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Determinants of Inflation in Egypt and Mexico: Empirical Evidence

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ABSTRACT: *This paper empirically examines the influencing role of internal and external factors on the inflation rate for two emerging economies, Egypt and Mexico. We develop an augmented version of the monetarist model, where the model is estimated using quarterly data for Egypt for the period 1975Q1-2015Q4 and Mexico for the period 1976Q1-2015Q4. For the long-run estimation, we apply the Johansen-Juselius Maximum Likelihood estimation, as well as the Fully Modified Ordinary Least Squares methods. According to our estimation results, the price level over the long-run is affected by both internal and external factors in both countries. It is ascertained that both the monetary policy measured by supply of money and interest rate, and the fiscal policy measured by government expenditure, deficit and debt, affect the price level over the long-run in both countries. Consequently, both policies can be used to fight inflation over the long-run in these two countries. Furthermore, both the United States interest rate and price affect the price level with the same sign in both studied countries over the long-run. However, over the short-run, where it is expected that the United States price affects the price in Mexico, it in fact does not have any effect on the prices in Egypt.*

Key words: *long-run price, inflation, fiscal and monetary policies, external and internal factors*

JEL classification: E31, E41, E62

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1 INTRODUCTION

The objective of this study is to empirically investigate the impact of internal and external factors on inflation in the two emerging economies of Egypt and Mexico. The economies of these two countries share characteristics that are common to those of developing countries and this is the reason that makes their case interesting for studying how external forces affect them, especially when shocks come from the United States. Likewise, both studied countries show differences beyond the economic setting that are important to point out for the understanding of the empirical model results.

Egypt, with more than 90% of the country being desert land, relies mostly on tourism, while Mexico has oil, an in-bond industry and remittances as the primary external sources of the country's income. We consider testing our model on these two relatively different countries for the reasons of establishing how external factors influence countries that are

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geographically apart. One such example is a study on how one and the same external factor coming from the changes occurring in the United States economy is felt on one hand in Mexico, a neighbor of the United States, and on the other hand, in Egypt, a country a thousand miles away from the United States. The model used is an augmented version of the monetarist model. In a departure from the existing literature, the paper incorporates both external and internal factors, causing inflation in a country, and compares how the impact of external factors is felt in each of the studied countries. We estimate the model using quarterly data for Egypt for the period 1975Q1-2015Q4, and for Mexico for the period 1976Q1-2015Q4.

As explained and showed by Kia (2006a), inflation in small open economies is influenced by both internal and external factors. Internal factors include fiscal and monetary, as well as structural and institutional variables, while external factors include terms of trade, foreign interest rate, exchange rate, sanctions, risk-generating activities, wars, etc. Moreover, the question raised in this paper focuses on whether, besides considering other factors, a neighbor close to or far from a large country like the United States can be affected by the impact of external factors. We establish that over the long-run the price level is influenced by both internal and external factors in the analyzed countries, while over the short-run, the sources of inflation are also fiscal and monetary policies. What is more, we ascertain that both the United States interest rate and price influence the inflation rate in Mexico, however, only the United States interest rate influences the inflation in Egypt.

As seen in the next section, the existing literature for these two countries does cover the impact of most of the internal and external factors on the price but also ignores one or more factors for each country. More precisely, in most studies the influence of a large country's monetary policy and prices is not considered for the case of Egypt, in addition, foreign-financed debt management as a part of fiscal policy is also ignored. The determinants of inflation, indeed, are evaluated from different perspectives, focusing either on the external factors or the internal ones, but not on both. Also, within the existing literature, policy regime changes and some structural regime changes are ignored. As for Mexico, some studies include only internal factors while ignoring external factors and vice versa. Furthermore, some critical policy regime changes are ignored. This study fills these gaps.

The rest of the paper is organized as follows. Section 2 offers a literature review. Section 3 briefly describes Egypt and Mexico and their relationship with the United States and is followed with Section 4 on the theoretical model. Section 5 describes the data and the long-run empirical methodology and reports the results. Section 6 is devoted to the short-run dynamic models. The final section provides some concluding remarks.

2 LITERATURE REVIEW

This section focuses on the empirical evidence about internal and external factors as determinants of inflation for Egypt and Mexico. The impact of the fiscal and monetary policy respectively considered as internal factors affecting inflation rates in emerging countries, especially tourist-oriented ones like Egypt and Mexico, has not been paid enough attention in the existing literature or has shown mixed results. Moreover, when referring to external factors, the influence of a large country's monetary policy and prices was not considered for the case of Egypt. In the continuation, we show that previous empirical evidence for these two countries covers either internal (fiscal policy or monetary policy) or external factors (prices, interest rates). In other words, there is a lack of a comprehensive approach where both elements are present in the analysis.

In the case of Egypt, a few studies have found that focus on the role of fiscal policies as determinants of inflation, however, with no consideration of external or institutional factors (see Helmy, 2009; Fanizza & Soderling, 2006; and Moriyama, 2011). Other studies consider only the role of the monetary policy in the explanation of inflation (Sharaf, 2015; El Baz, 2014; Arbatli & Moriyama, 2011; Achour & Trabelsi, 2011; Helmy, 2010; and Youssef, 2007). There are also a few studies for Egypt that consider external factors as determinants of inflation, but they lack the inclusion of fiscal or monetary policies (see Hosny, 2013; Al-Shawarby & Selim, 2012; Noureldin, 2009; as well as El-Sakka & Ghali, 2005).

As can be seen from the review of the empirical evidence for Egypt, the determinants of inflation are evaluated from different perspectives, focusing on either the external factors or the internal ones, but not on both. Furthermore, there is no mention of any variable that counts for policy regime changes that also affect inflation. This study attempts to fill this gap.

In regards to Mexico, the empirical literature is divided into two groups. The first group focuses on the analysis of the determinants of inflation during the 1980s high inflationary period (Palerm, 1986; Rogers & Wang, 1995; Shelley & Wallace, 2004). The second group concentrates on monetary factors affecting the inflation rate as the economy has been able to control inflation to single digits. In this group, the focus changes from inflation uncertainty (Grier & Grier, 2006), targeting and expectations (Carrasco & Ferreiro, 2013; De Mello & Moccero, 2009; Galindo & Guerrero, 2003; Galindo & Ros, 2008), to inflation persistence (Capistrán & Ramos-Francia, 2009; Chiquiar *et al*., 2010) or the Phillips Curve (Laguna, 2007; Ramos-Francia & Torres, 2008; Rodríguez, 2012).

Furthermore, Esquivel & Razo (2003), Shelley and Wallace (2004), Cuevas (2008), Galindo & Ros (2008), Cavazos & Rivas-Aceves (2009), Chiquiar *et al.* (2010) and Durán *et al.* (2012) considered a long-run relationship between inflation and different proposed variables. Nevertheless, all the above studies focus either on internal or external determinants of inflation, without providing a comprehensive approach where both external and internal factors are considered together as part of their proposed models.

An important consideration when analyzing inflation in Mexico is the role of external factors, in particular, how changes in the United States economy affect the inflation behavior. One example of the latter is how after the economic liberalization at the end of the 1980s inflation responded to external shocks, mainly coming from the United States, through variables as are, among others, the economic activity of the United States, and the interest rate or real exchange rate (De Mello & Moccero, 2009; Carrasco & Ferreiro, 2013; Cavazos & Rivas-Aceves, 2009).

As we can see from the existing literature, for the two analyzed countries studies focus on the fiscal view of inflation where variables such as deficit or public debt are taken into account as explanatory variables. Likewise, other analyses prefer the monetary approach to inflation where variables such as the interest rate or money supply are considered. Only few works include both fiscal and monetary policy variables, however, with no reference to external factors such as the impact of changes in the United States interest rate and the price respectively. The existing empirical evidence for both countries led us to the conclusion that there is a need for a comprehensive analysis of inflation where both internal and external factors, including the institutional changes and policy shocks, are modeled to explain the long-run determinants and the short-run dynamics of inflation. With that in mind, the contribution of this paper is to provide an empirical monetary model to study inflation for emerging economies, in our case the economies of Egypt and Mexico for the period 1975Q1-2015Q4 and 1976Q1-2015Q4 respectively. In the next section, we describe Egypt and Mexico and their relationship with the United States.

3 A SHORT GLANCE AT EGYPT AND MEXICO AND THEIR RELATIONSHIP WITH THE UNITED STATES

In order to provide a context for the model proposed in the following section, an overview of the similarities and differences between the economies of Egypt and Mexico is given in this section, with a focus on the trade relationships of both countries with the United States. In this paper, we argue that Egypt and Mexico have characteristics common to those of developing countries, which is the reason that makes their case interesting for studying on how external forces affect them, especially when shocks come from the United States. Likewise, both countries show differences beyond the economic setting that need to be pointed out for the purposes of understanding the empirical model results.

First, among the similarities, it is worth mentioning that as developing economies, Egypt and Mexico went through a period of closed economies until the 1970s, following a path of an import substitution industrialization (ISI) developing process (Villarreal, 2009). Both economies were affected by the shocks of high oil prices in 1973, however, the discovery of oil reserves in Mexico in 1976 allowed for this country to embark on external loans, which prolonged the ISI for additional years. In the case of Egypt, with the Egypt-Israel Treaty signed in 1979, the country extended trade relations with Western economies, in particular with the United States (Weis & Wurzel, 1998). Just the same, both economies suffered from a period of high inflation during the 1980s.

To promote economic growth, market-oriented economic policies shifted their economies toward a liberalized-open economic model. In Mexico, the shift occurred at the end of the 1980s, while in Egypt the economic liberalization process started in the 1990s. Trade as a percentage of gross domestic product (GDP) has grown from 20% in Mexico during the 1970s to 60% on average for the last decade. Egypt's trade as a percentage of GDP was fluctuating from 35% during the first part of the 1970s to around 60% until 2008, and down to 35% in 2015 (World Bank Group, 2016a).

Oil is a significant component of their trade and both economies have endured the consequences of oil price fluctuations in recent years. Mexico's oil exports and related products even today still account for 10% of total exports. However, in the past, periods of high oil prices were correlated with a higher participation in total trade. In the case of Egypt, oil exports have fluctuated at around a 20% mark in the last decade and continue to be one of the main export products.

Another similarity between these two countries is tourism and remittances revenues. Mexico's tourism reached 10% of total exports in 1995, becoming one of the main sources of foreign revenues along with oil and remittances. Recently, several factors negatively affected the tourism industry, from the financial crisis of 2007-2008, the rise of drug-cartel violence in tourist areas, and the 2009 swine flu epidemic. Egypt is well known as a tourist destination for visitors around the world, in particular from Europe. Tourism generates around 10% of total employment in Egypt and represents a significant source of economic growth (Ibrahim, 2011). Revenues coming from the tourist industry however declined due to the Arab Spring uprisings early in 2011 and it has been difficult for this country to return to the previous percentages ever since (Avraham, 2015).

Global migration has contributed to the increase of remittance flows between countries. Empirical evidence shows that remittances are a significant external source for financing economic development in developing countries (Giuliano & Ruiz-Arranz, 2009). Mexico and Egypt are among the main recipient countries, after India and China. In some years, Mexico considered remittances as the second or third largest source of income, after oil and tourism. Even though remittance flows represent only 2% of the GDP, they have had an impact in the poorest areas of central and southern Mexico (Taylor *et al.*, 2008). Another characteristic of Mexico's remittances is the origin of the flows, where more than 90% of total remittances come from the United States. In Egypt, remittances were significant as a percentage of its GDP (around 8%) during the 1980s. Even though their contribution to the GDP has decreased in recent years, it is still an important source of external revenues, averaging close to 5% of the total GDP in the last decade. In this particular case, remittance flows are coming mainly from Arab neighboring countries (World Bank Group, 2016b).

In terms of the monetary policy, the independence of the Central Bank was part of a policy to reduce uncertainties as well as to decentralize government power. BANXICO gained its independence in 1994 (Gutierrez, 2003) and Egypt's Central Bank has been operating with autonomy since 2003 (Youssef, 2007). Since their independence, both economies have followed a free-floating exchange rate system. The control of inflation was the main issue for both economies after the double-digit inflation of the 1980s. These economies followed a similar path to control inflation have conducted inflation targeting policies in recent years. Mexico's economy has been successful in controlling inflation to a 2-3% range, however with low rates of economic growth (Galindo & Ros, 2008), while with Egypt an average 10% inflation is seen in recent years due to political instability.

Second, among the differences between the two analyzed countries, we can mention Mexico's dependence on the United States market, as more than 75% of the total trade is with this country. Mexico is the second biggest market for American products, after Canada. Since the North American Free Trade Agreement (NAFTA), the intra-industry trade has increased, mainly in medium and high technology-intensive products, such as electronics and machinery equipment. Egypt has a more diversified trade composition, as the European Union is its main trade partner with 22% of total trade with this regional block. In Egypt, however, the trade pattern appears to be more inter-industrial, where exports are primary or low technological products while its imports are mostly manufacturing products.

Since the United States is Mexico's trade partner and has a strategic interest in Egypt, it is important to mention their geographical distance. Mexico has a common border with the United States, with key states being California and Texas, while Egypt is more than six thousand miles away from the United States. This distance plays a role in terms of the potential impact from the United States on their economies, where even the same event has a different impact on Mexico and on Egypt which can be explained by their geographical distance.

Religion is another significant difference between these two countries. While Mexico's population is mainly Catholic (more than 80% according to the Pew Research Center), Egypt's population is largely Muslim. In the case of Mexico, religion does not affect the economy, which is however not the case in Egypt, where the main difference is in the banking system. In the latter country, Islamic banks do not use an interest rate for loans but instead share profits and losses.

In sum, the economies of Mexico and Egypt share substantial similarities as developing economies and their differences make their comparison in dealing with inflation an interesting case to study. In the next section, we propose a theoretical model for inflation.

4 MODEL

The model used in this study is an extension of the model developed by Kia (2006a) and represents a monetary approach to inflation which is capable of incorporating both fiscal and monetary policy variables. Kia assumes the following utility function:

$$U(c_t, c_t^*, g_t, k_t, m_t, m_t^*) = (1-\alpha)^{-1} (c_t^{\alpha 1} c_t^{*\,\alpha 2} g_t^{\alpha 3})^{1-\alpha} + \xi (1-\eta)^{-1}[(m_t/k_t)^{\eta 1} m_t^{*\,\eta 2}]^{1-\eta}, \quad (1)$$

where α_1, α_2, α_3, α, η_1, η_2, η and ξ are all positive parameters, and $0.5<\alpha_i<1$, $0.5<\eta<1$. Furthermore, c_t and c^*_t are single, non storable, real domestic and foreign consumption goods, while m_t and m^*_t are the holdings of domestic real (M/p) and foreign real (M*/p*) cash balances, respectively. The variable g is the real government expenditure on goods and services, assumed to be a "good." Including government expenditure in preferences is based on the assumption that individuals benefit from government services in their consumption, for instance, clean and safe roads, foods which have been inspected, etc. provide a higher utility to consumers. The variable k_t summarizes the risk associated with holding domestic money. Consequently, it has the following function over the long-run:

$$\log (k_t) = k_0 \, defgdp_t + k_1 \, debtgdp_t + k_2 \, fdgdp_t, \quad (2)$$

where defgdp, debtgdp and fdgdp are the government deficits per GDP, the government debt outstanding per GDP and the government foreign financed debt per GDP respectively.

It is assumed government debt (bonds) pays the same interest rate as bank deposits, which is presented by R. In a risky environment, agents substitute real or interest-bearing assets for money. For example, as the government deficit per GDP increases, agents perceive higher future taxes or money supply (inflation). At the same time, the higher the outstanding government debt relative to the size of the economy is, the riskier the environment will be perceived. Individuals may hold these bonds to bridge the gap between the future labor income and expenditures, including tax expenditures. Consequently, we hypothesize constant coefficients $k_0>0$ and $k_1>0$. Furthermore, an increase in the amount of government debt held by foreign investors/governments may be considered a cause for future devaluation of the domestic currency. Consequently, demand for domestic money may fall, implying $k_2>0$.

In our research, it is assumed that Equation (2) is also subject to a short-run dynamics of the system, which is a function of a set of dummy variables included in vector DUM (explained in Section 5 for each country), and other predetermined short-run (stationary) variables that are known to individuals. These variables include the growth of money supply, real GDP, exchange rate, real government expenditure, changes in deficits per

GDP, government debt per GDP, domestic and foreign inflation rates, as well as changes in domestic and foreign interest rates.

Dummy variables (DUM) are included to capture seasonal and interventional factors that account for wars, sanctions, political and technical changes, innovations, together with policy regime changes that influence services of money. Kia (2006b) shows that the estimated long-run relationship can be biased when the appropriate policy regime changes and/or other exogenous shocks are not incorporated in the short-run dynamics of the system. As Kia mentions, DUM appears only in the short-run dynamics of the system.

Given g, defgdp, debtgdp and fdgdp, the consumer maximizes (1) subject to the following budget constraint:

$$\tau_t + y_t + (1 + \pi_t)^{-1} m_{t-1} + q_t (1 + \pi_t^*)^{-1} m^*_{t-1} + (1 + \pi_t)^{-1} (1 + R_{t-1}) d_{t-1} + q_t (1 + \pi_t^*)^{-1} (1 + R^*_{t-1}) d^*_{t-1} = c_t + q_t c_t^* + m_t + q_t m_t^* + d_t + q_t d_t^*, \quad (3)$$

where τ_t is the real value of any lump sum transfers/taxes received/paid by consumers, q_t is the real exchange rate, defined as $E_t p_t^*/p_t$, E_t is the nominal market exchange rate (domestic price of foreign currency), p_t^* and p_t are the foreign and domestic price levels of foreign (United States) and domestic goods, respectively, and π_t and π_t^* are domestic and foreign inflation rates, respectively. y_t is the current real endowment (income) received by the individual, m^*_{t-1} is the foreign real money holdings at the start of the period, d_t is the one-period real domestically-financed government debt which pays R rate of return, and d_t^* is the real foreign-issued one-period bond which pays a risk free interest rate R_t^*. It is also further assumed that d_t and d_t^* are the only two storable financial assets.

Solving the model, we get the following reduced form where money market is in equilibrium:

$$lp_t = \beta_0 + \beta_1 lMs_t + \beta_2 i_t + \beta_3 ly_t + \beta_4 lE_t + \beta_5 i^*_t + \beta_6 lp^*_t + \beta_7 lg_t + \beta_8 defgdp_t + \beta_9 debtgdp_t + \beta_{10} fdgdp_t + \beta_{11} trend, \quad (4)$$

where a l before a variable means the logarithm of that variable. Ms is the nominal money supply, i is the logarithm of (R/1+R) where R is the annual interest rate in decimal points. Similarly, i* is the logarithm of (R*/1+R*) where R* is foreign (United States) interest rate. The βs are the parameters to be estimated and have the following signs: $\beta_0>0$, $\beta_1>0$, $\beta_2>0$, $\beta_3<0$, $\beta_4=?$, $\beta_5>0$, $\beta_6=?$, $\beta_7>0$, $\beta_8>0$, $\beta_9>0$, and $\beta_{10}>0$.[3] The linear trend is also added to the equation to capture technological changes. The sign of β_{11} is an empirical verification.

3 For the sake of brevity, the derivation of Equation (4) is not reported, but is available upon request. Furthermore, like Kia (2006a) we also found $\beta_4 = \beta_6$. However, we follow his approach and do not apply this restriction in order to capture the impact of imported inflation, and also the exchange rate, a policy variable, on the inflation.

Finally, Equation (4) is a long-run relationship between the price level and its determinants and is estimated in the next section using Egypt and Mexico data.

5 DATA, LONG-RUN EMPIRICAL METHODOLOGY AND RESULTS

The model is estimated using quarterly data for Egypt for the period 1975Q1-2015Q4, and Mexico for the period 1976Q1-2015Q4. The period is chosen based on the availability of the data (see the data appendix for sources). All variables are seasonally adjusted. The Consumer Price Index (CPI) is used for both Egypt and Mexico for the domestic price p. Total US CPI, all items, 2010=1, are used for the foreign price p^*. The money supply variable is M1 and the variable i is the logarithm of (R/1+R) where R is the discount rate for Egypt and the annual deposit rate for Mexico and both rates are in decimal points. The reason for choosing this rate as a measure for the domestic interest rate is its availability in the sample period. Quarterly data on other but more relevant interest rates are available only for a very short part of the sample period.

Variables y and g are the real GDP and government expenditures on goods and services, respectively. E is the nominal market exchange rate, representing the black market rate in Egypt for part of the sample period, which is equal to the domestic currency in terms of American dollars. Foreign rate i^* is the logarithm of ($R^*/1+R^*$) where R^* stands for the United States three-month Treasury bill rate at the annual rate, in decimal points. The series for outstanding debt is calculated for part of the sample (see the data in the appendix).

As mentioned, the short-run dynamic part of the long-run model includes vector DUM. Vector DUM for Egypt is defined as:

DUM = (*peace, price, flex, tarif, pricesub, common*). For the definition of these dummy variables see Table A1 in the Appendix.

Vector DUM for Mexico is defined as:

DUM = (*lib, flexe, dme, tarr, nafta, corto, targ, itf, braz, minr*). For the definition of these dummy variables see Table A2 in the Appendix.

The augmented Dickey-Fuller and non-parametric Phillips-Perron test are used to investigate the stationarity property of the variables. Furthermore, to allow for the possibility of breaks in intercept and slope, we also apply Zivot & Andrews (1992) and Lee & Strazicich (2001 and 2003) tests. These tests show that all the series are integrated of order one (non-stationary). They are, however, first-difference stationary. For the sake of brevity, these results are not reported but are available upon request.

The long-run estimation results of the Johansen-Juselius Maximum Likelihood estimation, as well as the Fully Modified Ordinary Least Squares (FMOLS) regression, applied as a robustness check are reported for Egypt in Table 1 and in Table 2[4] for Mexico. The FMOLS estimation was originally introduced by Phillips & Hansen (1990), nevertheless, we use its extension from Hansen (1992b). The FMOLS first estimates the cointegrating vector by least squares and then does a non-parametric correction for small-sample endogeneity.

We also use the multiple structural change test by Bai & Perron (2003). According to the results of the latter, the break for both countries is 2008Q1 which is associated with the United States crisis. We allow for this break in the long-run equation. Further, the lag length is determined to induce white noise property in the residuals. Following Hansen & Juselius (1995, p. 26), we set p = r in Equation (4) and test for autocorrelation and ARCH. LM(1) and LM(2) statistics are employed to confirm the choice of lag length. The order of cointegration (r) is determined by using Trace tests developed by Johansen & Juselius (1991).

Since we allow the short-run dynamics of the system to be affected by the dummy variables included in vector DUM, a simulation of the critical values as well as their associated *p*-values are needed for the rank test. The critical values of the test statistics are calculated based on the length of the random walk of 400 with 2500 replications and using the Bartlett correction factor; the Trace test has been corrected for the small sample error (see Johansen, 2000 and 2002). Based on the Trace test results, in the first panel of Tables 1 and 2 there are three cointegration relationships in space for both countries. According to the diagnostic test, there is no autocorrelation with the lag length of 3 for both countries as well. However, the error is not normally distributed, but as Johansen (1995a) states, a departure from normality is not very serious in cointegration tests. As ARCH estimation results show, we also have a weak heteroskedasticity, but as Rahbek *et al.* (2002) have shown, the cointegration rank tests are robust against moderate residual ARCH effects (see also Juselius, 2006).

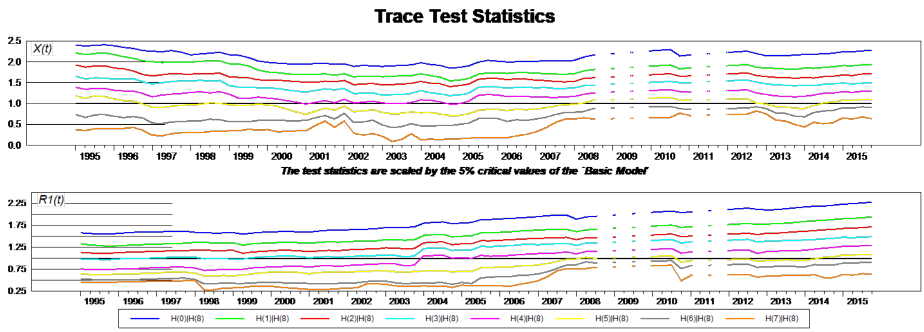
Since more than one cointegrating relationship for both countries is found, we need to identify the estimated cointegrating vectors. In this way, the estimated coefficients of cointegrating equations become economically meaningful and ensure uniqueness of all coefficients. Following Johansen & Juselius (1991) and Johansen (1995b), among many others, we can test for the existence of possible economic hypotheses among the cointegrating vectors in the system. The middle panel of Tables 1 and 2 reports the identified relationships. As the Chi-squared values indicate, restrictions are jointly accepted, the system is identified *à la* Johansen's (1995b) Theorem 3.[5] Namely, generic identification, which is related to the linear statistical model and requires the rank condition, and both empirical and economic identifications are satisfied (see Johansen & Juselius, 1994).

4 Note that the US TB rate and price index were entered as weak exogenous variables in the estimation process.

5 Note that where the system was not identified, we could never estimate the *t*-values.

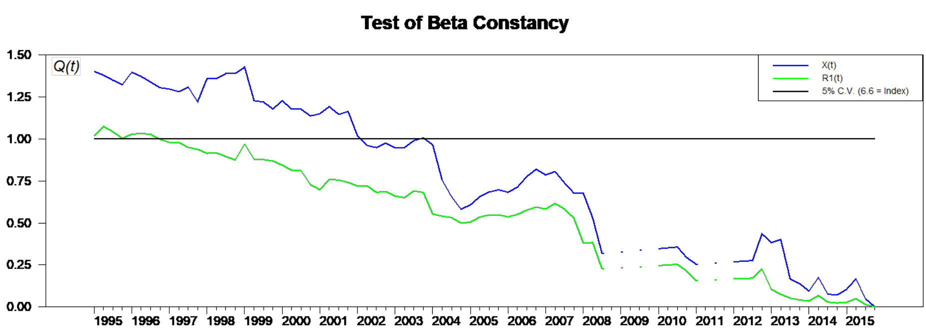
As Figures 1 to 6 show, all tests and coefficients are stable for both countries. Note that all recursive tests are normalized by the 5% critical value implying that calculated statistics that exceed unity reject the null hypothesis and suggest unstable cointegrating vectors. The curve X(t) plots the actual disequilibrium as a function of all short-run dynamics including the dummy variable, while the R1(t) curve plots the "clean" disequilibrium that corrects for short-run effects. The first 20 years were held up for the initial estimation. As these figures show, all coefficients appear stable over the long-run and the Trace tests are also stable.

Figure 1: *Trace Test Egypt Price Level**



* X(t) = the actual disequilibrium as a function of all short-run dynamics and the dummy variable.
R1(t) = the "clean" disequilibrium that corrects for short-run effects.

Figure 2: *Test of Beta Consistency Egypt**



* In R1model, we re-estimate only the long-run parameters Alfa and Beta, concentrating out the short-term dynamics by using the full sample estimate of the parameters.

Figure 3: *Test for Constancy of the Parameters of the Identified Equations for Egypt*

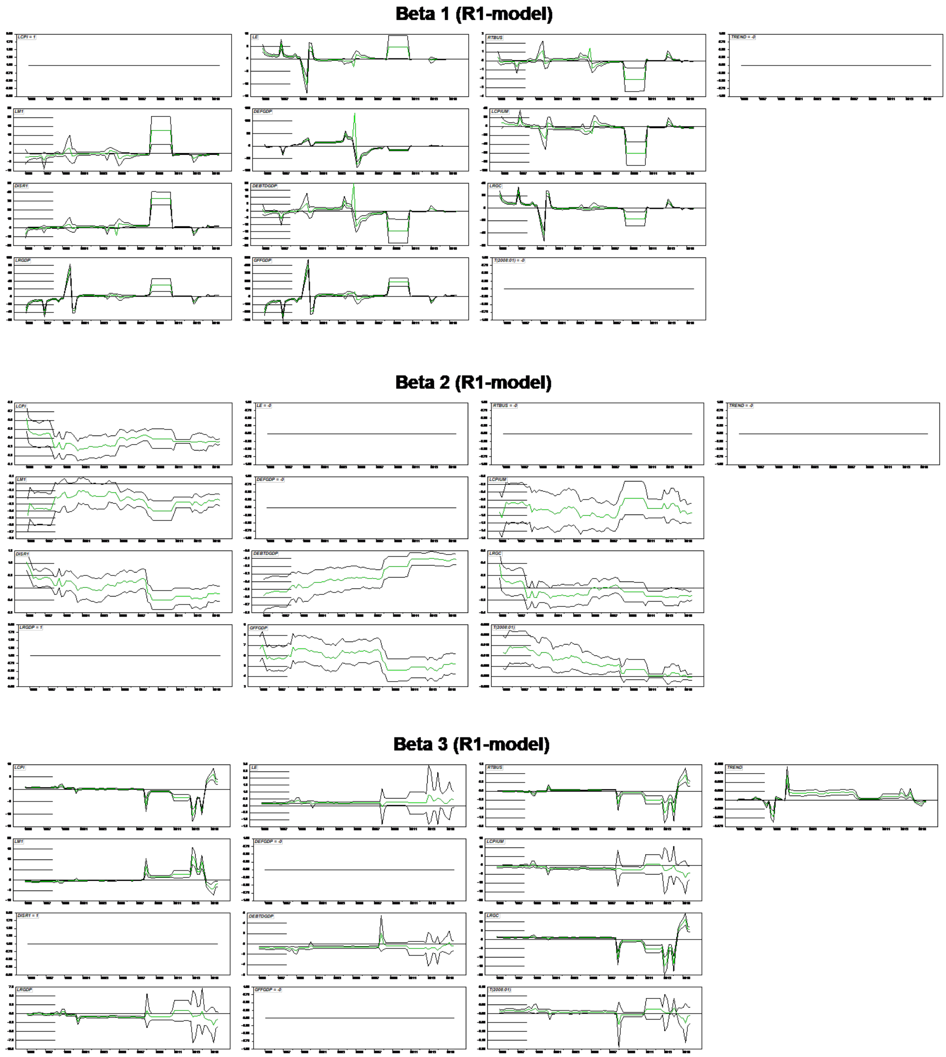
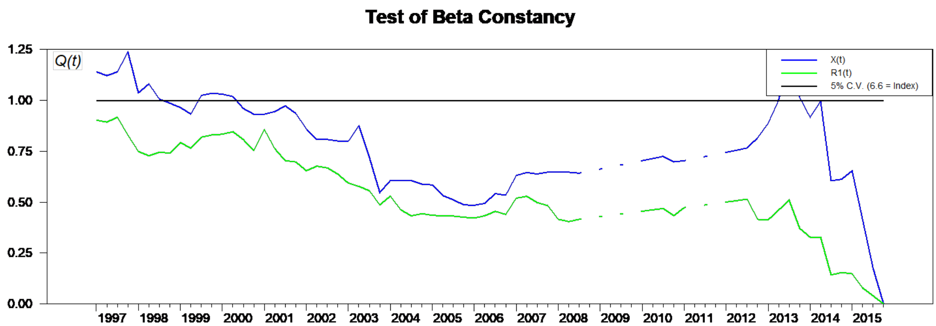
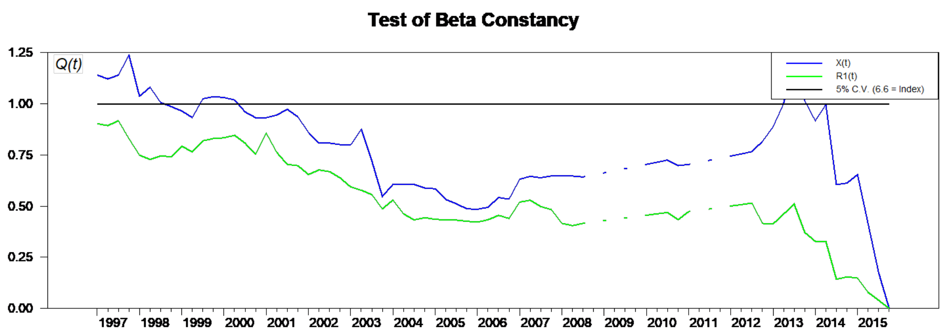


Figure 4: *Trace Test Mexico**



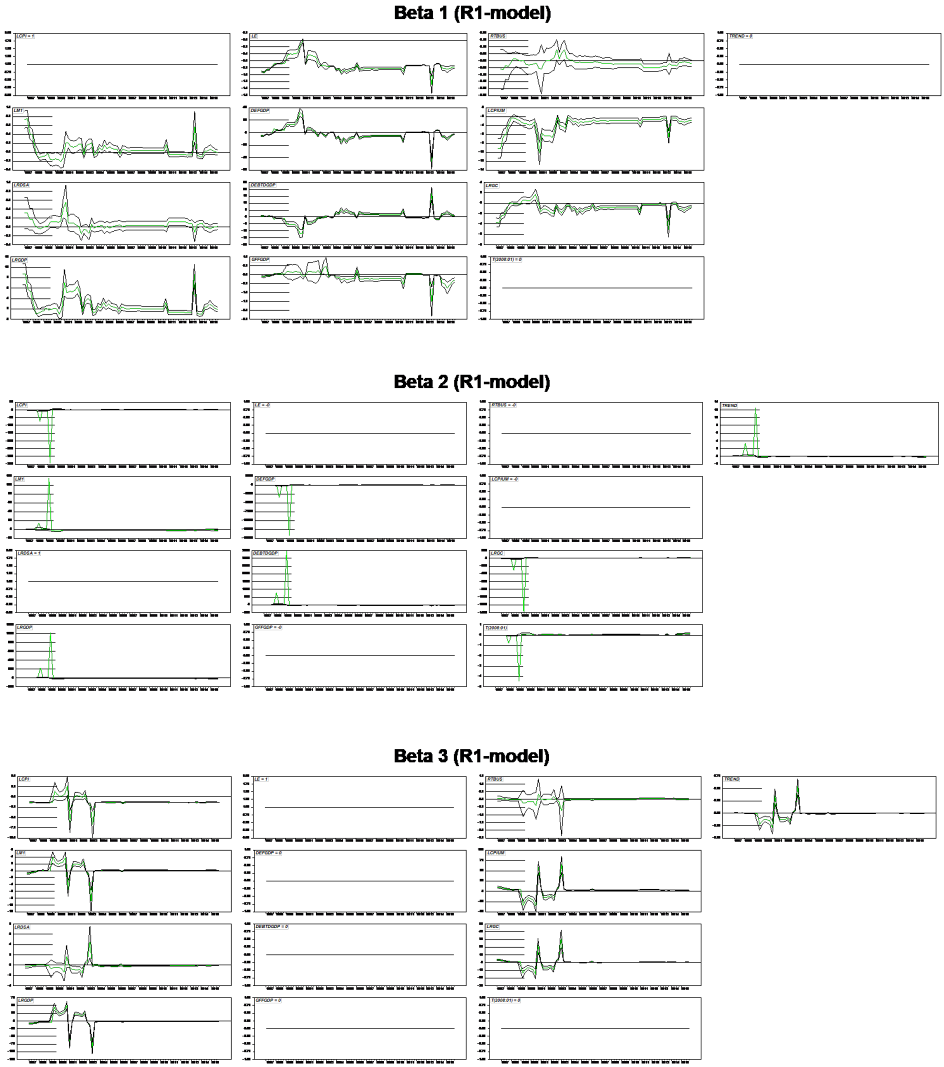
* In R1-model, we re-estimate only the long-run parameters Alfa and Beta, concentrating out the short-term dynamics by using the full sample estimate of the parameters.

Figure 5: *Test of Beta Consistency Mexico**



* In R1-model, we re-estimate only the long-run parameters Alfa and Beta, concentrating out the short-term dynamics by using the full sample estimate of the parameters.

Figure 6: *Test for Constancy of the Parameters of the Identified Equations for Mexico*



After having established that the long-run equations are stable, we analyze the identified long-run equations.

A. Long-Run Relationships in Egypt

Long-Run Price: The first row of the middle panel of Table 1 reports the long-run price equation. For the research purposes, we needed to restrict the break and trend to ensure the identified equation. As we can see from the results, all coefficients, with the exception of the coefficient of the exchange rate, are statistically significant and all, but the interest rate and foreign-financed debt, confirm our theoretical model. One possible explanation for the negative impact of the domestic interest rate on the price level is that as the interest rate goes up, demand for goods and services will fall, resulting in a lower price level. Likewise, an increase in the foreign-financed debt causes a higher demand for domestic currency (Egyptian pounds) which results in its appreciation, in other words, a lower value of the coefficient lE and consequently a lower price level. Our findings, in particular for the positive relationship between money supply and price, confirm several previous empirical studies (see Helmy, 2009; Fanniza & Soderling, 2006; Youssef, 2007; El-Sakka & Ghali, 2005; Metwally & Al Sowaidi, 2004).

Long-Run Money Supply Function: The second row of the middle panel of Table 1 may resemble the money supply function as there is a positive relationship between interest rate and money supply. Here we needed to restrict defgdp and fdgdp in order to obtain the identified equation. The sign of the price level is not what we expect, although the coefficient is statistically significant. However, the estimated coefficients of ly, lE, debtgdp, and the break are not statistically significant. On the contrary, foreign interest rate, which has a statistically significant coefficient, has a negative sign. Based on these, one would expect that as foreign interest rate goes up, money flows outside, money supply shifts up, and the interest rate goes up over the long-run. However, the estimated coefficient is negative, indicating a higher foreign interest rate results in a lower domestic interest rate. One possible explanation for this is that capital is not very mobile between the United States and Egypt. This result supports the findings of Arbatli & Moriyama (2011).

The coefficient of foreign (United States) price is statistically significant and positive. This result implies that as the foreign price goes up, there will be more demand for domestic goods, leading to a higher transaction demand for money and interest rate. Consequently, the relationship is positive. As the coefficient of lg indicates, there is no crowding out of government expenditure in Egypt. This also implies that a higher government expenditure results in a downward shift in the supply of money, which indicates that, as the size of government goes up, there will be a higher supply of money to finance the government expenditure over the long-run. This interpretation confirms both our theoretical and empirical findings that a higher government expenditure leads to a higher price level over the long-run; see Equation (4) and the first-row result. Along with this line, Helmy (2009) finds that a higher government budget deficit increases inflation using the fiscal policy of the price level theory.

Long-Run Aggregate Demand: The last row of the second panel resembles aggregate demand equation. For identification purposes, we needed to restrict lE, i*, defgdp and trend. Except for the break, all variables are statistically significant. The positive estimated coefficient of lMs indicates that as money supply goes up, there will be a lower interest rate which results in higher investment and real income. In other words, aggregated demand shifts to the right as money supply goes up. As the negative and statistically significant coefficient of i indicates, a higher interest rate decreases investment and consumption, and for that reason the real income as aggregated demand shifts to the left. Further, as the positive and statistically significant estimated coefficient of lp* indicates, a higher foreign price leads to higher demand for domestic goods, and accordingly a higher real income as aggregated demand shifts to the right. Finally, the estimated coefficient of lg indicates the multiplier effect of the government expenditure. This finding confirms the findings of Abu-Bader & Abu-Qarn (2003).

From the above result, we see both empirical and economic identifications are satisfied for Egypt. As a robust test, we see the FMOLS estimation result in the last panel of Table 1. However, since there is no restriction on any coefficient, most of the signs are not justified Maximum Likelihood results. Except for the estimated coefficients of income, debt per GDP, foreign-financed debt per GDP and the break, all coefficients are statistically significant. Among the latter, the coefficients of domestic interest rate, exchange rate, foreign price and debt per GDP confirm our theoretical model. In fact, 50% of coefficients, statistically significant or insignificant, confirm the theoretical model.

Table 1: *Long-Run Results for Egypt, Equation (4)*

H_0=r	0	1	2	3	4	5	6	7	Diagnostic tests† *p*-value	
Trace(1)	438.80	310.90	223.72	153.16	91.87	31.83	16.46	3.76	**Autocorrelation** LM(1) 0.04 LM(2)…. 0.19	**Normality** ChiSqr (20) 0.00
Trace 95	287.67	242.77	197.34	156.42	120.93	87.23	57.36	30.47		**ARCH** LM(1) 0.03
***p*-value**	0.00	0.00	0.00	0.07[a]	0.62	1.00	1.00	1.00	**Lag length = 3**	LM(2) 0.06

Johansen-Juselius Maximum Likelihood Results for r=3. Null: Restrictions for identification are accepted: χ^2 (4) = 5.33, *p*-value = 0.15

Normalized	lp	lMs	i	ly	lE	i*	lp*	lg	defgdp	debtgdp	fdgdp	C(2008:1)	trend
lp **(*t*-stat)**	-	0.68 (4.56)	-1.78 (-7.07)	-4.04 (-28.48)	0.06 (1.60)	0.06 (5.43)	2.96 (6.13)	1.21 (7.12)	0.13 (11.66)	0.36 (2.64)	-19.72 (-9.68)	Restricted =0	Restricted =0
i **(*t*-stat)**	-2.90 (-5.62)	1.79 (2.60)	-	1.53 (1.44)	-0.45 (-1.52)	-0.42 (-5.12)	4.19 (2.08)	-5.46 (-7.72)	Restricted =0	0.40 (0.82)	Restricted =0	0.10 (0.43)	0.004 (3.45)
ly **(*t*-stat)**	-0.36 (-20.45)	0.24 (5.43)	-0.51 (-7.73)	-	Restricted =0	Restricted =0	0.94 (6.98)	0.12 (2.87)	Restricted =0	0.11 (2.88)	-5.19 (-9.80)	0.00 (0.30)	Restricted =0
Fully Modified Ordinary Least Squares (FMOLS) Results													
lp **(*t*-stat)**	**constant** 5.64 (4.89)	-0.27 (-3.20)	0.16 (2.06)	-0.11 (-0.63)	-0.10 (-3.55)	-0.03 -(3.40)	0.67 (3.32)	-0.89 (-7.65)	-0.67 (-1.98)	0.07 (1.13)	-0.84 (-0.84)	0.01 (0.26)	0.03 (13.36)

a = means we cannot reject the null of r (the number of cointegration relationships) = 3
(1) Using the Bartlett correction factor, the Trace test has been corrected for the small sample error (see Johansen, 2000 and 2002).
† LM(1) and LM(2) are the one and two-order Lagrangian Multiplier test for autocorrelation respectively (see Godfrey, 1988). The sample period is 1975Q1-2015Q4. lMs is the log of nominal money supply (M1), i and i* are the log[R/(1+R)] and log[R*/(1+R*)] respectively where R and R* are domestic and foreign interest rates in decimal points respectively, ly is the log of real GDP, lE is the log of nominal exchange rate (domestic currency per $US), lp and lp* are the log of domestic CPI and US CPI respectively. lg is the log of real government expenditures on goods and services, defgdp and debtgdp are deficits and outstanding debt per GDP respectively, and fdgdp is the amount of foreign-financed debt per GDP. C(2008:1) is a dummy variable for the break at 2008Q1 and trend is a linear time trend. The short-run dynamic part of the long-run model includes dummy variables *peace* (= 1 since 1979; zero otherwise), *price* (=1 for 1991Q2-1991Q2; zero otherwise), *flex* (=1 since 1991Q1; zero otherwise), *tarif* (a stepwise dummy = 0.25 for 1993Q2 to 1993Q4, = 0.50 for 1994Q1 to 1994Q4, = 0.75 for 1995Q1 to 1995Q4, = 1 since 1996Q1; zero, otherwise), *pricesub* (= 1 for 1994Q4-1995Q1; zero otherwise) to reflect the price subsidy of 1994-5, and *common* (=1 since 1998Q2; zero otherwise).

B. Long-Run Relationships in Mexico

Long-Run Price: The first row of the second panel in Table 2 reports the identified long-run price determination for Mexico. For identification purposes, i*, trend and the break are restricted in this equation. Overall, all variables are statistically significant. The coefficients of all variables, except debtgdp, confirm our theoretical model. A possible explanation for the negative effect of government debt per GDP on the price level over the long-run is that a higher government debt in Mexico results in a higher investment on government bonds. This in turn lowers demand for goods and services and then also the price. Again, like with Egypt, the coefficient of money supply is positive, as expected by our model, on the basis of which we conclude that lowering money supply reduces the price level over the long-run. Studies on inflation from the monetary approach include some of the variables that are considered in our empirical model (Capistrán *et al.*, 2012; De Mello & Moccero, 2009; Cuevas, 2008; Garcés, 2008; Gaytán & González, 2006; Hsing, 2003; Martínez *et al.*, 2001; Alfaro & Schwartz, 2000). The analysis of the determinants of inflation for earlier periods of Mexico's economy (Shelley & Wallace, 2004; Esquivel & Razo, 2003; Roger & Wang, 1995) also found this positive relationship.

Long-Run Aggregate Supply: The second row of the middle panel of Table 2 resembles the aggregate supply equation as there is a positive relationship between the price and real GDP. For identification purposes, lMs, lE, i*, lp* and trend needed to be restricted. The estimated coefficient of all variables is statistically significant. The estimated coefficient of the domestic interest rate is negative, implying that as the interest rate goes up, the aggregate supply curve moves down to the right along the aggregated demand, causing a fall in price. In fact, this result confirms the findings of Cermeño *et al*. (2012) and Loría & Ramírez (2011) that Mexico's central bank uses interest rate as a tool to reduce inflation.

The estimated coefficient of government expenditure, deficit, and foreign-financed debt is also negative, implying that as these three fiscal variables go up, aggregate supply shifts down, and the price falls over the long-run. One possible explanation for this is that a higher government expenditure, and consequently a higher deficit, stimulates the Mexican economy. The multiplier effect of these fiscal variables results in a shift in the aggregate supply to the right and a fall in the price over the long-run. A higher foreign-financed debt results in more availability of domestic money for production, causing aggregate supply to shift to the right and the price to fall. The estimated coefficient of government debt per GDP is positive, implying a higher government debt crowds out domestic investment which results in the left shift of the aggregate supply and a rise in the price in Mexico over the long-run.

Long-Run Aggregate Demand: The last row of the middle panel of Table 2 may resemble the aggregate demand equation, i.e. a negative relationship between price and real income. This result is confirmed in Grier & Grier (2006) and Adrangi *et al*. (1999) findings that there is an indirect negative effect of average inflation on aggregate output due to increasing uncertainty about future inflation. For the research, we needed to restrict i, defgdp, debtgdp, fdgdp, i* and the break for identification purposes. All estimated coefficients are statistically significant. The estimated coefficient of lMs is positive, indicating that as money supply goes up, aggregate demand shifts to the right and the price goes up. We obtain the same result for the coefficient of lE which confirms Alfaro & Schwartz's (2000) findings. The coefficient of lp* is also positive, indicating a higher foreign price results in a higher demand for domestic goods and a higher price. The coefficient of lg is also positive, implying that a higher size of government leads to a higher aggregate demand and thus to a higher price level, although Sobarzo (2004) argues that Mexican government expenditures have been erratic, reducing their positive effects on the aggregate demand. As the negative estimated coefficient of trend variable shows, through time and with the improvement of technology, the price will fall.

From the above result, we see both empirical and economic identifications are satisfied for Mexico. As a robust test, we see the FMOLS estimation result in the last panel of Table 2. All coefficients, with the exception of the coefficient of i, lg and fdgdp, justify the Maximum Likelihood estimation results, nevertheless, only the estimated coefficient of the domestic interest rate is statistically significant.

Table 2: *Long-Run Results for Mexico, Equation (4)*

H_0=r	0	1	2	3	4	5	6	7	Diagnostic tests† *p*-value				
Trace(1)	449.92	328.83	226.95	153.57	94.88	44.86	19.57	NA	**Autocorrelation** LM(1) 0.07 LM(2)…. 0.09		**Normality** ChiSqr (20) 0.00		
Trace 95	320.75	270.01	222.50	180.79	139.64	102.55	67.74	36.52			**ARCH** LM(1) 0.00		
***p*-value**	0.00	0.00	0.00	0.38[a]	0.85	1.00	1.00	NA	**Lag length = 3**		LM(2) 0.02		
Johansen-Juselius Maximum Likelihood Results for r=3. Null: Restrictions for identification are accepted: χ^2 (8) = 15.63, *p*-value = 0.05													
Normalized (*t*-stat)	**lp**	**lMs**	**i**	**ly**	**lE**	**i***	**lp***	**lg**	**defgdp**	**debtgdp**	**fdgdp**	**C(2008:1)**	**trend**
lp (*t*-stat)	-	0.08 (2.40)	0.08 (2.56)	-2.04 (-7.15)	0.79 (22.74)	Restricted = 0	2.34 (12.22)	0.91 (4.38)	7.11 (8.09)	-2.06 (-5.06)	1.72 (4.27)	Restricted = 0	Restricted = 0
lp (*t*-stat)	-	Restricted = 0	-1.39 (-2.49)	14.28 (3.76)	Restricted = 0	Restricted = 0	Restricted = 0	-10.92 (-3.62)	-142.24 (-9.63)	37.33 (5.47)	-24.67 (-3.63)	-0.05 (-5.14)	Restricted = 0
lp (*t*-stat)	-	0.14 (4.44)	Restricted = 0	-0.89 (-4.74)	0.78 (24.27)	Restricted = 0	1.99 (11.63)	0.28 (2.31)	Restricted = 0	Restricted = 0	Restricted = 0	Restricted = 0	-0.01 (-8.67)
Fully Modified Ordinary Least Squares (FMOLS) Results													
lp (*t*-stat)	**constant** -3.74 (-4.94)	0.35 (9.16)	-0.10 (-3.08)	-0.22 (-1.28)	0.66 (16.41)	0.03 (2.47)	1.34 (5.38)	-0.22 (-1.75)	2.69 (3.62)	-0.33 (-1.19)	-0.03 (-0.09)	-0.008 (-3.49)	0.02 (0.45)

a = means we cannot reject the null of r (the number of cointegration relationships) = 3
(1) Using the Bartlett correction factor, the Trace test has been corrected for the small sample error (see Johansen, 2000 and 2002).
† LM(1) and LM(2) are the one and two-order Lagrangian Multiplier test for autocorrelation respectively (see Godfrey, 1988).
The sample period is 1976Q1-2015Q4. lMs is the log of nominal money supply, i and i* are the log[R/(1+R)] and log[R*/(1+R*)] respectively where R and R* are domestic and foreign interest rates in decimal points respectively, ly is the log of real GDP, lE is the log of nominal exchange rate (domestic currency per $US), lp and lp* are the log of domestic CPI and US CPI respectively. lg is the log of real government expenditures on goods and services, defgdp and debtgdp are deficits and outstanding debt per GDP respectively, and fdgdp is the amount of foreign-financed debt per GDP, and trend is a linear time trend. The short-run dynamic part of the model includes *lib* (= 1 in 1973Q1-1989Q1; zero otherwise), *flexe* (= 1 for 1982Q3-1982Q4; zero otherwise), *dme* (= 1 since 1985Q4; zero otherwise), *tarr* is a stepwise dummy (= 0.5 for 1986Q2-1988Q1 and = 1 since 1988Q1; zero otherwise), *nafta* (= 1 since 1993Q1; zero otherwise), *corto* (= 1 for 1995Q1-1997Q4; zero otherwise), *targ* (= 1 since 1996Q2; zero otherwise), *itf* (= 1 since 2001Q1; zero otherwise), *braz* (= 1 since 2002Q3; zero otherwise), and *minr* (= 1 since 2004Q2; zero otherwise).

C. Comparison of Long-Run Relationships of Egypt and Mexico

In this subsection, we analyze how much price determination in the two studied countries is domestic and how much of it is external. For both countries, monetary policy measured by supply of money and interest rate, and on the other hand fiscal policy measured by government expenditure, deficit, debt, and debt management, affect the price level, as reported in the first row of the second panel in Tables 1 and 2. This leads to a conclusion that in these countries both fiscal and monetary policies can be used to fight inflation over the long-run.

As regards the external factors, although we needed to restrict the United States interest rate for Mexico, nevertheless, looking at the FMOLS result, we see both the United States interest rate and price affect the price level with the same sign in both countries. Based on this, it can be concluded that the price level over the long-run is influenced by both internal and external factors, and that being a neighbor of or far from a large country does not matter in analyzing the impact of the United States interest rate and price on the prices in these two countries. An interesting finding is that the effect of the United States interest rate and price on the price level is higher in Egypt than in Mexico (for interest rate see the FMOLS result for Mexico), despite the fact that the distance between Egypt and the United States is approximately 6,821 miles by air, while Mexico is next to the United States, explaining a significant economic interdependence between the latter two countries. For example, one unit increase in the 3-month TB rate in the United States will increase Egypt's price level by 0.06 units, and Mexico's rate by 0.03 units. At the same time, one unit increase in the United States CPI increases the CPI of Egypt by 2.96 and the CPI of Mexico by 2.34 over the long-run.

6 SHORT-RUN DYNAMIC MODELS OF INFLATION RATE

Tables 3 and 4 report the parsimonious estimation of the final error correction model (ECM) for Egypt and Mexico respectively. The models are implied by the cointegrating vectors based on Hendry's General-to-Specific approach. We allowed a lag profile of eight quarters at the original ECM and estimated the error correction models of the price, i.e. Equation (4). Following Granger (1986), we should here note that if small equilibrium errors can be ignored while reacting substantially to large ones, the error correcting equation is non-linear. Based on this finding, all possible kinds of non-linear specifications, i.e. squared, cubed and fourth powered, of the equilibrium errors with statistically significant coefficients, as well as the products of the significant equilibrium errors were incorporated in the research.

Table 3*: *Parsimonious Error Correction Model for Egypt*
Dependent Variable = Δlp

Variable	**Coefficient**	***t*-stat**	***p*-value for Hansen's (1992) stability L_i test**
constant	0.12	5.28	0.31
ECP_{t-6}	-0.02	-3.75	0.25
ΔlMs_{t-5}	0.06	2.27	0.34
ΔlE_{t-4}	0.04	3.83	0.61
Δi^*_{t-7}	-0.01	-2.42	0.23
$\Delta defgdp_{t-6}$	-0.63	-3.42	0.27
$\Delta defgdp_{t-7}$	0.47	3.13	0.95
$\Delta fdgdp_{t-1}$	-2.18	-3.43	0.18
$\Delta fdgdp_{t-2}$	1.89	2.05	0.01
Δlg_{t-5}	-0.19	-3.42	0.54
pricesub	0.05	10.55	1.00
trend	0.0004	2.95	0.22
Hansen's (1992) stability L_i test on the variance = 0.85			*p*-value = 0.01
Joint (coefficients and the error variance) Hansen's (1992) stability L_c test = 3.03			*p*-value = 0.07

* For the definition of some of the variables see footnote of Table 1. The estimation method is Newey & West's (1987) Robust Error Ordinary Least Squares.
The sample period is 1975Q1-2015Q4. Mean of the dependent variable=0.03. Δ means the first difference, ECP is the error correction term generated from the first identified long-run relationship in the cointegration space, normalized on the log of domestic price (see Table 1).Dummy variable *pricesub* is equal to one from 1994Q4 to 1995Q1 and zero otherwise. Trend is a linear time trend. $\bar{R}^2$ =0.35, σ=0.03, DW=2.04, Godfrey(6)=0.73 (significance level=0.63), White=58.16 (significance level=0.77), ARCH(5)=1.64 (significance level=0.02). Note that $\bar{R}^2$, σ and DW respectively denote the adjusted squared multiple correlation coefficient, the residual standard deviation and the Durbin Watson statistic. White is White's (1980) general test for heteroskedasticity, ARCH is the five-order Engle's (1982) test, Godfrey is the five-order Godfrey's (1978) test, L_i is Hansen's (1992) stability test for the null hypothesis that the estimated coefficient or variance of the error term is constant, and L_c is Hansen's (1992) stability test for the null hypothesis that the estimated coefficients as well as the error variance are jointly constant.

Table 4*: *Parsimonious Error Correction Model for Mexico*
Dependent Variable = Δlp

Variable	Coefficient	*t*-stat	*p*-value for Hansen's (1992) stability L_i test
constant	-0.61	-8.27	0.94
ECP_{t-1}	-0.11	-8.76	0.95
Δlp_{t-3}	0.71	7.68	0.98
Δlp_{t-5}	-0.35	-3.65	1.00
ΔlMs_{t-3}	-0.05	-2.74	0.96
Δi_{t-3}	0.02	6.66	0.85
Δly_{t-3}	1.01	4.38	0.52
ΔlE_{t-1}	0.13	5.11	0.78
Δi^*_{t-3}	-0.01	-1.97	0.00
Δlp^*_{t-5}	-1.08	-1.98	0.98
$\Delta defgdp_{t-5}$	-1.65	-2.82	0.92
$\Delta defgdp_{t-6}$	1.74	3.40	0.96
$\Delta debtgdp_{t-1}$	0.87	2.62	0.25
$\Delta fdgdp_{t-2}$	0.30	4.66	0.96
itf	0.02	2.53	0.67
nafta	-0.03	-3.81	0.81
trend	0.001	5.56	0.88
Hansen's (1992) stability L_i test on the variance = 0.91			*p*-value = 0.00
Joint (coefficients and the error variance) Hansen's (1992) stability L_c test = 3.02			*p*-value = 0.45

* For the definition of some of the variables see footnote of Table 2. The estimation method is Newey & West's (1987) Robust Error Ordinary Least Squares.
The sample period is 1976Q1-2015Q4. Mean of the dependent variable=0.055. Δ means the first difference, ECP is the error correction term generated from the first identified long-run relationship in the cointegration space, normalized on the log of domestic price (see Table 1).
Dummy variables are *itf* (=1 since 2001Q1, zero otherwise) and *nafta* (=1 since 1993Q1, zero otherwise), $\overline{R}^2$=0.85, σ=0.06, DW=1.91, Godfrey (6)=0.78 (significance level=0.59), White=142.15 (significance level=0.55), ARCH (5) =20.31 (significance level=0.00). Note that $\overline{R}^2$, σ and DW respectively denote the adjusted squared multiple correlation coefficient, the residual standard deviation and the Durbin Watson statistic. White is White's (1980) general test for heteroskedasticity, ARCH is the five-order Engle's (1982) test, Godfrey is the five-order Godfrey's (1978) test, L_i is Hansen's (1992) stability test for the null hypothesis that the estimated coefficient or variance of the error term is constant, and L_c is Hansen's (1992) stability test for the null hypothesis that the estimated coefficients as well as the error variance are jointly constant.

Assuming that due to government spending and foreign-financed debt as a percentage of GDP as well as money supply variables are exogenous over the short-run, we have five endogenous variables in the system. However, for the sake of brevity, we only report the ECM of the price level. In Tables 3 and 4, Δ denotes a first difference operator and ECS, $\overline{R}^2$, σ and DW respectively denote the squared of error correction term from the long-run equation for the price level, the adjusted squared multiple correlation coefficient, the residual standard deviation and the Durbin Watson statistics respectively. White is White's (1980) general test for heteroskedasticity, ARCH is the five-order Engle's (1982) test, Godfrey is the five-order Godfrey's (1978) test. L_i is Hansen's (1992a) stability test for the null hypothesis that the estimated i^{th} coefficient or variance of the error term is constant, while L_c is Hansen's (1992a) stability test for the null hypothesis that the estimated coefficients, together with the error variance, are jointly constant. In addition, we include dummy variables specified in DUM for each country. According to Engle's (1982) ARCH test result, the error is heteroskedastic for both countries. Consequently, the estimation method applied is Newey & West's (1987) Robust Error Ordinary Least Squares. None of the other diagnostic checks proves significant for both countries. Based on Hansen's stability test results, all of the coefficients individually are stable, however, because the error is heteroskedastic, the variance of the estimate is not stable, making the stability test result for the joint test significant for both countries.

A. Short-Run Dynamic of Inflation Rate in Egypt

As reported in Table 3, the error correction term is significant after six lags and none of the non-linear error correction terms proves statistically significant. The estimated coefficient of the change in money supply is positive and is hence a determinant of the inflation rate in the short-run. This leads to a conclusion that a higher money supply increases inflation rate over the short-run. The coefficient of the change in the exchange rate (growth of exchange rate) is positive, implying that a fall in the value of the Egyptian pound results in a higher inflation over the short-run. Interestingly, the change in the United States rate over the short-run has a negative impact on the inflation rate in Egypt, while the growth of the United States price (United States inflation rate) does not have any impact on the inflation rate in Egypt and was for that reason dropped.

A change in deficits per GDP affects the inflation rate negatively after six quarters, while after seven quarters it raises the inflation rate. The overall coefficient, that is the sum of these coefficients, is negative, implying that the overall effect of the deficit per GDP is negative over the short-run in Egypt. Perhaps a higher deficit will be considered a higher future tax or money supply/inflation. Consequently, consumers will reduce their spending which will cause the inflation to fall. Finally, empirical evidence supports the fact the fiscal deficit reinforces the relationship between fiscal deficit and inflation (El-Sakka & Ghali, 2005).

The change in the foreign-financed debt per GDP has a negative impact on the inflation rate over the short-run as its level has a negative effect on the level of the price over the long-run. The growth of the real government expenditures affects inflation after five quarters over the short time, and the impact is negative. However, as evident from our research, over the long-run the impact of the real government expenditures increases the price level which confirms our theoretical model. Finally, the elimination of price subsidies in late 1994 resulted in an increase in the inflation rate. The overall conclusion is that the sources of inflation over the short-run in Egypt are mostly internal. These sources include both fiscal and monetary policies, which confirm the existing empirical evidence on Egypt. However, the United States interest rate also has a negative effect on the inflation rate, but its price level, contrary to its positive long-run effect, does not have any impact on inflation rate over the short-run.

B. Short-Run Dynamic of Inflation Rate in Mexico

As reported in Table 4, the error correction term is significant after one lag, and none of the non-linear error correction terms proves statistically significant. Lagged inflation in Mexico also influences the current inflation after the third and fifth quarters with an overall positive effect, a result that confirms Ramos-Francia & Torres' (2008) findings. On the other hand, the impact of the change of money supply is significant only after three quarters and is negative. This result is contrary to what Cuevas (2008) finds in Mexico, where money shocks seem to be the leading cause of inflation in the short-run.

The change in the interest rate influences the inflation rate positively, while the growth of the real GDP affects the inflation rate positively after three quarters. The estimated coefficient of the growth in the depreciation of the domestic currency (the growth of exchange rate) is positive, implying that a reduction in the value of domestic currency results in a higher inflation rate. The changes of both foreign variables prove to have a negative impact on inflation in Mexico. Regarding the negative impact of the United States prices on Mexico, it is only over the short-run after five quarters, and not over the long-run as we would expect, that it turns positive. Moreover, the Mexican price which reflects the United States price also has an overall positive effect on the domestic price; see Table 4. The negative influence of the United States inflation on the inflation in Mexico over the short-run indicates there is no imported inflation from the United States to Mexico. However, Galindo & Ros (2008) do point out the presence of imported inflation due to the pass-through effect.

As for the fiscal variables, the change in the deficit per GDP has a negative impact on inflation after the fifth quarter, but a positive one after the sixth quarter with an overall positive effect (the summation of the coefficients). Both the government debt and its foreign-financed debt have a positive influence on inflation. The overall influence of the fiscal policy, deficit, debt and debt management on the inflation rate is positive over the short-run in Mexico. This result confirms Roger & Wang's (1995) finding on the fiscal view of inflation. Further, the dummy variable itf has a positive effect on the inflation rate in Mexico, and this is why the officially announced inflation target by the Banco de México resulted in more inflation in Mexico, while joining NAFTA on the other hand resulted in lower inflation in Mexico as the coefficient of the dummy variable nafta is negative. The overall conclusion is that the source of inflation over the short-run in Mexico is mostly internal, i.e. the fiscal policy, a result that confirms the findings of Almansour *et al.* (2015).

However, according to Blecker's (2009) finding, after the economic liberalization in the mid-80s, Mexico has since been more vulnerable to external shocks, in particular coming from the United States. Furthermore, Mackowiak (2007) finds Mexico responds more strongly to shocks coming from the United States monetary policy when compared with other emerging markets.

C. Comparison of Short-Run Relationships of Egypt and Mexico

In this subsection, it is analyzed how much price determination in the two studied countries is domestic and/or external. From the results in Tables 3 and 4, it is evident that over the short-run the sources of inflation are fiscal and monetary policies. Being far from or a neighbor of the United States is key, as both the United States interest rate and price affect Mexico's inflation rate, but only the United States interest rate influences the inflation in Egypt.

Interestingly, the magnitude effect of the impact of the United States interest rate is the same (-0.01) in both countries, with the difference that the United States interest rate influences the inflation rate in Mexico after three quarters, and in Egypt after seven quarters. In conclusion, the United States price might not have any impact on the inflation rate in Egypt, but it does have an adverse effect in Mexico.

7 CONCLUDING REMARKS

This paper examines the influence of internal and external factors on the inflation rate in Egypt and Mexico respectively, using a monetary model of inflation that incorporates both monetary and fiscal policies, as well as other internal and external factors. The model is estimated using quarterly data for Egypt for the period 1975Q1-2015Q4, and for Mexico for the period 1976Q1-2015Q4.

We find that both the monetary policy measured by the supply of money and interest rate and the fiscal policy measured by government expenditure, deficit, and debt as well as debt management, affect the price level over the long-run in both countries. Consequently, both policies can be used to fight inflation over the long-run in these countries. Furthermore, it is the United States interest rate and its price that affect the price level with the same sign in both countries over the long-run.

Therefore, it can be concluded that the price level over the long-run is affected by both internal and external factors in these countries. An interesting finding in the research is that the impact of the United States interest rate and price on the price level over the long-run is higher in Egypt than in Mexico, even though Mexico is geographically positioned next to the United States, which shows there is an economic interdependence between the two countries. However, over the short-run, distance does matter. The magnitude effect of the impact of the United States interest rate is the same in both countries, with the difference that the United States interest rate influences the inflation rate in Mexico after three quarters, while in Egypt the inflation rate is influenced after seven quarters. We conclude that the United States price does not have any impact on the inflation rate in Egypt, but it does have a negative effect on the inflation rate in Mexico.

A higher exchange rate (lower value of domestic currency), leads to a higher price in Mexico, in both short and long-runs. Thus, a policy regime that supports a strong currency can keep inflation low in this country. An easy monetary policy in both countries results in a higher price level over the long-run, however, over the short-run, it leads to a higher inflation in Egypt, which nevertheless proves to be the opposite for Mexico.

Over the long-run, a lower interest rate turns to be an effective policy in lowering prices in Mexico, while the opposite is found for Egypt. However, while over the short-run, a change of interest rate does not have any significant effect in Egypt, a lower interest rate, as established in the research, reduces the inflation rate in Mexico.

Within the research, it is also ascertained that the fiscal policy is very effective in combatting inflation in both countries over the long-run. According to the results, an increase in real government expenditures and deficit adds to inflation over the long-run in both countries. A high debt per GDP in Egypt is inflationary, however, the opposite is true in Mexico over the long-run. Further, the foreign financing of government debt has a negative effect in Egypt, but we find the opposite effect on the price for Mexico over the long-run. Also, over the short-run, the increase of deficit and foreign financing of the debt lowers inflation in Egypt, but the opposite is true for Mexico.

From the perspective of an institutional impact, it was the removal of price subsidies in late 1994 that led to an increase of the inflation rate in Egypt. Finally, the inflation target officially announced by the Banco de México resulted in more inflation in Mexico, however, joining NAFTA resulted in lower inflation in the same country.

DATA APPENDIX

The data are seasonally adjusted and derived from the online *International Financial Statistics* (IFS), compiled by the International Monetary Fund (IMF). The data on the outstanding debt (Debt) for Egypt, which are recorded as claims on the government, were not available for the 2009Q3-2015Q4 and were for that reason constructed according to the following formulas:

$Debt_t = Debt_{t-1} + g_t$ (= total government expenditure) - T_t (= government tax revenues) - ΔMB_t (= change in monetary base)

$= Debt_{t-1} + deficits_t\ (= g_t - T_t) - \Delta MB_t$.

However, quarterly data on the outstanding government debt for Mexico are available.

The data missing for both countries were taken from the *World Development Indicator* (WDI). Also, when observations within a series were missing, they were interpolated. The data series on the GDP, government deficits and expenditures for both countries are available only yearly. Consequently, quarterly observations were interpolated, using the statistical process developed by RATS (Regression Analysis of Time Series), a procedure that keeps the final value fixed within each full period.

Information on the institutional and policy changes in Egypt was taken from *The Middle East and North Africa* (2015), and for Mexico from the annual Bank of Mexico reports (Bank of Mexico, several years). Unfortunately, no data on the government expenditure and deficit for the year 2005 for Egypt were available. To fill these gaps, we used the mean of the years 2004 and 2006 respectively. Finally, the source of the United States data is the St. Louis Federal Reserve website.

Table A1: *Definition of DUM for Egypt*

Dummy Variables	Definitions
peace	Equals 1 since 1979; zero otherwise; reflecting peace with Israel.
price	Equals 1 for 1991Q2; zero otherwise; reflecting an increase in price as a result of the tax increase from 14% to 66% in the second quarter of 1991.
flex	Equals 1 since 1991Q1; zero otherwise; reflecting the introduction of the flexible exchange rate in 1991.
tarif	*tarif* is a stepwise dummy (= 0.25 for 1993Q2 to 1993Q4, = 0.50 for 1994Q1 to 1994Q4, = 0.75 for 1995Q1 to 1995Q4, = 1 since 1996Q1; zero otherwise); reflecting the introduction of the new tariff in 1992.
pricesub	Equals 1 for 1994Q4-1995Q1; zero otherwise; reflecting the price subsidy of 1994-5.
common	Equals 1 since 1998Q2; zero otherwise; stands for joining the common market in 1998.

Table A2: *Definition of DUM for Mexico*

Dummy Variables	Definitions
lib	Equals 1 in 1973Q1-1989Q1; zero otherwise; reflecting the regulation of foreign investment.
flexe	Equals 1 for 1982Q3-1982Q4; zero otherwise; indicating the control of exchange rate.
dme	Equals 1 since 1985Q4; zero otherwise; signifying the imposition of a floating exchange rate.
tarr	*tarr* is a stepwise dummy (= 0.5 for 1986Q2-1988Q1 and = 1 since 1988Q1; zero otherwise); applied to reflect tariff reductions in both the first and second rounds in December 1987.
nafta	Equals 1 since 1994Q1; zero otherwise; reflecting the joining of the NAFTA agreement with the United States and Canada.
corto	Equals 1 for 1995Q1-1997Q4; zero otherwise; indicating the Accumulated Balances Regime.
targ	Equals 1 since 1996Q2; zero otherwise; reflecting the inflation target.
itf	Equals 1 since 2001Q1; zero otherwise; indicating the officially announced inflation target by Banco de México's adoption of the Inflation Targeting.
braz	Equals 1 since 2002Q3; zero otherwise; signifying Brazil and Mexico's trade agreement that reduced import duties on some 800 products.
minr	Equals 1 since 2004Q2; zero otherwise; reflecting the minimum interest rate announcement.

REFERENCES

Abu-Bader, S. & Abu-Qarn, A. (2003). Government Expenditures, Military Spending and Economic Growth: Causality Evidence from Egypt, Israel, and Syria. *Journal of Policy Modeling, 25(*6-7), 567-583.

Achour, M. & Trabelsi, A. (2011). Markov Switching and State-Space Approaches for Investigating the Link Between Egyptian Inflation Level and Uncertainty. *Review of Middle East Economics and Finance, 6*(3), 1-17.

Adrangi, B., Chatrath, A. & Raffiee, K. (1999). Inflation, Output, and Stock Prices: Evidence from Two Major Emerging Markets. *Journal of Economics and Finance, 23*(3), 266-278.

Al-Shawarby, S. & Selim, H. (2012). Are International Food Price Spikes the Source of Egypt's High Inflation? *Economic Research Forum Working Paper Series*, No. 714. Available at: http://www.erf.org.eg/CMS/uploads/pdf/714.pdf.

Alfaro, S. & Schwartz, M. (2000). Inflation & Money Goals: The Recent Experience of Monetary Policy in Mexico. In Mahadeva and Stern (Eds.), *Monetary Policy Frameworks in a Global Context*, (pp. 441-454). New York: Routledge.

Almansour, A. Aslam, A. Bluedorn, J., & Duttagupta, R. (2015). How Vulnerable are Emerging Markets to External Shocks? *Journal of Policy Modeling, 37*(3), 460-83.

Arbatli, E. & Moriyama, K. (2011). Estimating a Small Open-Economy Model for Egypt: Spillovers, Inflation Dynamics, and Implications for Monetary Policy. *IMF Working Papers*, WP/ 11/108.

Avraham, E. (2015). Destination Image Repair During Crisis: Attracting Tourism During the Arab Spring Uprisings. *Tourism Management*, 47, 224-232.

Bai, J. & P. Perron (2003). Computation and Analysis of Multiple Structural Change Models. *Journal of Applied Econometrics, 18*(1), 1-22.

Bank of Mexico (several years), *Annual Reports*. Mexico City.

Blecker, R. A. (2009). External Shocks, Structural Change, and Economic Growth in Mexico, 1979–2007. *World Development, 37*(7), 1274-1284.

Capistrán, C., Ibarra, C., & Ramos, M. (2012). El Traspaso de Movimientos del Tipo de Cambio a los Precios. Un Análisis para la Economía Mexicana. *El Trimestre Económico, LXXIX*(326), 813-838.

Capistrán, C. & Ramos-Francia, M. (2009). Inflation Dynamics in Latin America. *Contemporary Economic Policy, 27*(3), 349-362.

Carrasco, C. A. & Ferreiro, J. (2013). Inflation Targeting and Inflation Expectations in Mexico. *Applied Economics, 45*(23), 3295-3304.

Cavazos, G. & Rivas-Aceves, S. (2009). Relación entre la Inflación y Tasas de Interés en México y Estados Unidos. Problemas del Desarrollo. *Revista Latinoamericana de Economía, 40*(157), 111-135.

Cermeño, R., Villagómez, A. & Orellana, J. (2012). Monetary Policy Rules in a Small Open Economy: An Application to Mexico. *Journal of Applied Economics, XV*(2), 259-286.

Chiquiar, D., Noriega, A. & Ramos-Francia, M. (2010). A Time-Series Approach to Test a Change in Inflation Persistence: The Mexican Experience. *Applied Economics, 42*(24), 3067–3075.

Cuevas, V. M. (2008). Inflation, Output and Economic Policy in Mexico. *Investigación Económica, LXVII*(265), 85-120.

De Mello, L. & Moccero, D. (2009). Monetary Policy and Inflation Expectations in Latin America: Long-Run Effects and Volatility Spillovers. *Journal of Money, Credit and Banking, 41*(8), 1671-1690.

Durán, R., Garrido, E., Godoy, C., & de Dios Tena, J. (2012). Predicción de la Inflación en México con Modelos Desagregados por Componentes. *Estudios Económicos, 27*(1), 133-167.

El Baz, O. (2014). The Determinants of Inflation in Egypt: An Empirical Study (1991-2012). *The Egyptian Center for Economic Studies*. Available at: http://mpra.ub.uni-muenchen.de/56978/.

El-Sakka, M. & Ghali, K. (2005). The Sources of Inflation in Egypt: A Multivariate Co-integration Analysis. *Review of Middle East Economics and Finance, 3*(3), 257-269.

Engle, R. F. (1982). Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation. *Econometrica, 50*(4), 987-1007.

Esquivel, G. & Razo, R. (2003). Fuentes de la Inflación en México 1989-2000: Un Análisis Multicausal de Corrección de Errores. *Estudios Económicos, 18*(2), 181-226.

Fanizza, D. & Soderling, L. (2006). Fiscal Determinants of Inflation: A Primer for the Middle East and North Africa. *IMF Working Papers*, WP/06/216.

Galindo, L. M. & Guerrero, C. (2003). La regla de Taylor para México: un análisis econométrico. *Investigación Económica, LXII*(246), 149-167.

Galindo, L. M. & Ros, J. (2008). Alternatives to Inflation Targeting in Mexico. *International Review of Applied Economics, 22*(2), 201-214.

Garcés, D. (2008). Efectos de los Cambios de la Política Monetaria en las Dinámicas del Tipo de Cambio, el Dinero y los Precios en México. *El Trimestre Económico, LXXV*(299), 683-713.

Gaytán, A. & González, J. (2006). Structural Changes in the Transmission Mechanism of Monetary Policy in Mexico: A Non-Linear VAR Approach. *Working Papers* 2006-06, Banco de México.

Giuliano, P. & Ruiz-Arranz, M. (2009). Remittances, Financial Development, and Growth. *Journal of Development Economics, 90*(1), 144-152.

Godfrey, L. G. (1978). Testing Against General Autoregressive and Moving Average Error Models When the Regressors Include Lagged Dependent Variables. *Econometrica, 46*(6), 1293-1301.

Godfrey, L. G. (1988). *Misspecification Tests in Econometrics*, New York: Cambridge University Press.

Granger, C.W.J. (1986). Developments in the Study of Cointegrated Economic Variables. *Oxford Bulletin of Economics and Statistics, 48*(3), 213-218.

Grier R. & Grier, K.B. (2006). On the Real Effects of Inflation and Inflation Uncertainty in Mexico. *Journal of Development Economics, 80*(2), 478-500.

Gutierrez, E. (2003). Inflation Performance and Constitutional Central Bank Independence: Evidence from Latin America and the Caribbean. *IMF Working Paper* 03/53, p. 30. DOI: http://dx.doi.org/10.5089/9781451847406.001.

Hansen, Bruce E. (1992a). Testing for Parameter Instability in Linear Models. *Journal of Political Modeling, 14*(4), 517-533.

Hansen, Bruce E. (1992b). Efficient Estimation and Testing of Cointegrating Vectors in the Presence of Deterministic Trends. *Journal of Econometrics, 53*(1-3), 87-121.

Hansen, H. & Juselius, K. (1995). *CATS in RATS Cointegration Analysis of Time Series.* Evanston, IL: Estima.

Helmy, H. E. (2010). Inflation Dynamics in Egypt: Does Egypt's Trade Deficit Play a Role? *Middle Eastern Finance and Economics, 8*, 6-25.

Helmy, O. A. (2009). The Impact of Budget Deficit on Inflation in Egypt. In Hanaa Kheir-EL-Din (Ed.), *What Drives Prices in Egypt? An Analysis in Light of International Experience.* (pp. 143-176). Cairo: The American University in Cairo Press.

Hosny, A. (2013). Inflation in Egypt: Internal or External Driven? *Middle East Development Journal, 5*(3), 1-15.

Hsing, Y. (2003). Responses of Interest Rates in Mexico to U.S. Monetary Policy. *Journal of Applied Business Research, 19*(2), 1-15.

Ibrahim, M. A. (2011). The Determinants of International Tourism Demand for Egypt: Panel Data Evidence. *European Journal of Economics, Finance and Administrative Sciences*. Available at: http://dx.doi.org/10.2139/ssrn.2359121.

Johansen, S. (1995a). *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models*. Oxford: Oxford University Press.

Johansen, S. (1995b). Identifying Restrictions of Linear Equations With Applications to Simulations Equations and Cointegration. *Journal of Econometrics, 69*(1), 111-132.

Johansen, S. (2000). A Bartlett Correction Factor for the Tests on the Cointegrating Relations. *Econometric Theory, 16*(5), 740-778.

Johansen, S. (2002). A Small Sample Correction of the Test for Cointegrating Rank in the Vector Autoregressive Model. *Econometrica, 70*(5), 1929-1961.

Johansen, S. & Juselius, K. (1994). Identification of the Long-Run and the Short Run Structure. An Application to the ISLM Model. *Journal of Econometrics. 63*(1), 7-36.

Johansen, S. & Juselius, K. (1991). Testing Structural Hypotheses in a Multivariate Cointegration Analysis of the PPP and the UIP for UK. *Journal of Econometrics, 53*(1-3), 211-244.

Juselius, K. (2006). *The Cointegrated VAR Model, Methodology and Applications, Oxford*. New York: Oxford University Press.

Kia, Amir (2006a). Deficits, Debt Financing, Monetary Policy and Inflation in Developing Countries: Internal or External Factors? Evidence from Iran. *Journal of Asian Economics, 17*(5), 879-903.

Kia, Amir (2006b). Economic Policies and Demand for Money: Evidence from Canada. *Applied Economics, 38*(12), 1389-1407.

Laguna, C. E. (2007). Dinámica inflacionaria y brecha en la producción. La curva de Phillips en México. A*nálisis Económico, XXII*(50), 121-147.

Lee, J. & Strazicich, M.C., (2001). Break point estimation and spurious rejections with endogenous unit root tests. *Oxford Bulletin of Economics and Statistics, 63*(5), 535-558.

Lee, J. & Strazicich, M.C., (2003). Minimum LM unit root test with two structural breaks. *The Review of Economics and Statistics, 85*(4), 1082-1089.

Loría. E. & Ramírez, J. (2011). Inflation, Monetary Policy and Economic Growth in Mexico. An Inverse Causation, 1970-2009. *Modern Economy, 2*(5), 834-845.

Mackowiak, B. (2007). External Shocks, U.S. Monetary Policy and Macroeconomic Fluctuations in Emerging Markets. *Journal of Monetary Economics, 54*(8), 2512-2520.

Martínez, L., Sánchez, O. & Werner, A. (2001). Consideraciones sobre la Conducción de la Política Monetaria y el Mecanismo de Transmisión en México. *Documento de Investigación* 2001-02, Banco de México.

Metwally, M. & Al-Sowaidi, S. (2004). The Main Determinants of Inflation in Egypt. *The Middle East Business and Economics Review, 16*(1), 30-38.

Moriyama, K. (2011). Inflation Inertia in Egypt and its Policy Implications. *IMF Working Papers*, WP/11/160.

Newey, W.K., & West, K.D., (1987). A Simple, Positive Definite Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica, 55*(3), 703-708.

Noureldin, D. (2009). Relative Price Adjustment and Inflation Dynamics: The Case of Egypt. In Hanaa Kheir-El-Din (Ed.), *What Drives Prices in Egypt?* (pp. 205-242). Cairo: The American University in Cairo Press.

Palerm, Angel (1986). Inflación, Precios Relativos y la Política de Precios. *Economía Mexicana. Análisis y Perspectivas, 8*, 51-70.

Phillips, P.C.B. & Hansen, B.E. (1990). Statistical Inference in Instrumental Variables Regression with I(1) Processes. *Review of Economic Studies, 57*(1), 99-125.

Rahbek, A., Dennis J.G. & Hansen, E. (2002). ARCH Innovations and Their Impact Cointegration Rank Testing. *Preprint no. 12, 1998, Department of Theoretical Statistics. Working Paper,* No. 22, Center for Analytical Finance.

Ramos-Francia, M. & Torres, A. (2008). Inflation Dynamics in Mexico: A Characterization Using the New Phillips Curve. *North American Journal of Economics and Finance, 19*(3), 274-289.

Rodríguez, A. (2012). La curva de Phillips en México: ¿Existe una relación de largo plazo entre la inflación y la brecha del producto?. *EconoQuantum, 9*(1), 57-81.

Rogers, J. & Wang, P. (1995). Output, Inflation, and Stabilization in a Small Open Economy: Evidence from Mexico. *Journal of Development Economics, 46*(2), 271-293.

Sharaf, M. F. (2015). Inflation and Inflation Uncertainty Revisited: Evidence from Egypt. *Economies, 3*(3), 128-146.

Shelley, G. L. & Wallace, F. H. (2004). Inflation, Money, and Real GDP in Mexico: A Causality Analysis. *Applied Economics Letters, 11*(4), 223-225.

Sobarzo, H. (2004). Reforma Fiscal en México. *Estudios Económicos, 19*(2), 159-180.

Taylor, E., Jorge, M., Adams, R. & Lopez-Feldman, A. (2008). Remittances, Inequality and Poverty: Evidence From Rural Mexico. In Josh De Wind & Jennifer Holdaway (Eds). *Migration and Development within and across borders: Research and policy perspectives on internal and international migration*. (Chapter 6, pp. 101-130) IOM International Organization for Migration. The Social Science Research Council.

The Middle East and North Africa (2015), London: Europa Publications.

Villarreal, R. (2009). El Modelo de Apertura Macroestabilizador: La Experiencia de México. *Economía: Teoría y Práctica, 2*, 9-39.

Weis, D. & Wurzel, U. (1998). *The Economics and Politics of Transition to an Open Market Economy.* OECD Development Centre Studies. Available at: http://213.154.74.164/invenio/record/5415/files/weiss.pdf.

White, H. (1980). A Heteroskedasticity Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica, 48*(4), 817-837.

World Bank Group (2016a), *World Development Indicators*. Several years.

World Bank Group (2016b), *Migration and Remittances*. Factbook 2016. 3rd edition.

Youssef, H. A. (2007). Towards Inflation Targeting in Egypt Fiscal and Institutional Reforms to Support Disinflation Efforts. *European Economy. Economic Papers, Economic and Financial Affairs*, 288, 1-32.

Zivot, E. & Andrews, D.W.K. (1992). Further Evidence on the Great Crash, the Oil Price Shock, and the Unit-Root Hypothesis. *Journal of Business and Economic Statistics, 10*(3), 251-227.