The Effects Of Exchange Rate Regimes On Economic Growth In Egypt Using Error Correction Mode

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Abstract— This paper empirically verifies the implications of exchange rate regimes on GDP growth in Egypt during the period of 1986-2015. Vector Error Correction model is used to verify the effect of exchange rate regimes on economic growth. The exchange rate regime is represented by a dummy variable. Our findings suggest that fixed exchange rate regime significantly enhances economic growth compared to managed floating.

Keywords— exchange rate regime, fixed exchange rates, managed floating, GDP growth, Egypt.

Introduction:  
Exchange rate policy has a crucial influence on the relative prices of exports, imports and thus the balance of payments. It is commonly believed among the economists that exchange rate regime affects the short and medium-term economic growth. Regarding the long run, the economic theory does not provide an evidence of the effect of exchange rate policy on economic growth because usually the nominal variables are not considered among the determinants of the economic growth (levy-yeyati and Sturezengger, 2002).

Broda (2002), Jbili and Kramarenko, (2003), Bailliu et al, (2003) and Velasco (2003) followed the intuition of Friedman (1953) who suggested that fixed exchange rate regimes lack the mechanism to adjust to external shocks especially in case of price rigidity in the short run in particular. In such circumstances, we have to wait until relative prices accommodate to the shock. That leads to price distortions, high level of unemployment, increasing protectionist behavior and misallocation of resources because of slower price adjustment which makes the whole adjustment process slower and less efficient.

The urge to defend fixed regimes, in case of real shocks, pushes the monetary authority to adopt high real interest rate in order to prevent exchange rate from depreciating and in some cases when it fails to defend fixing, the monetary authority would have to take the decision of floating which also increases uncertainty about the exchange policy (levi-yeyati and sturzenegger, 2001). On the other hand, Bailliu et al (2002) suggested that fixed regimes provide credibility and certainty about economic factors which decrease risk premium and thus reducing real interest rates and exchange rate volatility which in return increases investment and international trade.

This paper empirically investigates the impacts of exchange rate policies on economic growth in Egypt during the period of 1986-2015 using Vector Error Correction Model (VECM). Our study used a novel
dataset of a de facto exchange rate regime from International Monetary Fund, and a dataset of GDP growth from World Bank’s Development Indicators (WDI) database.

Egypt has ranged from adopting crawling peg (or a traditional fixed peg) to managed floating during the study period. In fact, regardless the de jure exchange rate policy in Egypt, it had been managed for long decades, and yet, it had shown a pattern of continuous depreciation for most of the last thirty years. The importance of this paper comes from the important role the exchange rate regime itself play in the Egyptian economy. Egypt relies on imports to great extent in order to provide most of its needs, so the whole economy is highly sensitive to any slight fluctuate in the exchange rate. In fact, the Egyptian exchange rate market was prone to various kinds of external and internal shocks during the study period. Consequently, studying the impacts of such an important variable may give insights into the nature an exchange rate regime can play in the everyday economic life. The study concludes that fixed exchange rate regime enhances economic growth more than managed floating because it strengthens the state of certainty about economic factors and thus fosters high levels of investment and international trade. This paper proceeds as follows. Section 1 is literature review about the relationship between exchange rate regime and economic growth. Section 2 is the methodology used to estimate the relationship between exchange rate regimes and GDP growth in Egypt during the period 1986-2015 using the VECM model. Then we turn to the last section which is the conclusion.

I. A review of the relevant literature:

The iconic study of (Ghosh et al, 1997) popped up the question of the importance of exchange rate regimes to both inflation and economic growth. Using a dataset of 145 countries during the period of 1960-1990, the study concluded that countries with fixed regimes have higher levels of investment but surprisingly, they had the lowest per capita growth in the sample with a percent of 1.4. In floats, GDP per capita reached 1.7% and it recorded its maximum value under the intermediate regime with a percent of 2. According to the study, fixing the exchange rate fostered higher levels of investment and yet GDP growth was the lowest. The reason may be the reduction of total productivity level which, according to the Solow model of growth, explains economic growth. Also, the lack of adjustment mechanism under peg prevents relative prices from adjusting which results in reducing economic efficiency. The increase in productivity growth in floating countries can be related to the increase in international trade as it was 3% higher in floating. The study also showed that countries which adopted floating had a 0.3% increase in GDP growth in the first year following the floating and this percentage aroused to record more than 1% after three years of floating. A more recent study, Gadanecz and Mehrotra (2013) studied the relationship between more flexible regimes and economic growth on a sample of 52 developing and industrial countries. The study concluded that both of volatility and value of flexible exchange rate affect productivity growth.

We are going to show the results of three major studies which empirically investigated the impact of a 10% terms-of-trade shock on real GDP and/or real exchange rate and/or prices. These studies are (Broda, 2002), (Levi-yeyati and Sturezengger, 2003) and (Calvo and Reinhart, 2000). Their results proceed as follows:

Broda (2002) concluded that:
1- Real GDP response is smoother in a case of floating. After two years from a 10% reduction in terms of trade, the real GDP decreased by about 1.9% in case of peg. On the other hand, in floats, real GDP decreased by about 0.2%.

2- The Real exchange rate is slower in depreciation for countries adopting pegs. In countries adopting floating, real exchange rate depreciated in a sharp and simultaneous way by 4.1%. After two years of the shock, real exchange rate depreciated by about 1.3% in case of a peg and 5.1% in case of floating.

3- Nominal exchange rate depreciated more than real exchange rate in case of floating and that can be drawn from the 2% increase in consumer price level after two years of the shock. In countries adopting pegging, the real exchange rate was almost the same in the first period following the shock and the small depreciation occurred as a result of the reduction in domestic prices.

Levy-yeyati and Edwards (2003) reached that real GDP would depreciate with approximately 0.4% in case of floating but this percentage will duplicate in case of fixing. They also stated that real GDP is more sensitive to negative shocks more than positive shocks due to price rigidity. Calvo and Reinhart (2000) concluded that nominal exchange rate will decline by 6.9% after two years of the shock in the developing countries adopting floating.

II METHODOLOGY
The paper uses cointegration test and vector error correction model to test the relationship between exchange rate regime and economic growth in Egypt during the period of 1986-2015.

The study begins by examining the stationary of time series of the model variables in order to make sure that variables are integrated of the same order and then analyzing the cointegration among the model variables to ascertain if there is a long-term relationship among the variables of the model and thus verifying the validity of the relation estimation using the VECM error correction model.

A. Model Variables:
The dependent variable is the GDP growth rate. Data on the variable were obtained from the World Development Indicators (WDI) of the World Bank. The main objective of the study is to detect the effect of the exchange rate applied in Egypt during the study period on the rate of GDP growth. However, besides taking the exchange rate system as an independent variable, it is necessary to take into account several other independent variables in the estimated model in order to ensure that their effects are neutralized on economic growth and thus produce good results for the model. These independent variables are among the main determinants of economic growth in Egypt. Barro (1996) indicated that the determinants of economic growth are human capital, government spending, the role of laws, trade terms and investment. The study of Bailliu et al (2002) indicates that the effect of the exchange rate regime on growth occurs indirectly through other determinants of growth such as investment, openness to international trade, capital flows and the development of financial sector. The study also suggested that their effects are obtained by the parameters of their explanatory variables, not by the parameter of the exchange rate system. Therefore, the effects of these variables on growth caused by the nature of exchange rate policy cannot be isolated from those caused by other factors.

Only the most significant determinants of economic growth were satisfied in our study. The following is a brief presentation of the independent variables:
Exchange rate regime, household consumption, investment and trade openness.

1. Exchange Rate Regime

This variable was taken as a dummy variable that takes the value of one in the years in which the managed floating regime was adopted, and the value of zero in the years in which the crawling peg (or a traditional fixed peg) was followed. The years in which the variable took the value of “1” are 2003-2005, 2007-2011, 2014, 2015, and those are the years in which the managed floating system was adopted. The remaining years of the study period take a value of "0" from 1986-2002, 2006, 2012 and those are the years in which fixed systems were followed, such as a crawling peg or a traditional fixed peg. This variable is what the researchers aim to measure its impact on GDP growth rates during the period of (1986-2015).

B. Estimation

1. Stationary tests for model variables

We are going to test the stationary of the time series of the model variables based on Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test.

We observed that the time series of the model variables are not stationary at their level form and become stationary when first differenced, i.e. they are all integrated of the same order (order 1). (See table 1, appendix)

2. Cointegration Tests:

The results of the Max-Eigen test and the Trace Test are the same. Both of them indicate that there is a maximum of one relationship (one cointegration equation) among the model variable (See table 2, appendix), i.e. there is a relation among the model variables in the long run which allows us to estimate the VECM model among the model variables.

3. Estimating the Relationship among the Variables of the Study Using the VECM Model

The VECM enables us to estimate the relationship among the variables in both the short and long term. The model takes into account the long run relationships among variables by containing lagged variables and also takes into account the short run relationships by ensuring time-series differences. Moreover, the VECM model avoids the standard problems caused by spurious regression.

C. The Results of Vector Error Correction Model (VECM):

1. The Result:

The Following are the results of estimating VECM model; we will display parameters for the long-term study of the variables.

<table>
<thead>
<tr>
<th>Dependent variable: GDP growth parameters Coefficients (t-statistics)</th>
<th>Independent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.471 (-3.065)</td>
<td>$HCE$</td>
</tr>
<tr>
<td>-1.069E-10 (-0.821)</td>
<td>$FDI$</td>
</tr>
<tr>
<td>-0.336 (-4.695)</td>
<td>$Export$</td>
</tr>
<tr>
<td>0.030 (0.22)</td>
<td>$Import$</td>
</tr>
<tr>
<td>-0.5569 (-3.845)</td>
<td>$ECT_{t-1}$</td>
</tr>
<tr>
<td>-1.69 (-2.152)</td>
<td>$Exchange rate Regime$</td>
</tr>
<tr>
<td>37.676</td>
<td>$C$</td>
</tr>
</tbody>
</table>

$R^2$-adjusted
1) **Interpretation of the Results**

First of all, we find that the value of error term $ECT_t$ has a negative value and statistically significant at the 5% level and equals 0.5569 i.e. the speed of adjustment coefficient in the short-term relationship toward a long-term equilibrium is relatively large and equals 55.69% per annum. The $R^2$-adjusted value is 56.5% i.e. independent variables (HCE, FDI, Export, Import, and the Exchange rate regime) explain 56.5% of the changes in the dependent variable (GDP growth rate).

The parameter of the exchange rate is negative and statistically significant (-1.69) at the level of 5%. Since the exchange rate was considered as a dummy, takes the value of 1 in case of managed floating and takes a zero value in case of a crawling peg or a traditional fixed regime. Thus this negative parameter indicates the negative effect of managed floating on GDP growth during the study period, unlike the crawling peg (or the traditional fixed peg), and when managed floating is adopted, in a given year, the GDP growth rate is expected to decline by 1.69% than that in case of the adoption of a crawling peg (or a traditional fixed peg), keeping the other factors fixed. This indicates that a more fixed exchange rate regime has a positive impact on Egyptian GDP.

Regarding the effects of other variables on the output growth rate, we find that the effects of both household consumption and export growth on the GDP growth rate, in the long term, are negative and statistically significant (at the 5% level). The parameter of HCE is estimated to be -0.471 which means as the consumption of household increases by one unit, output growth rate is reduced by 0.47% in the long-term, keeping the other factors fixed. The reason is that the consumption of household usually depends on imports rather than domestic production. As for the export's parameter, it is estimated at -0.366 and refers that if the level of exports increases by one unit (1%), GDP growth decreases by 0.336% in the long run. This is probably due to the fact that the structure of exports in Egypt is focused mainly on both primary commodities and low value-added goods, thus both industrial and high value-added goods represent a small ratio of exports structure. Both FDI and imports do not significantly affect the long run growth; we find that the effect of FDI is negative, while imports have a positive impact on economic growth in the long run.

As for the impact of imports on economic growth, (usually if most of the imports are consumption goods, so it is expected that imports would have a negative impact on growth due to the offsetting domestic production, but if most of the imports of raw materials and intermediate goods required for production processes, thus in the long term impact is expected to be positive due to its role in stimulating domestic production). We find that the effect of imports is not significant on economic growth, and it seems that the result of the negative impact of imports segment has canceled the effect of the other part of positive impact of imports which finally results in a lack of significant impact of imports on economic growth in the long-term.

FDI has a negative non-significant impact on GDP growth. This is probably due to the fact that most of these investments are directed to activities with low-added values such as investing in Petroleum section and extractive industries. According to WBI indicators, 60% of these investments are headed to petroleum sector in 2014/2015 and 69% in 2012/2013, while modest ratios are directed to
activities with high-added values (only 2.2% for the manufacturing sector in 2014/2015 and 2.7 in 2012/2013). In addition, FDI usually displaces domestic investment. Therefore in the long term, the impact of such investments may be negative on economic growth, but yet not significant.

**III CONCLUSIONS**

The study concludes that fixed regimes (such as a crawling peg or a traditional fixed peg) engender GDP growth more than managed floating in the long term. Our results indicate that when managed floating is adopted, it is expected that GDP growth would decline by 1.69% keeping other factors fixed. This indicates that more stable exchange rate systems positively bolster FDP growth in Egypt which agree with the result of most of previous studies, for instance, Bailliu et al (2002), Stotsky et al (2012), Mehrotra and Gadanecz (2013), Ramos-Herrera and Sosvilla-Rivero, (2014), that the more stable exchange rate systems are positively correlated with the rate of economic growth. This is due to the reduction of both policy and real interest rates besides increasing investment flows, and boosting international trade.

**References:**

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