

DOES THE MENA COUNTRIES MAY CONVERGE IN GDP TO SOUTHERN EUROPEAN ONE? THE EFFECTS OF INTERNATIONAL TRADE

Abdelhafidh Dhrifi¹ — Samir Maktouf²

¹Faculty of Economic Sciences and Management, University of Sousse-Tunisia

²Faculty of Economic Sciences and Management, University of Tunisia, El-Manar

ABSTRACT

The recent integration of the countries of the MENA region in globalization movement and the signing of the Euro-Med agreements with the European Union has naturally prompted researchers and economists to test the hypothesis of convergence towards the Europe. This paper, which is in this context, tends to test whether movement toward international trade will foster a reduction in the disparity of incomes among countries. More specifically, we try to answer the following question: does international trade allows MENA Countries to converge in GDP per capita to Southern European one, and if this convergence is possible, what is the time required for a developing country to reduce the gap that separates the countries of a developed one? Using time series approach convergence over the period 1990-2011, results shows that the convergence hypothesis is checked for most of the selected countries in the MENA region. Our findings show also that the calculation of the time required for MENA countries to reduce the gap that separates to the Southern European one varies from one country to another.

Keywords: International trade, Growth, Convergence, MENA countries, European countries, ADF tests, Time series approach.

Contribution/ Originality

While the literature related to the impact of international trade on economic growth is so vast, rarely are the studies that tends to test the impact of international trade to income convergence. the present paper comes out of the traditional context, that seeks to study the effects of trade on economic growth, by seeks to test if international trade contributes to the GDP per capita convergence. In order to do so, a time series approach convergence is used to test the GDP per capita convergence of MENA countries to the southern European one. The original point of this article is to calculate the time required for a developing country to reduce the gap that separates the developing one.

1. INTRODUCTION

One of the dominant themes addressed in macroeconomic theory over the last three decades, is the convergence of national and regional economies. The fundamental question is whether economies tend to converge to the same level of income per capita. In other words, if there is an adjustment mechanism for an economy to reach the level of per capita income of more developed economy (Baumol, 1986;

Barro and Sala-I-Martin, 1991; 1992). In the neoclassical models the catch is exogenous given the assumption of declining marginal productivity of capital, poor countries that accumulate less capital grow faster than rich one and therefore can catch without government intervention, low capital accumulation and its relatively higher marginal productivity in poor countries allow to these latest automatically reach the catch.

Indeed, the predictions of neoclassical growth models and some more like that of some more institutionalist visions like that of Abramovitz (1986) support the convergence hypothesis and offer an optimistic vision. This conclusion which means, in particular a country can, thanks to an adequate measures, maintain its growth rate higher than the average subject of much criticism mainly the consistency of technical progress is assumed a manna falling from the sky. A second generation of models has emerged namely the endogenous growth models. These models, based on the idea that technical change is an effect induced by the growth or investment, consider that the catch is endogenous. That is to say, it depends on factors other than accumulation. Thus, elements such as human capital and technology policy are not without effect on the process of catching up.

On the other hand, these models focus on the fact that growth can be self-sustaining, it rather depends on the behavior of the agents and not factors fell from the sky as assumed in the exogenous growth model. The major result of this type of model is that we do not observe empirically decreasing relationship between the growth rate of the country and their initial income level. Rather there is a phenomenon of convergence clubs: There are two groups of countries converge them, but the two groups do not converge (Quah, 1996). In this context, Mankiw *et al.* (1992) show that there is no absolute convergence as in the Solow model, but the convergence is determined by the savings rate and the rate of population growth of the country.

Early work on the convergence of per capita shows that catching up rich countries to poor countries was not observed across the entire world. Henceforth, another generation of studies was based on theoretical models of long-term growth in an attempt to identify the factors which prevented catch. To try to enrich the explanations of economic convergence and to truly clarify the terms of catching, various recent studies have attempted to test the influence of various economic variables on convergence, especially when s' is the trade openness.

This paper fits in this vein of study and seeks to ask the following question: Is international trade actually a force for or against economic convergence? More specifically, we try to answer the question: doesthe MENA countries may converge in GDP to European one, controlling for the effect of international trade? And if this convergence is possible, what is the time required for a developing country to reduce the gap that separates the countries of a developed one?

The remainder of this paper is structured as follows. Section 2 provides an overview of the definitions of convergence hypothesis. Section 3 presents a brief literature review about international trade and convergence. Section 4 presents an empirical analysis of the convergence hypothesis between the MENA and the Southern European countries. Finally, the last section concludes.

2. DEFINITIONS OF THE CONVERGENCE HYPOTHESIS

2.1. Beta-Convergence

The concept of β -convergence has emerged in neoclassical growth models. It refers to a process in which poor regions grow faster than rich ones and therefore catch up on them. It is directly related to neo-classical growth theory (Solow, 1956) where one key assumption is that production factors, in particular capital, are subject to diminishing return. Then, when all economies are assumed to converge towards the same steady-state, β -convergence is said to be absolute.

Two designs of β -convergence appear in studies on economic growth. This is the unconditional β -convergence (or absolute convergence) and conditional β -convergence. We say there is unconditional convergence if poor economies have higher per capita growth rates than the rich regardless of initial conditions. If the coefficient of initial GDP per capita is negative and significant, we accept the hypothesis of absolute convergence.

The most common methodology generally used to measure the β -convergence was developed by Barro (1991) and Barro and Sala-I-Martin (1992) and generally involves estimating a growth equation in the following form:

$$\ln(\Delta y_{i,t}) = \alpha + \beta \ln(y_{i,t-1}) + \delta Z_{i,t} + U_{i,t}$$

In which:

- $y_{i,t}$ and $\Delta y_{i,t}$ are respectively the level and the growth rate of GDP per capita in region i at time t
- $Z_{i,t}$ includes all other factors supposedly affecting the growth rate; such as investment, capital stock, education levels and public expenditure, as well as political stability or even cultural and religious factors (Barro, 1991).
- $u_{i,t}$ is the standard error term
- α , β and δ are the parameters to be estimated

2.2. Sigma-Convergence

Sigma-convergence refers to a reduction of disparities among regions in time. It is therefore, the study of dynamic changes in the dispersion of the distribution of GDP per capita in logarithm. This indicator is most often variance or standard deviation of the cross-sectional distribution of GDP per capita. When for a sample of countries considered, this indicator decreased between start date and final date, σ -convergence is accepted.

The most frequently used summary measures of Sigma convergence are the standard deviation or the coefficient of variation of GDP per capita.

$$\sigma_t^2 = \frac{1}{N} \sum_{i=1}^N (Y_{it} - Y_t)^2$$

$$\sigma_t = \sqrt{\left[\frac{1}{N} \sum_{i=1}^N (Y_{it} - Y_t)^2 \right]}$$

Where N : is the number of countries in that group.

$Y_{i,t}$: is the logarithm of GDP per capita of country i at time t .

Y_t : is the average of the Y_{it} at time t .

In fact, there is σ -convergence when there is decreases of the variance inter countries of GDP per capita over time. To test this hypothesis econometrically, Fisher's test can be used to calculate the standard deviation of GDP per capita (σ_t), and compared with (σ_{t+1}). And hence, the hypothesis of σ -convergence is accepted if $\sigma_{t+1} < \sigma_t$, that is to say, there is a decrease in the dispersion of GDP per capita over time.

2.3. Convergence Clubs

A convergence club is a group of countries for which we accept the hypothesis of convergence. Galor (1996) defined the convergence club concept as follows: "countries that share the same structural characteristics may converge in the long run only if their "initial conditions" are similar. The initial conditions concern acquired economies, such as human and physical capital accumulated. For example, "poor" countries tend to converge towards one another and create a convergence club at a low level of per-capita wealth. By the same, rich developed nations such as the United States and those of Western Europe are grouped into a higher-income per-capita convergence level.

2.4. Time Series Approach Convergence

This concept of convergence defined by Bernard and Durlauf (1995) based on the property of stationary time series. We talk about convergence stochastic. We say there is stochastic convergence if the long-term forecasts differences in GDP per capita between two or more economies tend to zero. The convergence hypothesis is accepted if the GDP per capita of countries considered having the same deterministic trend and the same stochastic trend. The evolution of the GDP per capita is determined by identical factors. Technically, it is to test the existence of cointegration relationship between GDP per capita in log. The existence of r cointegrating relationships between n series means that movements of these n series are determined by $n-r$ commons stochastic trends. In our empirical work, we will use the time series approach convergence.

3. INTERNATIONAL TRADE, GROWTH AND CONVERGENCE: THE LITERATURE REVIEW

The relationship between international trade and convergence has led to a very animated debate from the point of view of theory and empirical work for half a century and especially in the last two decades. The international trade theory, initiated by A. Smith and David Ricardo, who is actually developed a parallel to the theory of economic growth, advocates that international trade

is positively correlated with the growth rate view its engine. Is, in fact, far from being a traditional neoclassical concern insofar, never the Solow (1956) types, never the Koopmans (1965) provide a theoretical exploration. While, these models give rise to a process of convergence where we do not need to trade, since these models were basically developed for the case of a closed economy.

Models of endogenous growth, in particular those of Grossman and Helpman (1991) have found a link between trade, technology transfer channel and economic growth. Under the assumption of an international dissemination of technologies, a depressed economy in terms of innovation can take gain of trade liberalization. The convergence is explained by the fact that the cost imitation in a country is less than the cost of innovation. By the same, poor economies imitate new technologies innovated in the most developed countries and consequently they can catch up to the spread that separates the rich countries.

The economic literature on the subject advanced three channels by which trade affects the economic convergence (Slaughter, 2001). This is factor price equalization, equalization factor endowments and finally channels technology: First, where countries open to trade, it makes a convergence of relative prices of goods (Samuelson, 1948). This convergence in turn promotes convergence in the relative prices of factors.

On the second channel, liberalization promotes convergence endowments. concern in the third channel, the diffusion of technology and knowledge via trade is seen as a strong argument for the link between trade and convergence (Barro and Sala-I-Martin, 1995; Ben-David and Loewy, 1997; Mendez, 1997). Some recent studies show that trade can broadcast rapid technology. Involving the exchange of goods promote technology transfer they are volunteers or involuntary (imitation). Despite the beneficial effects that play international trade on economic growth and convergence, the relationships between international trade and convergence stay ambiguous (Lucas, 1988; Grossman and Helpman, 1991; Rivera *et al.*, 1991; Mendez, 1997).

On the empirical studies on the subject, some empirical studies show that the contribution of trade liberalization goes in the direction of convergence. All countries benefit from the exchange gain because it promotes convergence of technology partner countries exchange and therefore the income disparity between them is reduced (Barro, 1991; Dollar, 1992; Levine and Renelt, 1992; Ben –David, 1993; 1996; Coe and Helpman, 1995; Bernard and Jones, 1996; Harrison, 1996; Edwards, 1999). For example, Ben–David and Kimhi (2000) examined the impact of volumes of trade on income differences between the participants in the trade liberalization. They show that per capita income countries that exchange with each other tend to converge.

Some other empirical studies argue that the contribution of trade is consistent with the divergence, others find a weak relationship between trade liberalization and per capita income convergence (Gauillier, 2003) and other works are finally results ambiguous (Stroomer and Giles, 2003). Overall, Winters *et al.* (2004), put in relief that the studies on the relationship between international trade and convergence stumble four types of problems: (1) the ambiguity of the

definition of "openness", (2) difficulty of measuring the trade openness, (3) the problem of specifying the growth equations and causality, and (4) the difficulty of measuring the effect of trade policy. Nevertheless, we believe that these criticisms should not be an obstacle to a reexamine the trade convergence trade relationships calculating the time required for a developing country to fills the gap that separates the countries of a developed one.

4. THE CONVERGENCE TEST BETWEEN MENA AND EUROPEAN COUNTRIES: USING OF TIME SERIES APPROACH

4.1. Methodology

The creation of the free trade area between the MENA and the European countries is a form of economic integration between countries at different levels of development. This is an agreement between countries with high intensity technology and low-level technology. It is in what follows to check, whether the creation of the free trade area, in favor of removal of trade barriers will promote convergence of per capita GDP of a country of the MENA (Algeria, Egypt, Turkey, Jordon, Lebanon, Morocco, Syria and Tunisia) to the countries of Southern Europe (Spain, France, Italy and Portugal) Over the period 1990-2011. When this convergence is possible, what is the time required to MENA countries to reduce half of the gap that separates the developed countries. Note that the constraint imposed by the unavailability of data, led us to exclude some countries of the region. As a first step, we use an approach based on time series to test the hypothesis of convergence in MENA countries to the countries of southern Europe. In a second step, we will adopt the work of [Ben –David \(1996\)](#) to calculate the time required to MENA countries to fills half of the gap that separates the southern Europe one, called half-life. Note that the calculation of half-life is only possible for countries that support the hypothesis of convergence. Our empirical tests are carried out for the period 1990-2011. The source of variables is based on data from the World Bank.

Therefore, the test of the convergence hypothesis adopted in this paper focus on the persistence of deviations of GDP per capita. Then we will adopt the approach proposed by [Bernard and Durlauf \(1995; 1996\)](#). According to this approach, the hypothesis of convergence is accepted if the difference in GDP per capita between two countries is stationary with zero mean. When the characterization tests differences in GDP per capita reject the stationarity hypothesis, we check the existence of cointegration relationship between sets of log GDP per capita. In fact, the existence of such a relationship means that two sets of per capita GDP in log have a common stochastic trend, and even if their trajectories are determined by random shocks have a permanent effect, they cannot permanently away from each other.

Accept the hypothesis of stationarity of the gap in GDP per capita or accept the existence of a cointegrating relationship between GDP per capita means that the two sets of GDP per capita have a common stochastic trend. Reject the hypothesis of cointegration and a fortiori that of

stationarity means that two sets do not have a common stochastic trend and that their evolution can be explained by different factors.

Let Y_{it} the GDP per capita in log of a developing country "i": (Algeria, Egypt, Turkey, Jordan, Lebanon, Morocco, Syria and Tunisia). Y^{Eur}_t be the average GDP per capita in log of the following European countries: Spain, France, Greece and Italy.

As a first step, we calculate the difference in GDP per capita $Y^{Eur} - Y^i$ for each country in the MENA region and then the stationarity tests and optionally the existence of cointegrating relationships. Our empirical work is based on the unit root test (Augmented [Dickey and Fuller \(1979\)](#) Test) and the [Johansen \(1988\)](#) cointegration test.

4.2. Results and Discussion

Recall that the objective of this paper is to test the convergence of MENA region to the level of middle-income countries in Southern Europe. This region is composed of Spain, Italy, Greece and Portugal. The average level of income of Southern Europe countries is measured by the average of per capita income in these four countries. According to World Bank statistics, we see that the real per capita income of southern Europe is higher than that of any country in the MENA region over the entire study period. Thus, Southern Europe could be considered as a target for countries in the region MENA.

Tables 1 and 2 show the results of testing the hypothesis convergence method of [Bernard and Durlauf \(1995; 1996\)](#). Our tests of stationarity level (zero-order integration) indicate rejection the assumption of stationarity of all series except Egypt and Turkey (Table 1). This means that these two countries may converge in GDP per capita to the Southern European one. We then, carry out tests on the existence of cointegration for the rest of countries.

Table 1 shows that the differences between GDP series are stationary in first differences in the case of Algeria, Jordan, Morocco and Tunisia and the European considered countries (they are integrated of order 1). We apply then the Johansen test to test the presence of a cointegrating relationship.

Recall that the Johansen test is designed to test the presence or absence of cointegration relationships. Tables 2 presented below summarize results of this test: according to the table and during the considered period, we observed that in most cases, the theoretical values are much higher than the theoretical one with the exception of the case of Lebanon and Syria, that means that the assumption of convergence is accepted for 6 countries studied out of the eight countries considered. They are Algeria, Egypt, Jordan, Turkey, Morocco and Tunisia. This suggests that these countries and the southern European one have a common stochastic trend in the long term and that the gap that separates the countries leaders tends to decrease.

Table-1. Results of ADF Test

	Test ADF	R ²	Critical value
$y^{Eur} - y^{Alg}$	-0.099	0.129	
$y^{Eur} - y^{Egy}$	-7.387***	0.796	***1% Critical value - 3.785
$y^{Eur} - y^{Tur}$	-2.66*	0.308	**5% Critical value - 3.011
$y^{Eur} - y^{Jdn}$	-0.856	0.254	*10% Critical value - 2.645
$y^{Eur} - y^{Lbn}$	-2.356	0.348	
$y^{Eur} - y^{Morr}$	-1.182	0.522	
$y^{Eur} - y^{Syr}$	-1.560	0.142	
$y^{Eur} - y^{Tun}$	-0.970	0.237	
First differences			
$y^{Eur} - y^{Alg}$	-3.689**	0.628	
$y^{Eur} - y^{Egy}$	--	--	
$y^{Eur} - y^{Tur}$	--	--	
$y^{Eur} - y^{Jdn}$	-4.235***	0.563	
$y^{Eur} - y^{Lbn}$	-2.349	0.756	
$y^{Eur} - y^{Morr}$	-7.570***	0.813	
$y^{Eur} - y^{Syr}$	-1.383	0.633	
$y^{Eur} - y^{Tun}$	-3.255**	0.741	

Notes: * significant at 10% ** Significant at 5%; *** Significant at 1%.

We noted that the acceptance of convergence assumption in the most of countries of our sample is mainly explained by the fact that several countries in the MENA region were embarked, since the late 80's, on programs of restructuring their industries and have revised their industrial strategies and policies. Thus, the Euro-Med partnership between European countries and Mediterranean countries a strong incentive for governments in the MENA choose a trade policy with clear direction. However, turmoil and political instability in the region slows the transition of some countries to the more open and liberal economies where the private sector plays a more important role. Such is the case of Lebanon and Syria economies that tend to diverge on the Southern European countries. We can say that the random shocks affecting per capita GDP are reflected in the future and the differences will not tend to reduce.

Table-2. Results of Johansen Test

	LR (Likelihood Ratio)	Critical value
$y^{Eur} - y^{Alg}$	4.911**	***1% Critical value 6.65
$y^{Eur} - y^{Egy}$	5.524**	
$y^{Eur} - y^{Tur}$	6.677***	**5% Critical value 3.76
$y^{Eur} - y^{Jdn}$	3.983**	
$y^{Eur} - y^{Lbn}$	3.075	
$y^{Eur} - y^{Morr}$	9.594***	
$y^{Eur} - y^{Syr}$	2.164	
$y^{Eur} - y^{Tun}$	4.073**	

Notes: ** Significant at 5%; *** Significant at 1%.

Here we find the results presented by Guetat and Serranito (2007) according to which the estimate of the convergence led to the rejection of the hypothesis of global convergence in this region over the entire period (1960-2000). Note that we then understand the overall long-term divergence of these countries by the historical weight (colonization) and impact of political and economic nature of the slow transition of these countries to the most open economies.

4-3. Determination of the Half - Life of the Convergence Process

In this paragraph, we try to determine the rate of convergence or the time required to issue for a developing country fills half the gap that separates the southern European one. To this, we will use the method proposed by Ben –David (1996). Ben David has focused on the relationship between international trade and convergence of per capita GDP. He has specified the following equation:

$$Y^{Eur}_t - Y^i_t = \lambda (Y^{Eur}_{t-1} - Y^i_{t-1}) + \epsilon_t \quad (1)$$

With λ represents the convergence coefficient.

According to Ben –David (1996), the convergence hypothesis is discussed following the value of λ .

If $\lambda > 1$: this case results in a discrepancy between the developing countries and developed countries. If $\lambda < 1$: this case valid the existence of a process convergence.

The half-life of the convergence process represents the time required to be issued to a developing country fills half the gap between the developed countries. According to Ben David, the half-life noted "t "is given by the following formula:

$$t = (\log 0.5) / (\log \lambda) \quad (2)$$

The estimation of equation (1) reveals the value of λ and determines therefore the half-life respectively for each country in our sample checking the convergence hypothesis. The results of the estimates of the values of convergence coefficient λ and deduced half-life values are shown in Table 3.

Table-3.Johansen test: likelihood ratio of the European countries with selected MENA countries

	The convergence coefficient λ	Half- life
$y^{Eur} - y^{Alg}$	0.9930	98
$y^{Eur} - y^{Egy}$	0.9915	81
$y^{Eur} - y^{Tur}$	0.9560	15
$y^{Eur} - y^{Jdn}$	1.0523	--
$y^{Eu} - y^{Leb}$	1.075	--
$y^{Eur} - y^{Mor}$	0.9902	70
$y^{Eu} - y^{Syr}$	1.045	--
$y^{Eur} - y^{Tun}$	0.9921	87

We note that the results in table 3 results confirm almost previous results of tables 1 and 2 with the exception of Jordan. Thereby, the convergence hypothesis is accepted for Algeria, Egypt, Turkey, Morocco and Tunisia. While, the convergence hypothesis is not checked for Jordan, Lebanon and Syria (the value of λ is greater than 1). Therefore, the calculation of the half-life is impossible for these countries. Our empirical work indicates that there is a chance that some countries, especially the Maghreb countries (Algeria, Egypt, Morocco and Tunisia), to converge to the European one. For example, should be 70 years for Morocco to fill the gap between the European countries against 81 years for Egypt, 87 years for Tunisia and 98 years for Algeria. Concerning the Middle Eastern countries, we note that the probability of convergence of these countries to the European countries is low compared to Maghreb region: the results of Ben –David (1996) showed that the convergence hypothesis of these countries to the European one is not verified. That means that the level of income countries of southern Europe does not seem to be a target towards which converge the countries of the Middle Eastern region except Turkey which will come to fill half of the gap that separate European countries in 15 years. Such a result is expected given the orientation countries towards specialization in high-technology goods. We note that Turkey presents a higher growth compared to that of the other countries of the considered sample, besides Turkey present similarities of specialization with the Southern Europe countries as Portugal, this is why it would seem that it is distinguished from the remainder of the group. Be noted that the non convergence of Middle Eastern countries can be mainly explained by the weight of history, small domestic markets and political instability, poor quality of institutions. All these factors are obstacles that prevent these countries advantage of the benefits of opening to the outside. That is why these countries must ensure more efficient allocation use of resources and improve productivity. This requires a bureaucracy reduction, a fight against corruption and improving poor quality of services.

5. CONCLUSION

This article aims to test the convergence hypothesis between MENA and European one using time series approach convergence. The various procedures of tests, exposed and used in this paper, allow us to conclude to the presence or the absence of convergence assumption. We proceeded to the realization of this study over the period 1990-2011. The results obtained by time series approach convergence enabled us to find positive results for the majority of the considered sample. The convergence in terms of GDP per capita of the selected countries in the MENA region to the Southern European one is checked for six countries studied out of the eight countries considered. The same results were almost confirmed by applying the model of Ben –David (1996). Our results show also that, if the chances of convergence of Middle Eastern countries to the countries of the European Union are low, we highlight in a formal way, the presence of a strong movement of incomes convergence between the Maghreb region and the European Union. In addition, this result confirms the importance of the exogenous shocks effect on the process of growth and consequently on that of the convergence of the Middle Eastern countries: Socio-politic stability also seems a determinant key of the MENA zone convergence. Overall, even if convergence is accepted for most of the countries in the region, it is difficult to assume that the process of convergence appears to be linear in time. Finally, it would

be interesting to complete this work and try to understand what economic policy or institutional variables that allows countries in the region to converge quickly to the southern European countries.

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