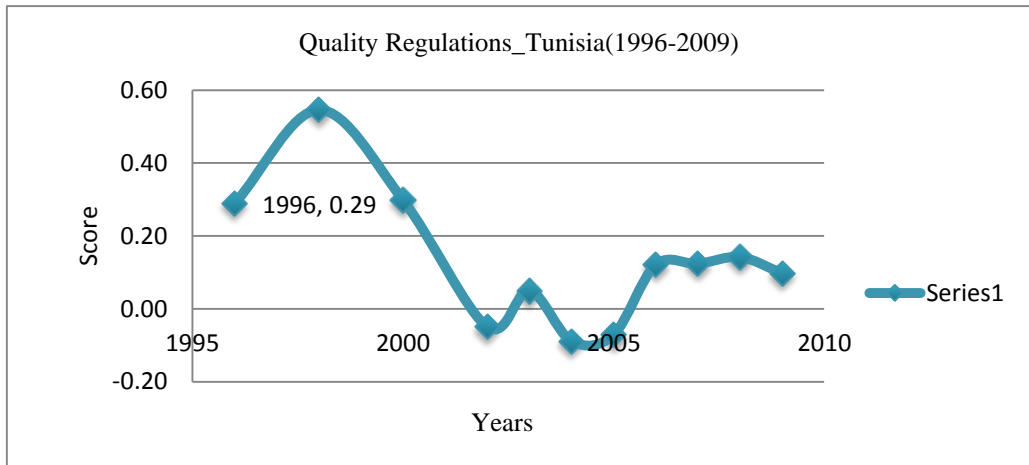


Figure 1: Evolution of the index expression & accountability-Tunisia

Source: Data base of the World Bank (2009)

Regarding this aspect, expression and empowerment, this score was between zero and -1.5. The shape of the curve shows that this indicator of governance has trended downward from 1996 until in 2009; the best score was recorded around 1996.

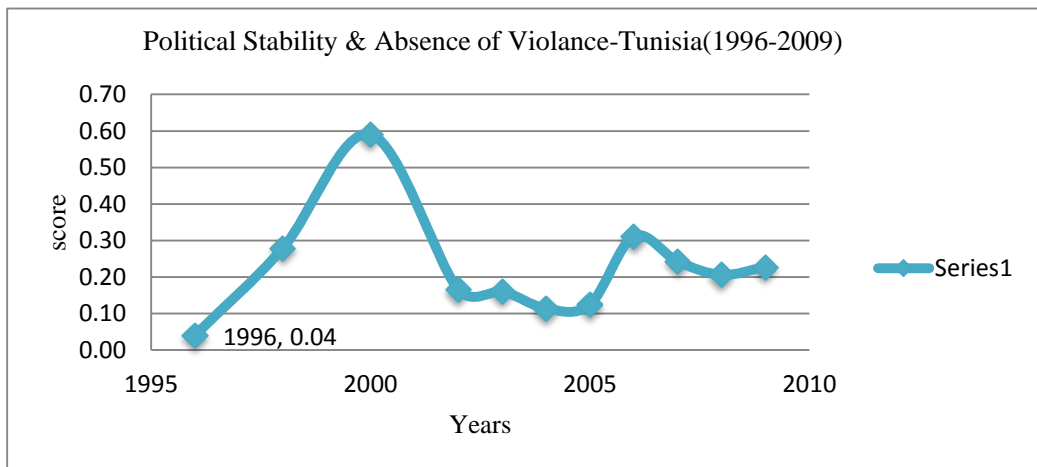


Figure 2: Evolution of the index political stability and absence of violence-Tunisia

Source: Data base of the World Bank (2009)

The second indicator of governance, namely, political stability and absence of violence, shows a rate more or less stable. This score ranged from 0.07 to 0.6 from 1996 to 2009, the best score was recorded in 2000 and a fall seems remarkable after this year.

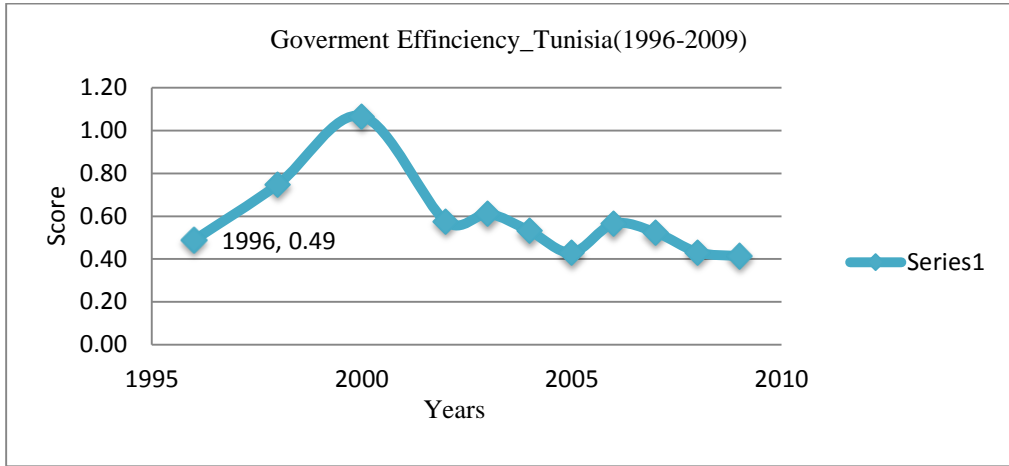


Figure 3: Evolution of the index government efficiency-Tunisia
 Source: Data base of the [World Bank \(2009\)](#)

The third indicator, government effectiveness, shows a similar rate to that for political stability. This graph shows that the highest score was recorded in 2000.

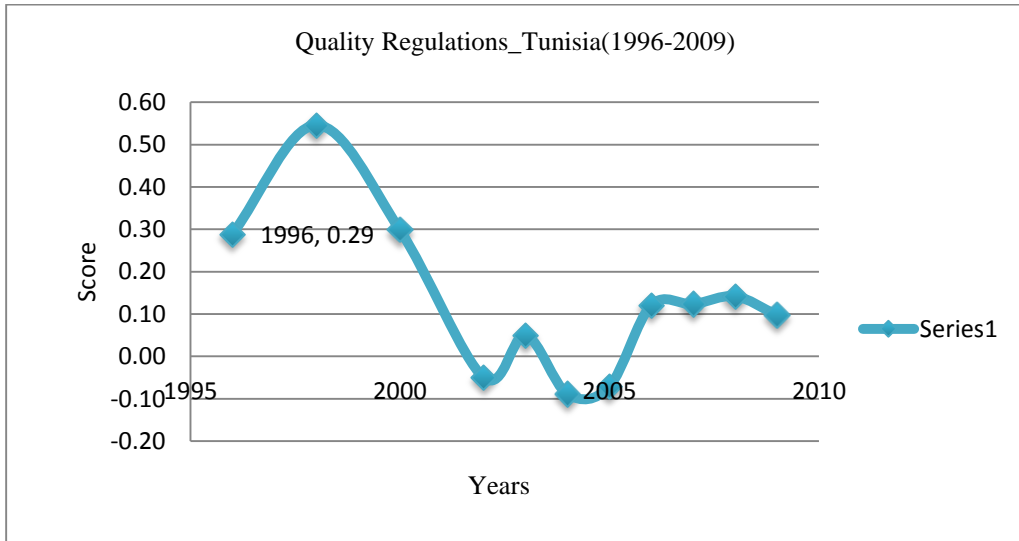


Figure 4: Evolution of the index quality regulations-Tunisia
 Source: Data base of the [World Bank \(2009\)](#)

For this fourth "regulatory quality" indicator, it shows a clear deterioration from the end of ninety years. Probably, anti competitive regulations have created an institutional lock in recent years.

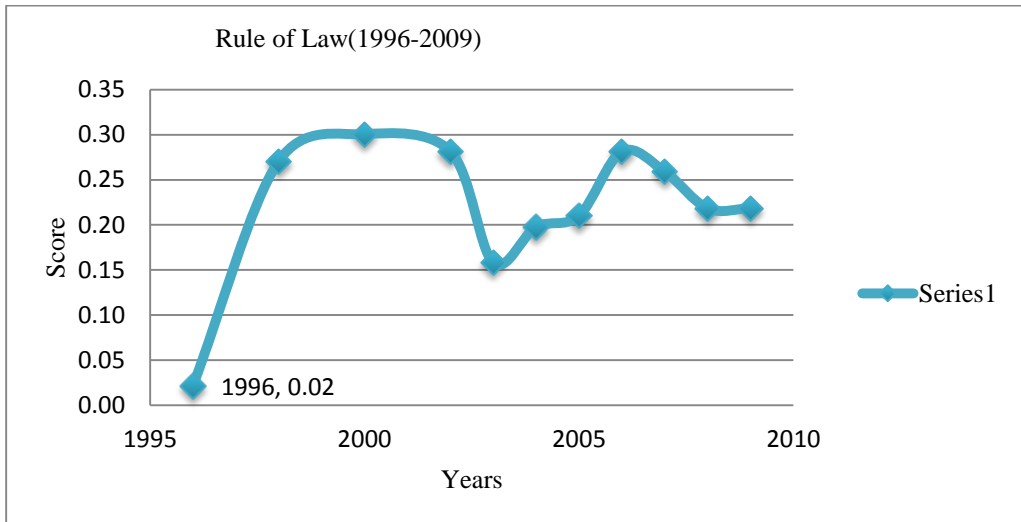


Figure 5: Evolution of the index rule of law-Tunisia

Source: Data base of the [World Bank \(2009\)](#)

The aspect of governance "rule of law" suggests two important periods: one at the end of ninety years when improvements are clear, thereafter a downward trend since the year two thousand, which is consistent with the general trend of previous scores.

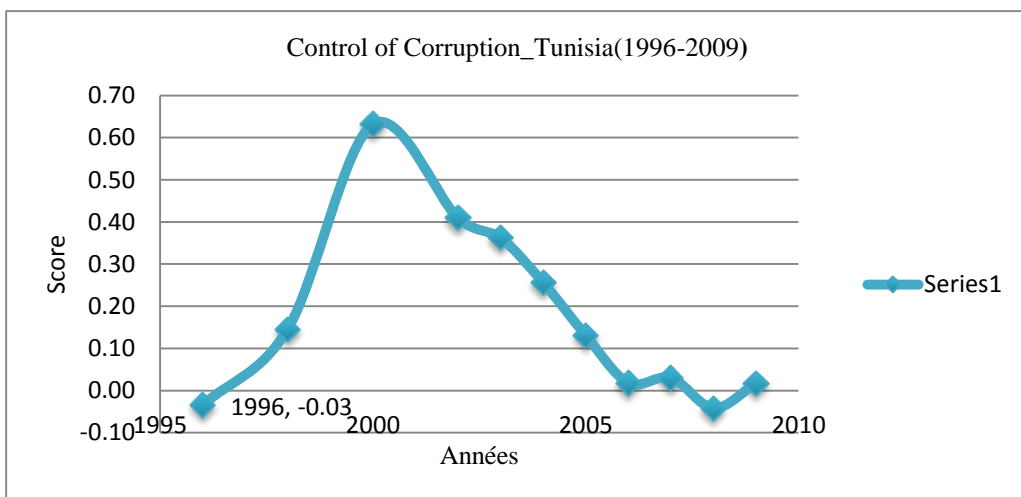


Figure 6: Evolution of the index control of corruption-Tunisia

Source: Data base of the [World Bank \(2009\)](#)

Regarding the latter aspect of governance, that of "control of corruption", improvements in the index is stored in a first phase. The best score was recorded for the year 2000 (the peak of the curve). Since then, the sudden deterioration at this index, spread from 2000 until 2009 Corruption has affected the political class and almost all units of the state.

Then we have used a composite index established in 1988 by the authors [Kogut and Singh \(1988\)](#).

$$DI_{ij} = \frac{1}{n} \sum_{k=1}^n (I_{ki} - I_{kj})^2 / V_k$$

ID_{ij} : Institutional distance between the country (i) and country (j).

N: the number of indicators of governance.

I_{ki} : The (k) th dimension or score of governance for the country (i)

I_{kj} : The (k) th dimension or score of governance for the country (j)

V_k : The variance of the (k) th score of governance for all countries taken together.

As the number of elementary indicators which we have referred is six. This composite indicator will take the following form:

$$ID_{ij(t)} = \frac{1}{6} \sum_{k=1}^n (I_{ki(t)} - I_{kj(t)})^2 / V_{k(t)}$$

We added the index (t) to show that this index will be calculated over a series of years. Therefore, an annual value will be determined for each year. Next, we determined this institutional distance over the period 1996-2009 for twenty two countries (Tunisia + 21 European countries). The results are in the form of a square symmetric matrix where the main diagonal is zeros. Indeed, by convention, the institutional distance between countries with itself is zero. At the intersection of a row with a column is the institutional distance between country (i) and country (j).

In order to compare, we plotted the trend of institutional distance over the period 1996-2009. In addition, we have divided the sample we made (Tunisia + 21 European countries) into subgroups which are four in number. The first group consists of a few countries in Europe, formerly planned economies, which joined the European Union after negotiations. These countries are Romania, Bulgaria, Slovenia and Poland. The second group consists of European countries, which are at the northern shore of the Mediterranean and geographically close to Tunisia. These countries are Italy, Spain, Greece and Portugal. The third group consists of some Scandinavian countries such as Norway, Finland, Sweden and Denmark. The fourth group includes countries of central Europe such as France, Germany, Luxembourg and the Netherlands. Our division into subgroups is based primarily on the difference in governance (institutional distance) in comparison with Tunisia. We note that the slightest deviation is with the countries of Eastern Europe EST (group1) (4 points or less), while the largest institutional distance from Tunisia is Scandinavian countries (group3).

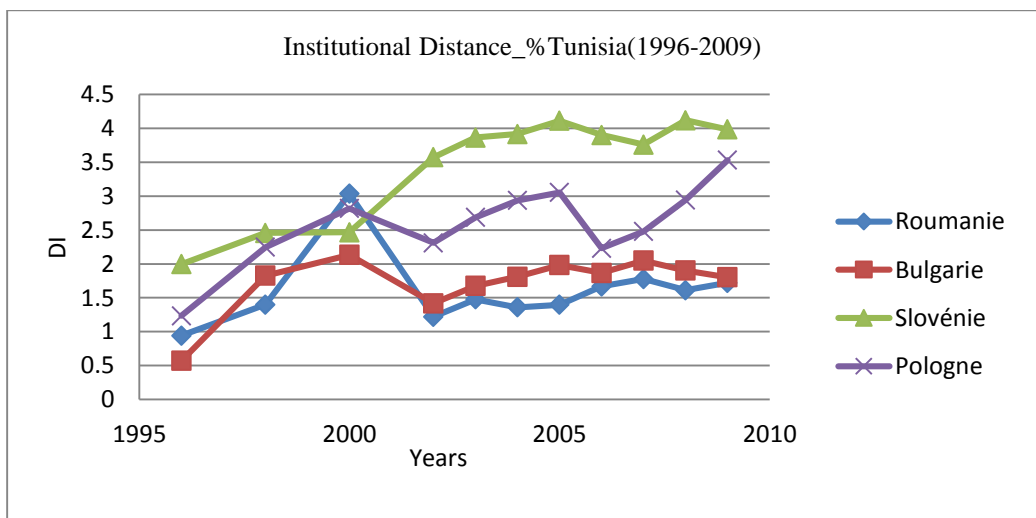


Figure 7: Group 1: Institutional distance – countries of east Europe

Source: The author calculating

The joint plot for this group shows that the governance gap versus Tunisia is in early 1996 to around two points. The smallest gap is in relation to Bulgaria and Romania. Moreover, the gap between the four countries (compared to each other) was minimal, so that over time we can clearly see that a country like Slovenia continues to dig a remarkable departure from the rest of the countries. Probably, this country has made institutional reforms distinguishable compared to other countries. In addition, a peak is clearly seen in the year 2000, for the two countries: Bulgaria and Romania. This is probably the date of commencement of negotiations for accession to the European Union and the wave started in this regard reforms. Then, a sudden drop in the gap is remarkable (compared to Tunisia still), probably because the pace of reforms was a bit long and / or Tunisia, is committed also to make reforms aim the establishment of a favorable sign free trade agreement with the European Union.

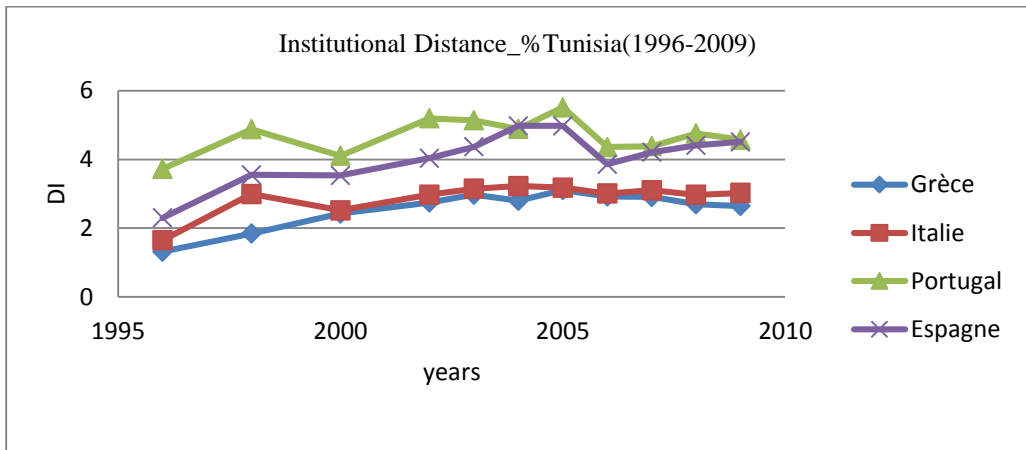


Figure 8: Group 2: Institutional distance – countries of south Europe
 Source: The author calculating

The second group consists of some countries of the northern shore of the Mediterranean (Spain, Portugal, Italy, and Spain). The minimum distance in terms of governance in relation to Tunisia for the four countries is observed in early 1996 between 1 and 4 points. This gap continues to widen over time. In 2005, between 3 and 6 points. We also note that, Portugal and Spain had the highest score, even compared to Italy. Then we can see that the gap between Greece and Italy seems to be closer to zero. Probably these two countries have the same performance in terms of governance and institutional quality.

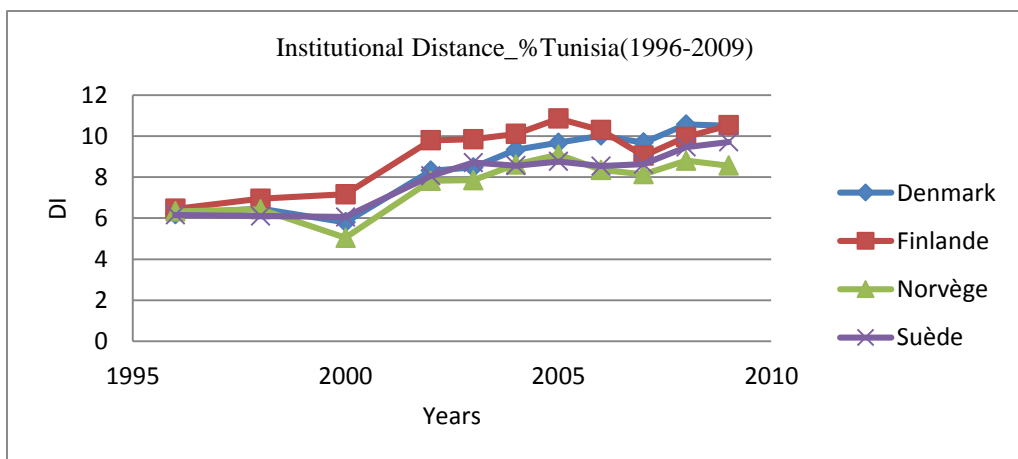


Figure 9: Group 3: Institutional distance-Scandinavian countries
 Source: The author calculating

The third group consists of four Scandinavian countries, namely Norway, Finland, Sweden and Denmark. From Figure (09), the trend shows that the governance gap versus Tunisia continues to grow with time. The largest difference was recorded in 2005 (between 8 and 12 points). In addition, by comparing these four countries together, the institutional distance between each country to the other is almost zero, so that over time, a remarkable divergence seems to take place with Finland.

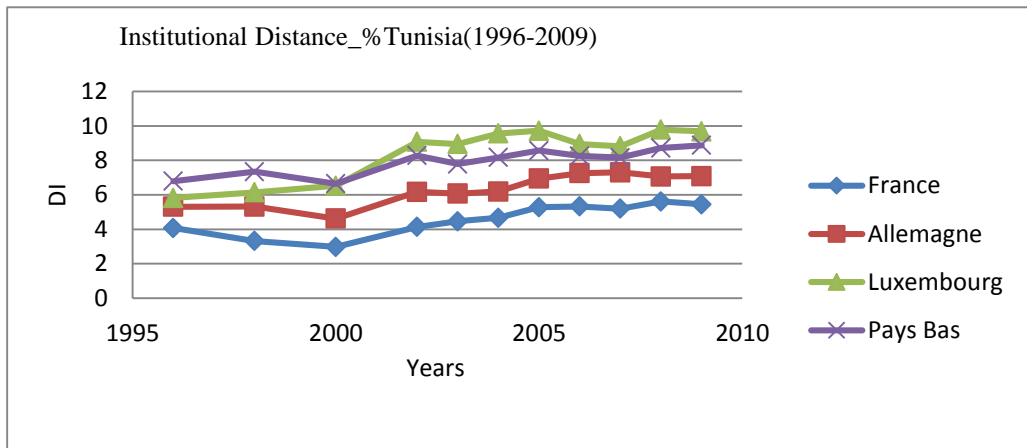


Figure 10: Group 4: Institutional distance-central European countries

Source: The author calculating

The fourth and last group consists of some Central European countries such as: France, Luxembourg, Germany and the Netherlands. Overall, the standard of governance in these countries compared to Tunisia, from 2 to 10 points. The composite index of institutional distance shows that the smallest gap was recorded during 1996 and 1998 thereafter, the gap continues to widen. The slightest variation was with France, but the biggest with Luxembourg. The latter, although it is very close to its neighbors in 1996, improvements in terms of governance, enabled him to dig a significant deviation from them.

6. ESTIMATING THE MODEL

6.1. Choice and justification of the sample

Tunisia is considered for the majority of international institutions such as an open country which has adopted measures concrete openings and adopted intensive reforms embodied by the structural adjustment plan. In addition, Tunisia is a member of the World Trade Organization (WTO). Moreover, Tunisia signed an Association Agreement with the European Union which came into force in 2008 actually, but that was first carried an update program overall level of the productive apparatus. This association agreement should grow and boost trade between the north and south side of the Mediterranean. In addition, the European Union is considered the first commercial partner of Tunisia. Our objective is whether the institutional component is involved in the stimulation of trade between the two sides, in addition to the geographical factor. Therefore, our sample consists of twenty-two countries: Tunisia plus twenty-one European countries.

6.2. Valuation and interpretation of results

The estimate of the cross-sectional pattern, allow us to judge the evolution of two different elasticities of distance (geographic distance and institutional distance) on trade, in the years 1996, 1998, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009. Initially, we estimated the base model without taking into account the spatial dependence. Using the method of ordinary least squares (OLS), we could achieve the estimation results shown below:

Table 1: Estimation of the gravity model

Years	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009
Constant	-25.21 (-23.58)	-25.62 (-24.60)	-26.96 (-23.67)	-25.87 (-25.43)	-27.11 (-25.11)	-25.77 (-23.32)	-24.73 (-20.12)	-24.18 (-21.43)	-23.24 (-20.45)	-14.13 (-9.1)	-21.2 (-16)
Log(Yi)	0.98 (38.88)	0.97 (39.73)	0.97 (36.72)	0.95 (39.95)	1.00 (38.59)	0.96 (37.45)	0.95 (33.68)	0.93 (36.18)	0.91 (35.23)	0.68 (17.7)	0.84 (25.9)
Log(Yj)	0.81 (32.52)	0.85 (34.74)	0.89 (33.48)	0.87 (36.45)	0.91 (36.11)	0.89 (34.24)	0.87 (30.27)	0.85 (33)	0.84 (32.35)	0.77 (20)	0.84 (26.1)
Log(DI)	-0.16 (-4.70)	-0.14 (-3.90)	-0.10 (-2.70)	-0.10 (-3.09)	-0.07 (-2.04)	-0.10 (-2.75)	-0.06 (-1.41)	-0.06 (-1.65)	-0.06 (-1.74)	-0.13 (-2.3)	-0.1 (-2.3)
Log(DR)	-1.15 (-14.57)	-1.15 (-15.98)	-1.14 (-14.81)	-1.13 (-15.82)	-1.22 (-16.34)	-1.17 (-15.08)	-1.25 (-14.49)	-1.18 (-15.25)	-1.19 (-15.18)	-1.37 (-12)	-1.2 (-13)
Observations number	390	398	417	440	420	440	397	442	442	401	401
R ²	0.89	0.89	0.88	0.88	0.88	0.87	0.85	0.86	0.86	0.70	0.80

In parenthesis: T of student

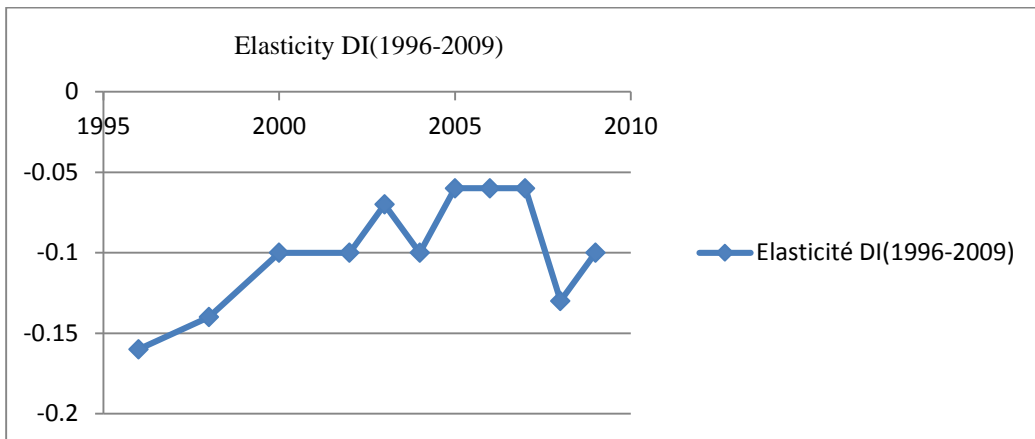


Figure 11: Evolution of the elasticity for the variable institutional distance

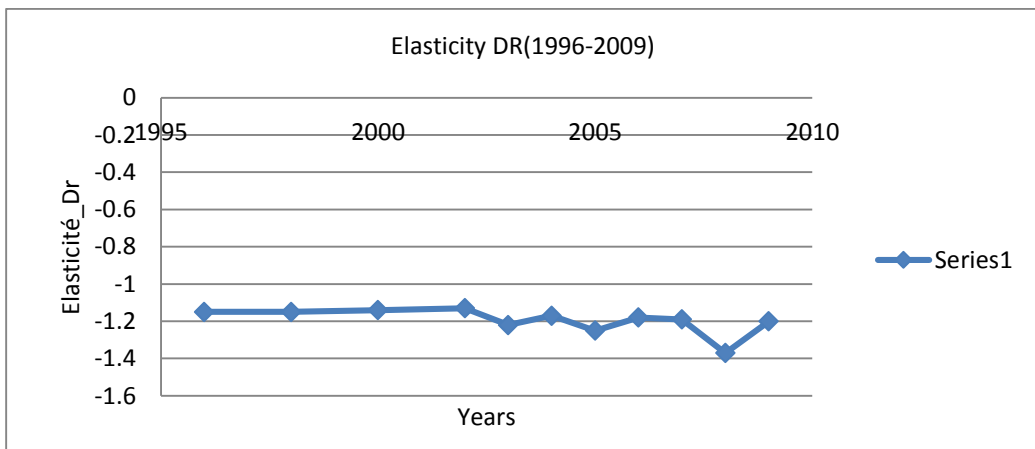


Figure 12: Evolution of the elasticity for the variable geographical distance

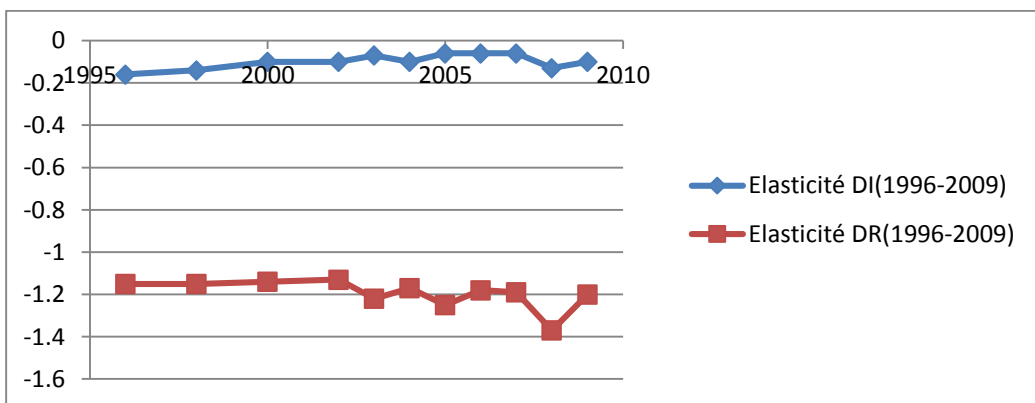


Figure 13: The joint evolution for elasticity for the variable geographical distance and institutional distance

Due to its linear log structure, the coefficients of the gravity model are in terms of elasticities and ratios of percentage change. These elasticities allow us comparison and give us a direct measure of flow response to potential variables. Generally, the elasticities related to GDP and distance is close to 1 in value. Regarding the distance, a comparison between groups of countries gives us a measure of the degree of integration into the global economy. In addition to these standard variables, the elasticities of some policy variables help us to understand the impact of these policies on representative trade flows.

We note that the size of the country, measured by its GDP remains a variable determining the interaction between countries. However, the elasticity of country is greater than that of the partner country. The elasticity of the country's size ranges from 0.7 to 1 if we take the average of all elasticities from 1998 to 2009; we found an average of 0.92. The increase in the GDP of a country of 5% will cause an increase in its interaction or export of 4.6%. The average elasticity of the size of the partner countries is 0.85 (it varies from 0.77 to 0.91). Increasing the size of the partner country of 5% will increase a country's exports of 4.25%.

The sensitivity of trade to the geographical distance (proxy for transport costs) remains greater magnitude than the sensitivity to the institutional environment and governance. This elasticity varies from -1.37 to -1.13. A careful examination of this elasticity shows that she is almost constant.

Moreover, the elasticity of trade with respect to the institutional distance varies from -0.16 to -0.06. On average, it is -0.1. A shorter distance of 10% (improvement of indicators or dimensions of governance), increases the exchange of 1%. This elasticity shows a slight decline. This is due possibly to the entry of new members from Eastern Europe called to a major institutional reform and efforts to adopt the standards of the market economy. Moreover, Tunisia is no exception to this rule and took institutional reforms in harmony with the entry into force of the Association Agreement.

Also, if we accept that economic development goes through the institutions, and since the size of a country is an important determinant of interactions, then we can talk about a multiplier effect: improving governance and quality institutions increased both the size of the country and reduce institutional distance that separates them from other countries.

6.3. Consideration of space auto correlation

Our model of gravity will be estimated, now, by taking into account the possibility of the existence of an auto correlation. The source of this autocorrelation comes from the dependent variable "export". Indeed, we can consider that the exports of countries are dependent on each other. For example, exports from Tunisia to Malta may be dependent on exports from France to Tunisia.

In our exploratory analysis, we tried to calculate the value of Moran index, which is considered as a non parametric measure of space auto correlation, from 1996 to 2009 and found the value of this index is not zero and it is negative for all years. This seems to confirm the idea of the existence of a negative auto correlation for the variable export. Indeed, it appears that countries with high export value are surrounded by countries with low export value. The opposite is also true: a low-value export is surrounded by countries with a high value of this variable. However, the coefficient value remains quite low and approaches zero, probably the dependence is not strong enough.

Table 2: Moran index

Years	Value of Moran index
1996	-0.077
1998	-0.085
2000	-0.040
2002	-0.01
2003	-0.064
2004	-0.012
2005	-0.009
2006	-0.005
2007	-0.063
2008	-0.009
2009	-0.045

Source: The author calculating

The confirmation of this idea can be made by estimating of the gravity model while taking account of the spatial dependence. The form of equation selected between different ways of consideration of spatial auto correlation is as follows:

$$LOG(X_{ij}) = \rho W^S LOG(X_{ij}) + LOG(G) + \alpha LOG(Y_i) + \beta LOG(Y_j) - \delta LOG(RD_{ij}) - \eta LOG(ID_{ij}) + \varepsilon_{ij}$$

This equation takes into account the spatial dependence between observations where ρ the coefficient of the lagged dependent variable is and W^S is the standardized spatial matrix. The following table recapitulates the estimation of different elasticity and the parameter ρ :

In all estimates (1995 to 2009), the spatial autocorrelation coefficient shows negative. This confirms the calculation given by the coefficient of Moran index. This coefficient varies from -0.07 to -0.02. Therefore, the spatial dependence is not strong enough between these groups of countries. Similarly, this estimate shows that the geographical distance as a proxy for transport costs, weighs more than the quality of institutions and the quality of the regulatory framework in partner countries. Furthermore, the weight of the country, proxied by GDP, is more critical to trade the size of the partner countries to exchange.

7. CONCLUSION

Tunisia has signed a free trade agreement with the countries of the northern shore of the Mediterranean. This agreement or free trade association agreement entered into force in 2008.

To ensure the success of this partnership, Tunisia proceeds to institutional and regulatory reforms to bring its institutional framework to that of the European Union. The tool test used for the possible involvement of institutions for international trade was the gravity model. The novelty we introduced to this model is the fragmentation of the distance into two geographical distance and a distance called institutional distance. This is calculated through a synthetic indicator, developed in 1988 by the authors [Kogut and Singh \(1988\)](#). Which uses six dimensions of governance developed by the World Bank? Our statistical study of this indicator shows that a gap of governance is increasing between Tunisia and these countries. Probably some aspects of governance for Tunisia appear to recede.

The estimate of the gravity model of a particular series shows that the elasticity of the geographic distance remains stronger than that on the institutional distance, even if the elasticity of the latter always seems to be statistically significant and shows the expected sign. In addition, the weight of the country approximated by GDP seems to be critical, even if the weight of the partner countries is also important. The novelty of this type of model is the introduction of the spatial autocorrelation. This is defined as the existence of interdependence between the values of an economic variable at a territory with the value taken by the same variable in other territories.

In the first place, we calculated a statistical coefficient called coefficient of Moran. The value of this index is negative for all years which shows that the value taken by the variable export, which we calculated the coefficient of Moran, is not neutral. Indeed, it seems that a territory with high export value is surrounded by countries with low export value, or an area with a low export value is surrounded by countries with a high value of this variable. To confirm our idea, we estimated the model with consideration of spatial dependence. The coefficient of this dependence appears to be negative and statistically significant. However, the value seems to be low.

Table 3: Estimation of the gravity model taking in consideration spatial dependence

Years	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009
Constant	-25.85 (-22.73)	-25.03 (-25.37)	-26.75 (-27.37)	-25.49 (-36.17)	-26.39 (-25.11)	-25.12 (-23.32)	-24.37 (-32.82)	-24.1 (-21.4)	-23.2 (-20.4)	-14.8 (-9.3)	-21.12 (-15)
Log(Yi)	1.01 (52.38)	1.01 (45.53)	1.02 (42.98)	0.97 (57.81)	1.00 (53.88)	0.97 (49.07)	0.97 (43.75)	0.96 (33.3)	0.92 (32.17)	0.66 (16.3)	0.85 (24.4)
Log(Yj)	0.82 (37.81)	0.82 (34.74)	0.84 (42.51)	0.87 (51.84)	0.88 (43.54)	0.87 (44.34)	0.85 (49.98)	0.86 (33.1)	0.84 (32.34)	0.78 (20.5)	0.84 (26)
Log(DI)	-0.15 (-6.85)	-0.14 (-3.33)	-0.09 (-3.01)	-0.10 (-2.85)	-0.08 (-2.25)	-0.10 (-2.96)	-0.09 (-2.73)	-0.06 (-1.52)	-0.06 (-1.62)	-0.13 (-2.3)	-0.1 (-2.2)
Log(DR)	-1.13 (-14.18)	-1.20 (-13.32)	-1.16 (-15.02)	-1.10 (-14.42)	-1.19 (-16.55)	-1.20 (-15.08)	-1.25 (-17.45)	-1.24 (-14.9)	-1.21 (-14.4)	-1.3 (-11)	-1.2 (-12)
$\hat{\rho}$	-0.05 (-2.13)	-0.09 (-3.58)	-0.11 (-4.35)	-0.07 (-3.18)	-0.06 (-2.82)	-0.08 (-3.47)	-0.06 (-2.33)	-0.06 (-1.85)	-0.02 (-0.83)	-0.08 (-1.9)	-0.03 (-0.8)
Observations number	390	398	417	440	420	440	397	442	442	401	401
R ²	0.89	0.89	0.88	0.88	0.88	0.87	0.85	0.86	0.86	0.71	0.8

In parenthesis: T of student

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References

- Anderson, J., & Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *The American Economic Review*, 93(1), 170-192.
- Helpman, E., & Krugman, P. R. (1985). *The market structure and foreign trade: increasing returns, imperfect competition and the international economy*. MIT Press, Cambridge.
- Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills: Sage Publications.
- Kaufmann, D., Kray, A., & Mastruzzi, M. (2009). *Governance matters VI: Aggregate and individual governance indicators 1996–2006*. World Bank policy research working Paper No. 4280. Washington, D. C.
- Kogut, B., & Singh, H. (1988). The effect of national culture on the choice of entry mode. *Journal of International Business Studies*, 19(3), 411-432.
- McCallum, J. (1995). National borders matter: Canada-U.S. regional trade patterns. *The American Economic Review*, 85(3), 615-623.
- Tinbergen, J. (1962). *An analysis of world trade flows, in shaping the world economy edited by Jan Tinbergen*. New York, NY: Twentieth century fund.
- The World Bank (2009). *Republic of Tunisia, development policy review: Towards innovation Driven growth*. Report No. 50847-TN, January 2009.
- Turrini, A., & Van, Y. T. (2002). *Traders, courts and the home bias puzzle*. CEPR discussion paper. 3228.

Appendix

Appendix 1: List of countries

1. United Kingdom
2. Spain
3. Slovenia
4. Romania
5. Portugal
6. Poland
7. Netherlands
8. Luxembourg
9. Italy
10. Hungary
11. Greece
12. Germany
13. France
14. Denmark
15. Bulgaria
16. Belgium
17. Malta
18. Finland
19. Norway
20. Slovak Republic
21. Sweden
22. Tunisia