Money Exchange Incongruity and World Imbalances

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Abstract:

The objective of this paper is to study the incongruities of the exchange rate in four South-Mediterranean countries since the 1980s from a double comparative perspective. We will compare four countries (Tunisia, Turkey, Morocco and Egypt), on the one hand, and two methodologies (FEER and BEER), on the other. Findings show that the BEER methodology may not be relevant for such countries that have gone through structural changes and important crises. Hence, for a relatively unsteady period of a country’s economy, the FEER methodology seems to be the most appropriate methodology thanks to its integration of structural changes.

Key Words: Real Effective Exchange Real, Panel Data, BEER, FEER

JEL Classification: C33, F36, F41

Résumé Court:


Mots Clés : Taux de Change Réel Effectif, Données de Panel, BEER, FEER

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1. Introduction

The dynamics of exchange rate affects the financial and economic sphere both directly and indirectly. Hence, the economic policy is supposed to react more or less to the evolution of exchange rate, and vice versa. It is for the above reasons that the determination of the exchange rate is at the heart of all issues related to macroeconomics and to international finance, particularly in an environment of growing world imbalances, an environment that follows the integration process of the international financial system.

Therefore, on the one hand, the adjustment by the exchange rate offers the possibility to correct imbalances (such as current account deficits or the incongruities of the real exchange rate) by the nominal exchange rate in order to maintain or to gain competitiveness. On the other hand, the appreciation or depreciation of a currency has its consequences on a country’s fundamentals. For instance, appreciation allows for the alleviation of imported inflation, such as the soaring of oil prices, whereas it disfavors price-competitiveness and cost-competitiveness, though its efficiency depends on knowing its equilibrium level. In fact, the notion of overvaluation or undervaluation of a currency is itself meaningless without the notion of equilibrium level.

So far, there has not been any unanimous agreement yet on the determinants of exchange rate. Theoretically speaking, the determination of the real exchange rate is associated with short-term financial factors and with longer-term real factors. We could evoke two theoretical approaches for the analysis of the determinants of exchange rate (Plihon, 2006). The first determines the exchange rate through goods and services (the situation of current accounts balance, the parity of purchasing power and relative prices), while the second is determined according to the financial approaches to the real exchange rate (the influence of the monetary policy and of financial variables\(^1\), the instability of exchange rates\(^2\)).

These different theories designed to determine exchange rate could be unable to correctly predict the short-term evolution of exchange rates. In order to find the determinants of long-term exchange rates, Equilibrium Exchange Rate theories have seen the light. These theories identify a number of exchange rate determinants that are considered essential. As

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\(^{1}\) The Flexible Price Monetary Model, the Portfolio Choice Model, and the Efficient Market Theory

\(^{2}\) the Rational Speculative Bubble Model, the Exchange Rate Overreaction Theory and the Mimetic Behavior Approach, and Exchange Crises Models
the purchasing power parity remains a reference theory, many alternative approaches were developed these last years. In this work, we present two approaches, the Fundamental Equilibrium Exchange Rate (FEER) and the Behavioral Equilibrium Exchange Rate (BEER), in four south-Mediterranean countries.

In order to answer such questions, the paper will be organized as follows: In a first section, we present current-account deficits in the four selected countries. The findings of the FEER estimation will be used in a second section. Then, we present the methodology and the findings of the BEER approach. A fifth section will present a comparison between both approaches. A final section will conclude the work.

2. Current-Account Deficits and Exchange Policy

2.1. Current-Account Deficits: Tunisia, Turkey, Egypt and Morocco

In this section, we will try to present the events that marked the period between 1980 and 2011 in the four south-Mediterranean countries: Tunisia, Turkey, Egypt and Morocco. Hence, we briefly present the current-account deficits in these countries by facing the observed current account and the equilibrium current account. By relying on the study of the determinants of mid-term current account (Faruque and Isard, 1998; Chinn and Prasad, 2003, Aflouk et al. 2010), the equilibrium current account is determined through the estimation of the structural determinants of the current account (demographic characteristics, net foreign assets, etc.) and by relying on panel regression techniques. (Appendix 1).

The variables of equation are defined as follows: CA, current account as % of GDP; ISNFA, initial stock of net foreign assets at the beginning of each period of 4 years as % of GDP; DR, child and old dependency ratio, population under the age of 15 years and over the age of 65 years as % of population aged 15 to 64; OG, output gap in % of the potential production.

The sources of the different variables are presented in appendix 2.

\[ CA_{it} = \alpha_i + \alpha_t + \beta_0 + \beta_1 ISNFA_{it} + \beta_2 DR_{it} + \beta_3 OG_{it} + \beta_4 OB_{it} + \varepsilon_{it} \quad (1) \]

The group is composed of 26 emerging economies (Algeria, Argentina, Bolivia, Brazil, Chile, China, Colombia, Ecuador, Egypt, India, Indonesia, Malaysia, Mexico, Morocco,
Pakistan, Paraguay, Peru, Philippines, Singapore, Sri Lanka, Thailand, Tunisia, Turkey, Uruguay, Venezuela and Vietnam).

The results of unit root tests are presented in appendix 3. As it can be seen, we reject the null hypothesis of non-stationary in all the series by using the IPS test statistic (2003).

We could already conclude that current-account imbalances in south-Mediterranean countries are comparable. They all show a sort of similarity, save for the case of Turkey in the 1980s and the 1990s. In fact, these countries witnessed huge deficits in the 1980s (around 12% in the GDP in Tunisia, 9% in the GDP in Egypt and 10% in the GDP in Morocco) which were followed by an improvement by the end of the same decade for Tunisia and Morocco and in the early 1990s for Egypt. Starting from the second half of the 2000s, the current account of these Mediterranean countries remained sensitively lower than its equilibrium level.

a. Tunisia

With the economic crisis of the 1980s, Tunisia starts the period with a huge current-account deficit. The process of economic reforms\(^3\) and liberalization starting since 1986, after three decades of dirigism and of important State involvement in the economy, explains the recovery of current account towards the end of the 1980s. Despite its fall in the beginning of the 1990s, the current account balance in Tunisia became quite stable between the mid-1990s and the beginning of the 2000s. In fact, the succession of reforms and ratified agreements with international institutions and with super economic powers (the EU and the USA) explain this stabilization. However, despite openness to international competition through the coming into force the free-trade agreement with the European Union and the annual economic growth maintained at the level of 5%, the current account fell during the second half of the 2000s due to the 2007 economic crisis.

After the revolution of December 17\(^{th}\), 2010 which suggested radical political changes, the Tunisian economy was heavily affected. Perpetual democtrations and even violent riots at times seriously handicaped the economy’s growth. Hence, the fall of exports, the inflationary

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\(^3\) External debt and the balance of payments are severely controlled, public investment is reduced and consumption is subjected to restrictive measures by a freeze in salaries and additional restrictions for importation.
spiral and the closure of foreign companies contributed to the sharp degradation of current account to reach -7.4% in 2011.

Figure 1 – Actual and equilibrium current accounts of Tunisia

The equilibrium current account in Tunisia (Fig. 1), it witnessed a fall during the 1980s due to the fall of net foreign assets, to the deterioration of net oil exports and to the rise of the dependency ratio. Since the beginning of the second half of the 1990s, a negative evolution of the dependency ratio and a slight improvement of the net foreign assets led to a recovery of equilibrium current account. During the second half of the 2000s, the fall of net foreign assets and the deterioration of the oil balance explain the fall of the equilibrium current account towards the end of the period despite an improvement in the dependency ratio.

b. Turkey

Despite current deficits during the 1980s, the current account balance in Turkey improved during the 1980s and the 1990s thanks to the economic openness that started in the 1980s and that was later accelerated by the customs union (1996) with the European Union (EU), the development of exportation capacities with the new products and new markets, mainly in the Middle-East and by the influx of European investments.

The regained growth that followed the major crisis that the country went through in 2001 did not disappear despite the international financial crisis of 2008. Turkey’s economic growth after the crisis of 2001 was particularly poor in job creation. It was mainly

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4 Since the 1980s, Turkey witnessed current deficits, but these were slightly over its equilibrium value.
manifested in the important gains of productivity (Blanc et al., 2007). Such an economic context led to a degradation of the current account during the 2000s.

The Turkish economy started to wane since the spring of 2008 with the fall of private investments and later the fall of consumption. The wane deepened starting from autumn with the international crisis and the fall of world economic activity. In such a context of loss of trust and the systematic appreciation of the Turkish Lira following the May 2006 shock, the rise of interest rates explains the ensuing current account deficit to reach -9.9% in 2011.

**Figure 2 – Actual and equilibrium current accounts of Turkey**

The equilibrium current account (Fig. 2) witnessed contrasted evolutions. Turkey had a constantly negative equilibrium current account which, however, kept on improving until the 2000s thanks to its net foreign position and to the slight fall of the dependency ratio. During the 2000s, Turkey witnessed a fall of its equilibrium current account due to the degradation of oil balance and to a slight rise of the dependency ratio which reduces national savings despite an important rise in net foreign assets.

c. Egypt

In the beginning of the 1980s, Egypt witnessed an important decrease of foreign financial flows, of tourism, of foreign economic aids and of oil revenues, which led to current account deficits that reached their highest point in 1984 with a deficit of 8.7 % in the GDP. Despite the delicate economic situation in Egypt, the current account improved in the beginning of the 1990s thanks to important reforms launched during the same period. Egypt’s economic growth did show neither in the advancement of technological sectors, nor
in the diversification of exports, nor in an offensive positioning in the dynamic sectors of the world economy.

During the 1990s and the 2000s, the current account remained stable despite an improvement in the beginning of the 2000s. In fact, the current account recovers, recording since 2001/2002 surpluses following the growth of service exportations such as tourism and the Suez Canal income (Moisseron and Youssef, 2004), the liberalization of exchange rate and the reforms in the pricing, fiscal and financial fields.

During the second half of the 2000s, the current account fell and became loss-making due to the rise of importation payments. The revolution of January 25th, 2011 has equally given birth to new challenges. The economic growth fell due to the troubles that struck tourism and foreign direct investments (FDI), both representing important sources of exchange reserves (Perspectives économiques en Afrique, 2012). The current account remained in deficit and stabilized around -2% since 2009.

**Figure 3 – Actual and equilibrium current accounts of Egypt**

![Current Accounts Graph](image)

Source: authors’ calculation, International Monetary Fund (World Economic Outlook, April 2012) for the observed current account as % of GDP, forecast for 2012.

Egypt’s equilibrium current account (Fig. 3) improved from -4.3% in the beginning of the 1980s to 3.5% in the GDP in the middle of the 2000s. This may be explained by the positive contribution of a great improvement of net foreign assets despite a fall of oil balance which was compensated by a lesser dependency vis-à-vis young and old people.

**d. Morocco**

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5 The decision was taken in January 2003 to let the Egyptian pound float
In the beginning of the 1980s, the Moroccan economy paid the heavy price of different factors: the second oil shock, the fall of phosphate prices, the rise of the dollar value and of interest rates, adding to that the severe drought that marked the year 1981\(^7\). The current deficit of payments reached a historical record in 1985 at 9.6\% of the GDP.

Since 1983, certain measures\(^8\) aimed at reducing internal demands and at opening and liberalizing the economy. Such reforms touched all aspects of the economy, mainly foreign trade, budget expenditures, taxation, foreign investments, privatization, etc. Such measures led to an improvement of current account during the second half of the 1990s and the 1990s. However, the evolution of current account witnessed wavering periods with ups and downs during the 1990s. These were in part due to the restrictive policies adopted under the structural adjustment program, to the poor results of the 1992 and 1993 agricultural campaigns and to the slight decrease of investment rates.

With the second generation of structural reforms\(^9\) aiming at the stabilization and the recovery of the economy during the period between 1994 and 2004 in cooperation with international institutions with the objective of reinforcing the productive patterns, the current account continued to improve mainly thanks to the trade sector as well as to the tourism sector which witnessed a significant improvement. Starting from 2008, exports, foreign direct investments, tourism, industry as well as transferring Moroccans living abroad, etc. were progressively affected by the morass of international economy. The current deficit rises to reach -7.6\% of the GDP in 2011.

\[\text{Figure 4 – Actual and equilibrium current accounts of Morocco}\]

\(^7\)Foreign debt doubled more than six times between 1975 and 1982 to reach more than 83\% of the GDP.
\(^8\)The government has set a structural adjustment program (PAS).
\(^9\)The big axes of such reforms are:- The liberalization of foreign trade, the ratification of free-trade agreements with the EU and the USA:- The reform of customs and the financial sector, the acceleration of the privatization process:- The ratification of the labor law:- The improvement of the business environment.
Morocco’s equilibrium current account (Fig.4) decreased during the first half of the 1980s due to a sharp fall in the net foreign assets. During the 1990s, the current account equilibrium improved to reach 2% in 2006. Numerous factors contributed to this tendency: an improvement of the net foreign assets, an improvement of the oil balance and a decrease of the dependency ratio. During the second half of the 2000s, Morocco recorded a falling current account equilibrium (reaching 0.4% of the GDP) for different reasons: the fall of net foreign assets, the collapse of net oil exports and a slight rise in the dependency ratio.

2.2. Exchange Policy

We will try to advance the exchange policy developments that marked the period between 1980 and 2011 in four south-Mediterranean countries, namely: Tunisia, Turkey, Egypt and Morocco.

If we refer to the IMF classifications of October 2012, we see that Turkey’s exchange rate regime is a floating regime, Tunisia’s regime is a “crawling peg” arrangement, while according to the same classification Egypt’s regime is a “stabilized arrangement.” Finally, Morocco is ranked among countries with a “conventional peg” exchange rate regime. However, between 1980 and 2012, these countries witnessed a transformation of their exchange rate regimes, which explains the developments of real and nominal effective exchange rates of south-Mediterranean countries (in relation to their equilibrium level) that witnessed numerous distinct tendencies. In fact, it is either to be able to use exchange rate as an economic policy weapon (to favor exportations, to level off deficits, etc.) or as answer to structural reforms whose ultimate objective is to liberalize the economy evolved by the exchange rate regimes.
Egypt abandoned the repegging of its currency in 2000 before swinging towards a floating exchange regime in 2003. Morocco maintained the Dirham-anchoring principle to a basket of currencies, Turkey followed a floating exchange regime that it would continue to implement in 2013 according to the Turkish Central Bank. Turkey declares, hence, that it does not have an objective of a nominal or a real exchange rate within the present exchange regime. Finally, the Tunisian Dinar exchange rate (TDN) is determined in the interbank market. The Tunisian Central Bank intervenes in order to regulate cashflow in the market in case of imbalance between currency supply and demand in the market. Nevertheless, the exchange policy has been marked by an important evolution of the exchange regime and the openness of the Tunisian economy.

The evolution of the Tunisian exchange regime and of capital controls clearly progressed towards a growing liberalization. In the 1970s and the 1980s, the Dinar was aligned with the French Franc, then with a basket of currencies including the USD and the DEM. In the middle of the 1980s, the growing deficits of the payment balance put pressure on the Dinar and led to its gradual depreciation until 1989, in the context of a financial liberalization plan that led to a convertible dinar towards the end of 1992 and to the creation of an exchange market in 1994. In the 1990s and until 2000, the exchange policy was greatly influenced by the phenomenal rise of the Tunisian interbank exchange market and by the decrease of the TCB’s intervention. The Tunisian Dinar was therefore marked by greater flexibility of its exchange rate, both real and nominal. The abandoning of the objective of real stability, along with the appreciation of the Euro, led to the real depreciation of the Dinar’s effective exchange rate during the last years.

Between 1969 and 1991, Egypt adopted a multiple exchange rate regime that went through numerous transformations all along this period. In 1973, this exchange regime was institutionalized then modified starting from 1979. Since 1991, in the context of joint reforms with the World Bank and the IMF, the multiple exchange regime was abolished to be replaced by a unified exchange regime. The anchoring of the Egyptian pound on the dollar was therefore necessary both to stabilize Egyptian debt denominated in dollars and to incite Egyptian residents to convert their dollar assets into national currency. Between 1998 and 2004, Egypt witnessed an exchange crisis that pushed to the intervention of the Egyptian Central Bank in order to maintain the exchange rate within the interval
determined by the bank itself. In 2004, Egypt started a transition towards a more flexible exchange regime, but it maintained a controlled floating.

Unlike Tunisia which opted for a regime based on controlled floating since 1986 and Egypt which opted for a generalized or pure floating regime since 2000, Morocco maintained the historical and traditional anchoring to a basket dominated by two key currencies, namely the Euro and the Dollar. Nevertheless, the evolution of the Moroccan exchange regime still follows a gradual financial liberalization movement that should eventually lead to a floating exchange regime, to the complete convertibility of the Moroccan Dirham and to the removal of the latest obstacles facing capital movement with the outside world.

Exchange policy in Morocco was generally marked by a partial convertibility of the Dirham (1993), by the creation of an exchange market open to banks (1996) and by a progressive liberalization (since 1983) and accelerated (since 2005).

Turkey is not an exception to the rule. In fact, the exchange regime was one of the pillars of the reforms adopted. Until the end of the 1970s, Turkey worked with a fixed exchange regime. Since 1980, Turkey started a sharper and sharper liberal process. The period between 1980 and 1987 was hence marked by the adoption of a more flexible exchange regime (Crawling peg).

Since 1988 and until the beginning of the 1990s, the liberalization of capital markets was marked by the establishment of an exchange market, the opening of the capital account in August 1989 and the convertibility of the national currency. Since 2001, the pegging to the dollar was completely abandoned in favor of a floating exchange regime.

3. **FEER Estimations for South-Mediterranean Countries**

In this section, we make FEER estimations for four south-Mediterranean countries (Tunisia, Turkey, Egypt and Morocco) for the period between 1982 and 2011. The FEER\(^{10}\), first introduced by Williamson (1994) (Jeong et al., 2010; aflouk et al., 2010), is defined as the real effective exchange rate guaranteeing the simultaneous realization of the internal equilibrium and the external equilibrium. It is the exchange rate that allows the current account to reach a particular target when the internal equilibrium is realized. The internal equilibrium is

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\(^{10}\) Fundamental Equilibrium Exchange Rate
represented by reverse link between potential production and real exchange rates that go through the job market. The external equilibrium describes a positive relationship between production and the real exchange rate which results from the dynamics of foreign exchanges.

In order to estimate the incongruities of the exchange rate, we proceed towards a two-step analysis, firstly, on the international level, we consider the works of Jeong et al. (2010) for the main currencies, then, on the level of each developing country by relying on a country’s simple model.

As for the main currencies (Dollar, Yuan, Yen, Pound Sterling), the adopted methodology is a synthesis of prior research on the FEER (Borowski and Couharde, 1999; Jeong and Mazier, 2003) and the Symmetrical Matrix Inversion Method (SMIM) proposed by Cline (2008) (Jeong et al., 2010). A multinational model describing foreign trade of the USA, the Euro Zone, China, the UK, Japan and the rest of the world was applied to calculate the equilibrium exchange rate of the main currencies.

Based on these results for every developing country, save for China which was studied using the previous multinational model, an equilibrium exchange rate will be estimated by using a simple model of foreign trade in which international demand and international trade prices are exogenous. The equilibrium exchange rate will be defined like previously as the compatible exchange rate with the internal and external equilibriums of each country. We could suppose that developing countries do not have an important effect on both the exchange volume and prices of bigger countries with exchanges that influence those of these small countries.

The works of (Jeong et Mazier, 2003) show that the results obtained with a multinational model are very close to the results obtained with a one-country model for small countries. The results in terms of the real effective exchange rate of small countries are linked up with those of the multinational model in order to calculate the incongruities in terms of bilateral exchange rate.

The developments of real effective exchange rates in south-Mediterranean countries in relation with their equilibrium level show the existence of a great heterogeneity between the exchange policies in these countries, this is explained by the low integration level between
these countries. Consequently, they witnessed numerous distinct tendencies. Overall, we can speak about a period of overvaluation during the 1980s, then a period of undervaluation during the 1990s, and finally a period of overvaluation during the 2000s with the exception of Tunisia which became very close to the equilibrium by the end of the period.

Since the 1970s, some countries started to reform their economic systems in order to provide more place for private initiatives and a bigger role for markets and international trade. However, the major reform dynamics started in the beginning of the 1980s. Many countries in the region, knowing serious crises of the payments balance and a slow or negative growth, adopted a macroeconomic stabilization and a number of structural reform programs aiming at restoring the macroeconomic equilibriums and at promoting growth.

Despite the constant efforts to stimulate the recovery and to accelerate the reforms, Mediterranean countries maintained a slow growth trajectory during the 1990s. Unemployment increased and the slow and delayed demographic transition that the region witnessed (with a more and more important contingent of young workers in the active population) put pressure on the economic and social infrastructures (Nabli et al., 2007).

During the 2000s, the perspective had greatly changed. The countries followed their economic reforms, and along with a more favorable global environment, the economic performance of these countries improved, with a growth of the GDP to reach a mean beyond 6% per year (Nabli et al., 2007).

The first observation is that the rhythm of reform remained low in the region with the exception of Turkey which, compared to other developing countries, realized advancements in terms of growth. The second observation is that the content as well as the rhythm of these reforms varied considerably within the region with particular subgroups of countries that realized more important progress than others in terms of the performance of the private sector. The third observation is that the reaction of the private sector to the adopted reforms (though they are just limited reforms) was overall poor resulting in a poor performance (Nabli et al., 2007).

The stylized facts developed above largely explain the evolution of equilibrium exchange rate. During the 1980s, the Tunisian Dinar witnessed a series of short periods of depreciation and appreciation. Yet, since the mid-80s, and with the fall in the oil price among
other developments, the exchange rate of the Tunisian Dinar witnessed a sharp depreciation in real and nominal terms, which explains the phase of real undervaluation of the Tunisian currency and in relation to the Dollar (Fig 5).

Figure 5 – Actual and equilibrium real effective and bilateral exchange rates of Tunisia (2000 = 100)

Following the process of liberalization that started in 1987, the Tunisian Dinar witnessed a slight real appreciation during the 1990s, which led to a poor overvaluation in real terms, but which remains very important in relation to the Dollar, along with the stability of current account on deficit levels.

Later, the Tunisian Dinar witnessed a short period of undervaluation following the improvement of the current account in the beginning of the 2000s. In the aftermath of the Djerba terrorist attack in 2002, tourism revenues went down. Besides, the slowdown of industrial activity, the fall of exports in addition to drought affected growth. In such a critical economic situation, the Tunisia Dinar remained slightly undervalued in real and nominal terms despite a sharp real and nominal depreciation.

The recession that followed the 2007 economic crisis and the slowdown of the growth in European countries that represent Tunisia’s principal partners put a significant pressure on the Dinar. The latter witnessed a slight real undervaluation until 2010. With the events that started on December 17th, 2010 and in the year 2011, the Tunisian Dinar witnessed a slight real overvaluation reflecting the degradation of the current account.

As for Turkey, and during the 1980s, the Turkish Lira was strongly undervalued both in real and nominal terms due to the sharp depreciation in the context of low current deficits, the decrease of imports and hyperinflation. The 1990s were also greatly marked by a very
great inflation leading to a very unstable growth. The Turkish Lira was then appreciated in real terms and became slightly overvalued in real terms and close to the equilibrium in relation with the Dollar until 2000.

In 2001, the financial and monetary crisis and the over-adjustment of the Turkish Lira (a depreciation of more than 100%) contributed to the reappearance of a low undervaluation in relation with the Dollar. Following the stabilization plan set after the 2001 crisis, the political shocks of July 2002 and the war in Iraq, the Turkish Lira was appreciated in real and nominal terms without provoking any decrease in exportations.

Figure 6 – Actual and equilibrium real effective and bilateral exchange rates of Turkey (2000 = 100)

Despite the real and nominal depreciation in the beginning of the 2000s, the Turkish currency was overvalued in real terms and in relation with the Dollar during the 2000s due to the sharp real appreciation. The 2008 crisis put an end to the aggravation of the current account deficit due to the fall of imports, which explain the low overvaluation in 2009. However, the very strong recovery in 2010 led again to a very high increase of the current account deficit with an important overvaluation in 2011 in real and nominal terms despite an important depreciation in relation to the Dollar.

The Egyptian pound witnessed a strong real appreciation shown in a short overvaluation in relation to the Dollar and further prolonged in real terms which is explained by the string inflation pressures in the beginning of the 1980.

The “Infitah” (Openness) policies during the 1980s led to dynamics in all the economy’s sectors with an unprecedented growth of the financial assets held by households (Hussein
and Roussillon, 1990). Despite a real appreciation until the end of the 1980s, the Egyptian currency was undervalued in real terms and in relation with the Dollar until the mid-1990s.

Since 1997, the Egyptian exchange rate became subject to numerous external shocks\(^{11}\). In 1998, world oil prices went down, which reinforced the deterioration of the current account balance. The political tensions of the late 1990s in the Middle-East region\(^{12}\) had a negative impact on the region's economy in general and on the Egyptian economy in particular, which explains the overvaluation in real and nominal terms of the Egyptian pound since 1997 and until the beginning of the 2000s, reflecting a sharp degradation of current account balance during the same period.

With the reforms of the early 2000s\(^{13}\), the adoption of a unified floating exchange rate reinforced the competitiveness of the Egyptian economy. In the beginning, this decision was accompanied by a brutal real and nominal depreciation of the exchange rate. This depreciation explains the short period of real and nominal undervaluation of the Egyptian currency until 2004. Since then, Egypt has developed its economic relations with Europe (as a first commercial partner, first investor and first aid provider) as well as with the USA and with Near/Middle-East neighbors. However, the outbreak of the 2007 economic crisis and the decrease of world demand explain the resulting collapse of current account balance and the overvaluation of the Egyptian currency during the 2000s.

Figure 7 – Actual and equilibrium real effective and bilateral exchange rates of Egypt (2000 = 100)

\(^{11}\) The Asian crisis of 1997/1998, the Luxor terrorist attack.

\(^{12}\) The tensions in the Middle-East peace process in the late 1990s and the second Palestinian Intifada launched in October 2000.

\(^{13}\) In July 1999, Egypt signed with the USA the Trade and Investment Framework Agreement (TIFA) aiming at reinforcing cooperation between both countries and at facilitating the access to their respective markets by the removal of non-pricing barriers and other barriers facing trade and investment. In June 2001, the ratification of the association agreement between EU and Egypt represented a major evolution whose effect were detected in the policy of trade liberalization.
Despite the reforms, the events of January 2011 and the transition process were accompanied by a new trouble movement that negatively affected tourism and foreign direct investments. The Egyptian currency was slightly depreciated in real terms despite a strong nominal appreciation. Egypt maintained an important overvaluation, contributing to a current account close to -2% of the GDP (which means below the equilibrium value) and to an acceleration of inflation.

Finally, in Morocco, the period between 1980 and 1990 witnessed some structural reforms along with the liberalization of the market. During the 1980s, there was alternation between periods of undervaluation and overvaluation of the Moroccan Dirham, but this was with tendency towards a more durable and more significant overvaluation in real terms.

Two important phases marked this period. The first lasted from 1980 to 1985 and was essentially marked by a continuous depreciation of the Dirham, explaining the phase of undervaluation of the Moroccan currency in relation to the Dollar despite a real overvaluation. The undervaluation phase was interrupted by a short period of overvaluation that can be explained by the important real and nominal appreciation.

Figure 8 – Actual and equilibrium real effective and bilateral exchange rates of Morocco (2000 = 100)
During the 1990s, the Moroccan currency witnessed a nominal overvaluation period while the real exchange rate was close to equilibrium. During this period, Morocco went through two years of drought with a negative growth rate as well as external shocks related to the decrease in phosphate prices and the increase in oil prices.

The development of the agricultural sector and the dynamism of particular promising sectors of the Moroccan economy (electronics, trade, construction, etc.) since 1996, the devaluation of the Dirham by 5% in April 2001, the growing integration of Morocco in the European Union, the increase in transfers from abroad and the revenues of privatization have all contributed to a real and nominal undervaluation of the Dirham (27% in 2001), which was accompanied by an improvement of current account balance in the beginning of the 2000s.

During the second half of the 2000s, the overvaluation appeared in real and nominal terms and persisted until 2011 which led to a fall of international demand resulting in the drying up of the bank credits. Phosphate production and exportation went down despite the recovery plan. The same applies to other industrial activities that were highly affected by the economic recession that struck several countries from the Euro zone such as textile, tourism along with the fall of transfers by Moroccan living abroad and the new rise of prices since 2008.

4. Equilibrium Exchange Rate: The BEER Approach

14 Public authorities started a second generation of reforms during the period between 1994 and 2004 in cooperation with international institutions.
15 A recovery plan of the industrial activity spanning between 2009 and 2015.
As mentioned above, in this article we proceed to the study of equilibrium exchange rate in south-Mediterranean countries using a comparative perspective in order to complete the reflection. We have therefore deduced incongruities in the exchange rate. The BEER approach, which was first introduced by Clark and MacDonald (1998), consists in estimating the long-term relation between the real effective exchange rate and its fundamentals. In this sense, the changes in the equilibrium exchange rate with time reflect the evolution of economic fundamentals. The most important variables affecting the level of the real exchange rate are the Terms of Trade (TOT), the Net Foreign Assets position (NFA) in percentage of the GDP and the ratio of relative productivities of the different domestic ($\rho'_e$) and foreign ($\rho''_e$) sectors (or those of the entire economy)$^{16}$.

First of all, through the Net Foreign Asset ratio related to the GDP, we study one aspect of the relationship between international payments and the real effective exchange rate. Theoretically, we were expecting a real appreciation associated to the accumulation of net interest revenues. At the same time, an increase of the foreign debt due to the deficit current accounts puts pressure on the real exchange rate which will end up depreciating in the long run (Égert, Lommatzsch and Lahrèche-Révil, 2007). If we refer to Keynesian logic, countries with net external liabilities need to realize trade surpluses in order to cover their deficit, which necessitates a depreciation of the real exchange rate.

After that, the “Balassa-Samuelson” effect, first introduced by Balassa and Samuelson in 1964, refers to the distortion in the purchasing power parity (PPP) caused by the international differences of relative productivities between the sectors of tradable and non-tradable goods. Balassa and Samuelson showed that the evolution of the productivity explains the permanent variations of the real exchange rate. In fact, the relative price of non-tradable goods is conditioned by international competitiveness. The growth of productivity should generate a higher inflation in the sector of non-tradable goods and hence relative prices will tend to rise more significantly in countries with high productivity growth$^{17}$ (MacDonald & Ricci, 2002).

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$^{16}$This ratio can be replaced by the ration of relative prices of tradable and non-tradable assets.

$^{17}$Si dans la plupart des travaux empiriques qui portent sur les déterminants du taux de change, l’effet Balassa Samuelson est la théorie qui est toujours associée à l’explication de l’appréciation du taux de change dans certains autres ceci est susceptible de ne pas se vérifier (Edwards, 1989, 1994), (Montiel, 1997) et (Gente 2006).
However, we could theoretically expect that a productivity increase leads to a TCER depreciation. In fact, with the presence of home bias, productivity gains in the open sector have a negative effect on the prices of tradable goods that are locally produced compared to the price of the production of foreign goods, which leads to a real depreciation of the open sector through the Terms of Trade (Égert, Lommatzsch and Lahrèche-Révil, 2007).

Finally, the Terms of Trade follow a growing tendency, leading to an improvement of the trade balance. However, there is no consensus related to the variation of the Terms of Trade on the REE (López-Villavicencio and Mignon, 2009). In fact, on the one hand, an improvement of the Terms of Trade may lead to an income effect caused by the increase of the national income. On the other hand, a substitution effect is set due to the appreciation of the exchange rate that, in turn, leads to an increase of the consumption of imported goods and to a decrease of the consumption of the protected sector goods. Consequently, non-tradable good demand decreases and the real exchange rate is depreciated.

Although the three previous fundamental principles are important in this field, we concentrate mainly on the effects that cumulative deficits or current account surplus (whether an increase or a decrease in the NFA position) exercise on the real exchange rate. In this regard, the Terms of Trade are considered as a control variable in the analysis. Based on prior studies (Bénassy-Quéré and al. 2009; López-Villavicencio and Mignon, 2009), we have used the recent developments of non-stationary panel econometrics in order to study the main long-term determinants of the real exchange rate during the period between 1980 and 2012, and this is for a number of developing countries, namely Algeria, Argentina, Brazil, Chile, China, Egypt, Hong Kong, India, Korea, Morocco, Mexico, Tunisia and Turkey.

Since unit-root tests and the cointegration test allowed us to conclude that variables are integrated and cointegrated, the use of particular cointegration methods, such as the Pooled Mean Group (PMG), becomes possible. The Pooled Mean Group is an estimator based on two approaches, the Mean Group estimator and the traditional estimators of panel data.

The estimator could be presented as the intermediary model where fixed effects, the CT coefficients and the variances of error terms could differ between groups; however, it poses the constraint that LT coefficients would be identical. This is explained by the fact that in the long run we can suggest an equilibrium relation between variables. For instance, if we
refer to the Solow growth model, in the long run countries will have access to the same technology and will therefore have the same production function.

\[
\log(\text{REER})_t = \mu + 0.490\text{NFA} + 0.247\log(\text{PROD}) + 0.016\log(\text{TOT}) + \epsilon_u
\]

\[
(6.429)^{***} \quad (1.985)^* \quad (0.407)
\]

Since the significance of the Terms of Trade is not checked, we have thought about a second model:

\[
\log(\text{REER})_t = \mu + 0.530\text{NFA} + 0.313\log(\text{PROD}) + \epsilon_u
\]

\[
(6.878)^{***} \quad (2.408)\quad **
\]

Where REER is the real effective exchange rate, NFA is the net foreign assets seized through the NFA/GDP ratio, PROD relative productivity and TOT terms of trade Index of net merchandise. All variables are in logarithms.
According to the previous results, the determinants of exchange rate and hence the incongruities according to the BEER methodology cannot be studied without taking into consideration the exchange regime (Appendix 5). (Broda, 2000) shows that in reaction to a decrease in the Terms of Trade, a slow and limited real depreciation was observed for countries with fixed exchange regime and it is caused by the decrease of domestic prices. An immediate strong real depreciation was observed in countries with a floating regime. It is
the consequence of the nominal depreciation (It is still higher since inflation in on the increase).

In the case of a floating exchange regime as in the case of the fixed exchange regime, the sign associated with the Terms of Trade is negative. On the theoretical level, this does not present any problem since the impact of the Terms of Trade on the real exchange rate could be positive or negative. In fact, an improvement in the Terms of Trade leads to an increase of the national income, which results in the increase of demand, in particular the demand of non-tradable goods (income effect). On the other hand, the increase in the general level of prices is the cause of a real appreciation of the exchange rate which, in its turn, leads to the growth of the consumption of imported goods and to the fall of the consumption of the goods of the non-tradable sector (substitution effect). Hence, the demand for non-tradable goods decreases and the real exchange rate is depreciated.

Nevertheless, the relative productivity sign, which allows us to detect the Balassa Samelson effect, differs from one regime to another. Theoretically speaking, an increase in the productivity in the sector of tradable goods could lead to a depreciation of the real exchange rate in the open sector through the Terms of Trade. In the same line and based on calibrated coefficients, Benigno and Thoenisses (2003) show that an increase in productivity in the open sector implies a trend depreciation of the real exchange rate due to the negative impact on the real exchange rate in the open sector (depreciation).


Some comparative studies of the BEER and FEER approaches within the same theoretical context have been undertaken (Driver and Westaway, 2004, Bénassy-Quéré et al. 2009). Despite their differences, these two approaches provide complementary perspectives on the evaluation of the exchange rate. The observed differences between these two approaches emanate from the methodological aspect of the adopted approach. These differences can mainly be explained by the time horizon (Bénassy-Quéré et al. 2009). In the long term, the technological catch-up was not achieved, but the net foreign position in each country must be stabilized at a level that is coherent with the level of development and the demographical structure of each country.
In this case, the BEER approach seems to be the most appropriate for the evaluation of exchange incongruities. The FEER approach is the most pertinent concept in terms of international monetary cooperation because it emphasizes the mid-term imbalances of current account. In fact, stocks of assets as a percentage of the GDP are not stabilized in the mid-term\textsuperscript{18}, as it is confirmed by the evolution of net foreign assets in industrialized and developing countries. However, a comparison of the BEER estimations with the FEER estimations could give quite interesting clarifications.

At first sight, save for Morocco and for particular specific periods, the incongruities of both approaches show big differences. Overall, the BEER incongruities are more important than those of the FEER, which conforms to the nature of the BEER long-term equilibrium.

For a better understanding of the divergences between the FEER and the BEER, it is probably important to remember that the BEER is rather stable in the long term and that the BEER incongruities are consequently the mainly the differences between real exchange rates and a mean value. As a general rule, the real appreciation beyond this mean value leads to an overvaluation and, inversely, the real depreciation leads to an undervaluation. On the other hand, the FEER is related to a rather stable current account balance. The FEER incongruities mainly reflect the differences between the observed and the equilibrium current account. As a general rule, the rise of the current account beyond the equilibrium value leads to an undervaluation and, inversely, a decreasing current account leads to an overvaluation. Consequently, the FEER and BEER incongruities are compatible when the real exchange rate and the current account are closely related.

In fact, in order to calculate the fundamental equilibrium exchange rate, it is necessary to know the difference between realized production and potential production on the one hand (Internal equilibrium) and the difference between the observed current account and the one judged as “defensible” (external equilibrium). For this reason, Williamson’s approach is often qualified as normative: the level of the equilibrium exchange rates that it allows to define is subject to the undertaken hypotheses. The FEER is therefore an approach in terms of structural balance: the equilibrium exchange rate must allow for the equalization of the structural balance of the current account with the “normal” net capital flows.

\textsuperscript{18}This declaration remains true even in case the mid-term is defined as a five- or ten-year period.
Furthermore, a zero current balance is required only if we are interested in an equilibrium of a very long period. In the mid-term, countries could record durable imbalances of their current accounts, being inevitably accompanied by capital flows. At this level, only “structural” movements of capitals are pertinent. The determination of desirable level of the balance depends on the net foreign position which is compatible with the country’s economic maturity and demographic characteristics.

The BEER is based on the estimation of an equation that is reduced to the mean of long-term relations which exist between the real exchange rate and different fundamental variables. With a purely empirical methodology, the results differ substantially from one estimation to another. In fact, the definition of a panel is based on one criterion while the level of development could raise another evolution of incongruities (Bouchoucha, 2011).

The abolition of the exchange regime as a fundamental variable could have more or less important consequences on the estimation results (Appendix 4), especially that Turkey has changed its exchange regime during the period. Firstly, Turkey’s divergence between the FEER and the BEER is particularly striking. With the FEER approach, the Turkish currency appeared undervalued between 1982 and 1992 in accordance with the current account close to 0% of the GDP, but remains largely beyond the equilibrium value. The BEER inversely gives a long period of overvaluation between 1983 and 1998 due to the high real appreciation observed between 1987 and 1999, but which does not seem to have an impact on the current account. This may be related to the structural improvement of the Turkish economy during this period, which reflects a real appreciation of the equilibrium exchange rate.

Nevertheless, during the 2000s, the FEER gave a growing overvaluation following the stabilization plan that was set after the 2001 crisis and which was compatible with the huge current deficits. On the other hand, the BEER gave a growing undervaluation, mainly after 2005, and despite real appreciation. Yet, this appreciation still appears to have a negative impact due to the effects of the liberalization policy and the resort to foreign capitals. These developments would be reflected in the real appreciation of the equilibrium exchange rate.

Secondly, Tunisia is another case of a great discrepancy between the FEER and the BEER. The BEER juxtaposes two very contrasted periods, the first from 1980 to 2004 with an undervalued Dinar, the second from 2005 to 2012 with an overvalued Dinar. This is simply
linked to a strong real depreciation from 1984 to 1989 and which was followed by stabilization and then a real depreciation phase until the end of the period. These two phases of under- and overvaluation in accordance with the BEER rather seem to be unrealistic because they are disconnected from the big fluctuations of the current account during these periods.

To sum up, for these countries, the BEER approach gives a too simplified vision of the equilibrium exchange plan based on a simple mean value that does not sufficiently integrate the structural changes that may occur. These structural changes are more taken into account by the FEER approach. In consequence, for this reason this approach seems to be more appropriate.

For the concerned countries, and particularly for Tunisian and Turkey, the BEER cannot be the adequate methodology. In fact, having gone through important structural changes that went up to changing the exchange regime (Turkey) and having faced important crises (the inflation crisis in Turkey and the adjustment plan in Tunisia of the 80s), these countries have had their fundamentals profoundly affected during this period.

Hence, save for the notion of complementarity between the two methodologies, the FEER that integrates structural changes seems to be more appropriate during a relatively unstable period for a given country.

6. Conclusion

In this article, we have compared between the BEER and the FEER methodologies in four south-Mediterranean countries that were marked by fundamental changes during the period between 1980 and 2011.

Despite the differences between the four studied countries, south-Mediterranean countries generally shared the passage through a phase of structural adjustment and of restructuring. According to the FEER, the study of the evolution of real effective exchange rates in south-Mediterranean countries in relation to their equilibrium level during the period between 1982 and 2011 allows us to distinguish between different distinct tendencies: An overvaluation phase during the 1980s, then an undervaluation during the 1990s, and finally an overvaluation phase during the 2000s, with the exception of Tunisia which is found at the end of a period that is close to equilibrium.
According to the above findings, the BEER and the FEER are two fundamentally different methodologies. Since the BEER is sensitive to the specifications of the estimated model, it is important to construct homogenous panels. The least to say is that this sensitivity presents some facilities in the introduction of particular specifications that seem to be pertinent and necessary for a given period and for a given country.

The FEER approach seems to be more adapted to estimate exchange incongruities for two main reasons. Firstly, the FEER may better guarantee the coherence of incongruities when studying countries that are different, since this methodology is based on an international trade model to estimate such incongruities (Jeong et al., 2010; Aflouk et al., 2010). Secondly, the FEER seems to be more appropriate because it takes into account more structural parameters (mainly through the elasticity of foreign trade) and growing models adapted by each country.

We, therefore, back the thesis that the BEER and the FEER methodologies should not be opposed to each other. They should rather be combined in order to provide reference points for potential exchange policies. During a period marked by important fluctuations, it is more pertinent to consider the FEER methodology. The BEER approach must be enhanced by factors that were previously neglected by related literature such as the exchange regime.
References

- Broda, C., 2000. Terms of Trade and Exchange Rate Regimes in Developing Countries, Mimeo, MIT, Cambridge, MA.
• Vérez J-C. et al., 2011, “Introduction croissance, emploi et inégalités en Turquie ”. Région et Développement n° 34-2011
Appendix 1

Table 1 – Determinants of current account for emerging countries

<table>
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<th>OLS Pooled</th>
<th>Individual Fixed Effects</th>
<th>Time Fixed Effects</th>
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<td>8.78***</td>
<td>14.23***</td>
<td>3.85***</td>
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<tr>
<td></td>
<td>(6.62)</td>
<td>(7.11)</td>
<td>(2.79)</td>
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<td><strong>Initial Stock of Net Foreign Assets</strong></td>
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<td>0.07***</td>
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<td></td>
<td>(9.88)</td>
<td>(6.20)</td>
<td>(11.90)</td>
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<td><strong>Dependency Ratio</strong></td>
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<td></td>
<td>(-5.45)</td>
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<td>(-1.60)</td>
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<td><strong>Oil Balance</strong></td>
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<td>0.22***</td>
<td>0.19***</td>
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<td></td>
<td>(6.35)</td>
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<td>(6.27)</td>
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<td><strong>Output Gap</strong></td>
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<td>-0.37**</td>
<td>-0.32*</td>
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<td>(-2.49)</td>
<td>(-2.49)</td>
<td>(-1.86)</td>
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<td><strong>Adjusted R²</strong></td>
<td>0.50</td>
<td>0.57</td>
<td>0.60</td>
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( ) = T statistics; *** = significant at 1%, ** = significant at 5%, * = significant at 10%
Coefficients robust to heteroskedasticity
Source: authors’ estimates.

Appendix 2

Table 2 : Sources

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<th>Variable</th>
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<tr>
<td>ISNFA</td>
<td>P.R. Lane and G.M. Milesi-Ferretti’s Database, 2007</td>
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<tr>
<td>CAS</td>
<td>World Economic Outlook, IMF, April 2012</td>
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<td>Annual Report on Exchange Arrangements and Exchange Restrictions, IMF</td>
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<td>DR</td>
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### Appendix 3

**Table 3 – Panel unit root test for emerging countries**

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</table>

*** = Significant at 1%, ** = significant at 5%, * = significant at 10% using the test statistic Im Pesaran Shin; the rejection of the null hypothesis (of the presence of unit root), leads us to reject non-stationarity of the series.

Source: authors’ calculation.
Table 4 - Undervaluation ($e > 0$ and $r > 0$) or overvaluation ($e < 0$ and $r < 0$) for Tunisia, Turkey, Egypt, Morocco (in %)

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<th>$e_{egy}$</th>
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<td>-37.1</td>
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<td>-0.8</td>
<td>-32.8</td>
<td>-18.2</td>
<td>-15.2</td>
</tr>
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</table>

Source: authors’ calculations.
## Appendix 5

<table>
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<th>Table 5. Comparison between exchange rate regimes [1980 – 2012]</th>
</tr>
</thead>
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<td><strong>Number of country</strong></td>
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<tr>
<td><strong>TOT</strong></td>
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</tbody>
</table>

1/ floating exchange rate regime: Chile, Brazil, Turkey, Korea, Mexico
2/ fixed and intermediate exchange rate regimes: China, Algeria, Egypt, India, Hong Kong, Morocco, Tunisia, and Argentina.
3/ T-stat in parentheses.
4/ AIC was used to select de lag orders for each group; the maximum lag was 2 for the period (1980-2007); 1 for the period (1980-1993) and 1 for the period (1994-2007) following the rule (minimum T(i) - max lag).