" Determinants of Real Exchange Rate

Evidence: from Egypt

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Abstract

In November 2016, the Central Bank of Egypt (CBE) had announced the adoption of a floating exchange rate regime. Determining the equilibrium exchange rate is a chronic problem in the Egyptian economy, this means that the exchange rate is determined according to several variables. So, this research comes to examine the determinants of the exchange rate dealing with money supply, trade openness, and foreign exchange reserves. This research uses time-series data from 1990 to 2018 and depends on the method of co-integration (Autoregressive Distributed Lag Model, ARDL) through which the relationship is estimated in the long run, and depends on the Error Correction Mechanism (ECM) method to estimate the relationship in the short run, and the model is applied through the statistical program EViews. Besides using the descriptive method to view and analyze the exchange rate problem, the variables, and interpretation of the results.

This study revealed that foreign exchange reserves and broad money have a significant and positive impact on the real exchange rate in the long-run, as well as trade openness and foreign exchange reserves have a significant impact and positively related to the real exchange rate in the short-run. The study also found, If the real exchange rate is deformed, it will need about 21 months to return to equilibrium.

Key Words: Real Exchange Rate, Money Supply, Trade Openness, Foreign Exchange Reserves, Egypt

الملخص

أعلن البنك المركزي في ٣ نوفمبر ٢٠١٦ عن اعتماد مصر لنظام سعر صرف عائم مرة أخرى. يعد تحديد سعر الصرف التوازني مشكلة مزمنة في الاقتصاد المصري، وهذا يعني أن سعر الصرف يتحدد وفقًا لعدة متغيرات. لذلك، يأتي هذا البحث لفحص محددات سعر الصرف التي تتعامل مع العرض النقدي والانفتاح التجاري واحتياطيات النقد الأجنبي. يستخدم هذا البحث بيانات السلاسل الزمنية من عام ١٩٩٠ إلى ٢٠١٨ ويعتمد على طريقة التكامل المشترك (نموذج التوزيع التلقائي المبطئ، ARDL) التي يتم من خلالها تقدير العلاقة على المدى الطويل، وتعتمد على طريقة آلية تصحيح الخطأ (ECM) لتقدير العلاقة على المدى القصير، ويتم تطبيق النموذج من خلال البرنامج الإحصائي EViews. إلى جانب استخدام المنهج الوصفي لعرض وتحليل مشكلة سعر الصرف والمتغيرات وتفسير النتائج.

وقد كشفت نتائج هذه الدراسة أن احتياطيات النقد الأجنبي والمعروض النقدي لها تأثير معنوي إيجابي على سعر الصرف الحقيقي على المدى الطويل، كما أن الانفتاح التجاري واحتياطيات النقد الأجنبي لهما تأثير معنوي وإيجابي على سعر الصرف الحقيقي على المدى القصير. كما كشفت الدراسة أن سعر الصرف الحقيقي عندما يتعرض لتشوهات يحتاج إلى حوالي ٢١ شهرًا للعودة إلى وضع التوازن.

الكلمات المفتاحية: سعر الصرف الحقيقي، عرض النقود، الانفتاح التجاري، احتياطيات النقد الأجنبي، مصر.

Introduction

Many recent applied studies on developing countries confirm the adverse effect of real exchange rate imbalances on all aspects of economic performance. In other words, countries that have adopted permanent and appropriate exchange rate policies have managed to maintain the real exchange balance and have been more able to attract investment and achieve higher economic growth (Keller, et al 2000).

the imbalance of the real exchange rate affects negatively on the macroeconomic indicators and weak the economic performance through several aspects.

The exchange rate that is valued above its real value, it means a country's currency appreciates, causes a high local inflation rate and hence increases export prices, which leads to low the country's competitiveness. Consequently, it leads to an imbalance in external

balance, depreciation of foreign exchange reserves, and major difficulties facing balance on the current account. On the other hand, a high rate of inflation as a result of a country's currency appreciates causes price distortions between the various local sectors inside and outside the country. It also encourages the exit of investments, stimulation of speculation, and the collapse of the economy (Domac and Shabsigh 1999). In addition, a country's currency appreciates leads to increase unemployment rates in the domestic and international trade sectors, and misuse of economic resources and misallocate of factors of production, as it prevails in most developing countries.

It may be expected to evaluate the exchange rate at less than its value, which means a country's currency depreciates, to opposite results of the above. An increase in exports and a decrease in imports, which leads to an increase in domestic output and an increase in employment rates,

provided that the elasticity of demand on imports goods and service is high and the capability of production factors in the country able to Replacement imports and increase exports.

Also, a significant devaluation of the local currency may cause an exchange rate shock, which means increased demand for foreign exchange and a decrease in its supply. this occurs when there is the exit of capital from the country due to war or instability or because the exchange rate, not accurately estimated for a long time (Sawyer & Sprinkle, 2009 & Mishkin 2016).

Research Problem

This study examines the impact of the broad money, trade openness, and foreign exchange reserves as independent variables in determining the exchange rate in Egypt during the period from the implementation of the economic reform and structural stabilization program in the 1990s to

2018. Besides, it also focuses on the difficulties and challenges that Egypt has faced to determine the exchange rate since Egypt left the Sterling Group in 1948.

Research Objectives and Importance

Egypt faced difficult challenges to provide the foreign currencies necessary to secure its needs of external goods and services, and it applied more than once economic reform and structural stabilization program in order to tackle this problem. Egypt borrowed from some countries and asked for support from the IMF and the WB to cover the deficit in the current account balance.

This research aims to find out the causal relationship between the real exchange rate, broad money, foreign exchange reserves, and trade openness in Egypt. Especially that the Egyptian economy is a mono-economy where its import is larger than its export. In order to offer

recommendations and solutions for the decision-maker enabling him to overcome difficulties and challenges that may be faced in determining the exchange rate in the long- and short run, also to reach a permanent and appropriate exchange rate in Egypt.

Research Methodology

This research uses a quantitative analysis methodology based on the econometric model. The quantitative data is processed by assuming the real exchange rate as an independent variable and trade openness, foreign exchange reserves, and broad money as a dependent variable.

The model uses time series data which is available from 1990 to 2018 about Egypt and depends on the method of co-integration (Autoregressive Distributed Lag Model, ARDL) through which the relationship is estimated in the long run, and depends on the Error Correction Mechanism (ECM) method to estimate the relationship in the

short run, and the model is applied through the statistical program EViews. Besides using the descriptive method to display the variables and interpretation of the Results.

Research limits

This research covers an important issue facing the Egyptian economy from time to time. so, the problem was dealt with descriptive analysis since Egypt left the sterling bloc. The quantitative study period was chosen from 1990 because Egypt has carried out comprehensive economic reform and structural stabilization since that date. Where a managed float regime was used.

Research Plan

The research is organized as follows:

Literature Review is the rest in this section, in the second section, we present the descriptive analysis for exchange rate development in

Egypt. In the third section, we present the econometric model analysis, including the methodology which is applied and the results with the interpretation. In the last section, we present forward our conclusions and recommendations.

Literature Review

o The research of Williams & Sola, (2018) used OLS methodology to identify the determinants of exchange rate. They concluded that imports, exports and foreign exchange reserves are the main factors that determine exchange rate.

o Massoud & Willett (2014) summarized and classified the exchange rate (ER) regimes adopted by the Egyptian government in the period from 1960 to 2014. Also, the study measures exchange rate flexibility to market factors. It found that exchange rate flexibility increased after CBE announcement of adopting inflation targeting ER

regime in 2005 but decreased after 2011 revolution. the study revealed the Egyptian de facto ER regime during the study period was a managed ER regime with several degrees of flexibility against the US dollar, and the Egyptian government has never been applied free-floating ER regime.

o Nakijoba (2018) used VECM model to detect exchange rate determinants in the short run and long run in Uganda. The study deduced that Interest rate and Gross domestic product affect nominal exchange rate positively. Inflation, broad money supply (M2), and terms of trade negatively depreciate the exchange rate.

o Kilicarslan (2018) used GARCH to test for exchange rate volatility and used to FMOLS to specify the determinants of exchange rate volatility. The research concluded that as domestic investment, money supply, and trade openness increases, the real effective

exchange rate volatility decreases, while the increase in foreign direct investment, output, and government expenditures increases the stability of real effective exchange rate.

o the study of Noureldin (2018) worked on determining equilibrium exchange rate. The research found that Egyptian pound was underestimated by about 22.3 percent in 2017Q1. the research also forecasted the degree of undervaluation of Egyptian pound in 2020 Q4to be 13.1 percent if the exchange rate maintains 17.73 pounds per US dollar rate.

o Atya, Eyad Mohammed (2017) examined the impact of real exchange rate on unemployment in Egypt during the period 1985–2015 and used three methods to consider this relationship which are Autoregressive Distributed Lag Model (ARDL), Fully Modified OLS (FMOLS), and Dynamic OLS (DOLS). The study found real

exchange rate has a positive significant relation to unemployment.

as, found unemployment has a negative significant correlation on

growth, while there is no significant impact of economic openness on

unemployment. the study concludes the depreciation of the real

exchange rate will decrease unemployment.

o Shah, Abid A, et al. (2012) researched the empirical relationship

between the exchange rate and the export sectors in Pakistan by

using the monthly data of the exports from 7/2003 to 4/2010 with a

nominal exchange rate. And to estimate the long-run relationship are

used cointegration and autoregressive time series regression models

while   has   used   autoregressive   conditional   heteroskedastic

methodology to estimate the effects of the exchange rates volatility

on export. The outcome of cointegration and OLS demonstrated a

significant long-run relationship between exchange rates and export,

which proved that the depreciating currency, improves the competitiveness of the export sectors.

o The paper of Yu, Shih-C. & Lee Wo-C. (2017) researched the correlation between RMB exchange rate volatility and exchange rate volatility of other East Asian after exchange rate reform in China at 2005 to 2016 and found that RMB exchange rate fixed to US Dollar exchange rate before July 21, 2005 and take over a single fixed exchange rate, where RMB exchange rate volatility are insignificant to exchange rate volatility of East Asian economies. while RMB exchange rate volatility shows a significant correlation with exchange rate volatility of East Asian after 21 July 2005. the study went after in three-stage where the first stage started from 2005/7/22 to 2008/9/19 and the second stage was from 2010/6/21 to 2015/8/10 and the last stage from 2015/8/11 to 2016/12/31. This paper

concluded that after PRC started RMB exchange rate reform in 2005, RMB has been obtained a significant international currency in East Asia. Thereafter RMB exchange rate fluctuations became influence exchange rate fluctuations of East Asia.

o The paper of Khan, and Qayum, (2008) examined the Purchasing Power Parity (PPP) between Pak-rupee vis-à-vis US-dollar exchange rate and found there is support for PPP in the long run. The nominal exchange rate has a significant role to adjust deviations of PPP for long-run. This research used multivariate cointegration and bound testing approach to cointegration over the period 1982-2005.

1. Descriptive Analysis of Evolution of exchange rate and its Determents in Egypt.

2.1. Period of Fixed Exchange Rate Regime

Generally, the Egyptian pound exchange rate was pegged to the US dollar after Egypt left the sterling block in 1948. as the exchange rate, Egyptian pound equaled 4.1 US dollars, and after two years it has reduced by 30%, so the Egyptian pound was equaled 2.78 US $. During the central planning period (1952-1973),

During this period, Egypt had faced a scarcity of foreign exchange resources due to the Suez war, the payment of the Suez Canal compensation, the compensation that was paid to Sudan to construct the High Dam, and military spending on the 1967 war and the 1973 war. but continued with a fixed regime.

In 1974, setting the exchange rate in Egypt have taken a new direction when US President Nixon announced a decision not to convert the dollar to gold, while Egypt adopted a new economic policy "open door".

so, several foreign exchange markets appeared, where each market provide the necessary foreign currency to finance specific economic activities and at different Fixed exchange rates, these led to a distortion of the exchange market in Egypt, and to increase the demand on foreign exchange in the banking system, as deposits in foreign exchange increased compared to deposits in the Egyptian pound, which led to Inflation and a decline in its purchasing power year after year and emerge what is called the phenomenon of dollarization (Abul‑Eyoun, 2003).

Over and above that a parallel market appeared during this period for foreign exchange next to the official exchange market, which deals with

exchange rates called promotional rates, which are calculated on the basis of the official exchange rate plus an allowance called the incentive premium, and this premium was set at 50% of the official purchase price and 55% for sale, and this premium was increased several times until it reached 79% of the official prices, and this market was created in 1973 (Abdelaziz, 1995)

Egypt relies on four primary sources to provide foreign currencies, which are oil revenues, Suez Canal transit fees, tourism, and remittances from Egyptians working abroad.

In 1978, the official exchange market and the parallel market were converted into two foreign exchange pools, whereby the official exchange market is subject to the CBE, while other accredited banks handle the parallel market. where Resolution No. 372/1978 was issued

stipulating the unification of the exchange rate in the two markets from January 1979, at the price of a pound equivalent to $ 1.43.

The overlapping and unregulated situation in the currency market continued during the 1980s, the policy of economic openness did not achieve a sufficient flow of foreign capital, despite the privileges granted by the government for foreign investment such as a tax exemption for ten years, the transfer of profits without restrictions and his protection from confiscation in accordance with Law No. 43 of 1974 and Law No. 32 of 1977 (Mohieldin, & Ajok 2002).

2.2. Turning Point and Reform

In 1986, the Egyptian economy experienced enormous difficulties, due to the sudden decrease in revenues especially after the sharp decline in oil prices, where the rate of growth decreased to 2.7%, the budget deficit reached 23% of GDP, the deficit of current account balance

(CAB) exceeded 10% of GDP, and the accumulation of external debt reached 119% of GDP, debt service ratio of total exports reached more than 40%, and inflation rose to 25% in 1987 (Mohieldin, & Ajok 2002).

Therefore, the government has undertaken structural reforms in cooperation with the International Monetary Fund and the World Bank to reduce internal and external imbalances. Accordingly, the number of exchange rates decreased to three, and the value of the Egyptian pound was gradually reduced by 25% in its nominal value (Dailami, & Dinh, 1991).

In addition, Resolution No. 22 of 1987 was issued to establish the free banking market for foreign exchange and to allow accredited banks operating in Egypt and licensed to deal in the Egyptian pound and foreign exchange to buy and sell foreign exchange for its account and

under its responsibility, as well as reducing quantitative restrictions on imports with more liberalization of exports (Harb, (2007).

The improvement situation did not last long, as the government encountered difficulties implementing some of the special measures included in the program.

This led to the disruption of the 1987 reform program a few months after its implementation, due to the International Monetary Fund's refusal to allow additional withdrawals according to the "Stand-by Agreement" after the initial payments in May 1987 (MF, 1998).

The data also demonstrated, an increase in the dollarization rate (an increase in the rate of deposits in foreign currencies to domestic liquidity) as it increased from about 15% in 1976 to about 31% in 1981 and then to 40% in 1988 and approached 50% by the year 1990, which means the continued decline in the purchasing power of the Egyptian

pound, and the low confidence in its ability to achieve his function as a store of value (El-Essawy, 2007)).

2.3. Economic Reform and Structural Stabilization Program in 1990s:

In addition to the previously mentioned difficulties, the Gulf War and its after losses of Egyptian workers' remittances abroad, low tourism revenues, lower Suez Canal fees have exacerbated economic difficulties, these losses had estimated at more than $ 2.5 billion.

However, aid from the United States of America and the Gulf states in addition to increasing oil prices and lower import prices contributed to reducing the size of the crisis in 1990, as the balance of payments achieved a surplus of about $ 0.9 billion, and exemptions and rescheduling of debts helped to reduce debt service from 46% to about

16.5 % In relation to exports and achieved an increase in foreign exchange reserves from $ 1.7 billion to $ 6.1 billion.

Despite this improvement, the Egyptian economy faced serious challenges in 1991, where the budget deficit reached 20% of GDP, the inflation rate reached 15%, and the balance of payments deficit amounted to 11.4 billion Egyptian pounds and the exacerbation of external debt, negative real interest rates, foreign exchange reserves covered only about 3 months and decrease in confidence in the local currency, where the dollarization rate has increased to about 50%. Therefore, Egypt started the program of economic reform and structural stabilization, dependent on the necessity of containing domestic demand based on price indicators of the interaction demand and supply forces in the market, while working to reduce the degree of government intervention in economic activity through the implementation of an

intensive program to privatize public ownership of the means of production Abul-Eyoun, 2003).

The economic reform program relied on support from the International Monetary Fund, as well as a structural stabilization loan by the World Bank, in addition to bilateral debt forgiveness and debt service subsidies by the Paris Club.

the comprehensive reform program includes reforming the financial sector, liberalizing the interest rate, reducing subsidies and removing price controls, unifying the exchange rate, liberalizing foreign trade, and reforming the public sector.

The reform program was concerned with the exchange rate, as the two exchange markets have been combined, exchange rate has been determined within the framework of one free market. According to a new exchange system based on pegged Egyptian pound to the US

dollars as based on a managed float regime. And determine the exchange rates of the Egyptian pound against other currencies, based on the exchange rate of the pound against the dollar, and the exchange rate of the dollar against these currencies in international markets.

According to "declared" exchange rate regime, the price determination is left to market forces, and the monetary authority's interference in the foreign exchange market is limited according to a set of indicators such as changes in foreign exchange reserves or the deficit of Balance of payment Abdel Khaleq, 1999).

Several laws were passed during the 1990s that supported the floating exchange rate policy. but the intervention of CBE continued in the foreign exchange market according to the status of supply and demand of foreign currencies in order to maintain the unification and stability of the exchange rate, as well as a means of controlling inflation. In

achieving this stability, CBE relied on interfering in the foreign exchange market indirectly through open market operations, in order to limit the effects of increased foreign exchange inflows on the value of the pound so as not to negatively affect the competitiveness of exports.

The impact of the exchange rate reform was positive on the Egyptian economy, where it increased the Suez Canal revenues and the profits of oil companies and increased the accumulation of foreign exchange reserves from about 6.2 billion dollars in 1991 to about 19.5 billion dollars in 1997. This led to an increase in the Authority's commitment to link the exchange rate, which in turn led to lower expectations for the rate of inflation, and a significant improvement in the state's budget deficit, as the deficit decreased from about 20% of GDP in 91 to about 1% in 1997. (CBE, 1998)

2.4. Floating of Egyptian Pound in January 2003

With increasing the degree of integration in commodity and global capital markets, national economies are more vulnerable to external shocks, which inevitably affects their growth rates. Therefore, many economists advise the importance of adopting effective monetary and foreign exchange policies that help absorb any external shocks (El Erian & El Gamal 2001)

Indeed, the Egyptian economy was negatively affected by the reflection of external shocks in 1997, which were represented in the global decline in oil prices from 15,6 to 9,7 and the financial crisis of emerging markets which led to a sharp decline in the exchange rates of currencies of Southeast Asian, that encouraged the increase of imports from those countries where the total Egyptian imports recorded a noticeable growth in the fiscal year 1997, reaching 16.9 billion, an

increase of 1.7 billion dollars in one year. Thus, the trade balance deficit increased to 11.8 billion dollars in 1997 compared to about 10.2 billion dollars in 1996. Also, the Egyptian tourism suffered a hard blow due to the Luxor terrorist accident, at the end of 1997, which led to a significant deterioration in tourism income for a long period, as tourism revenues decreased from about $ 3.6 billion to $ 2.9 billion as a direct response to the Luxor accident, which led to a decrease the tourist nights from about 26 million nights to about 21.5 million nights. As a result, the tourism and hotel sector suffered, as well as the economic activities associated with them (Abul-Eyoun, 2003).

And to maintain the stability of the exchange rate, CBE endeavour to intervene as a seller of the dollar, in order to reduce the decline in Egyptian pound value, led to the depreciation of the foreign exchange reserves, but this intervention failed to prevent the continued rise in the

exchange rate of the dollar in the markets where it reached 3,69 pounds at the end of that year, and foreign exchange reserves decreased to reach USD 13.8 billion in 2001.

Furthermore, CBE undertook several steps aimed to reduce the loss of more foreign exchange reserves and obtain stability in the foreign exchange market, the most important of which is announcing a specific exchange rate of 3,85 pounds to the dollar, at which all banks and exchange companies maintain, with allowing a margin price of 1% up and down, then followed by several reductions in the exchange rate announced by the CBE, as to reach 4,49 pounds to the dollar at the end of 2001, with an increase in the allowing margin price to 3% for banks and exchange companies. (CBE, 2001)

Figure No. (1) demonstrations exchange rate movement, and the changes in Broad Money % of GDP in Egypt, where shows the increase

in money supply in 1980-1982 and in 2000-2002 while decreased during the period 2008 till 201.

All these endeavors have not succeeded, especially after the incidence of September 11, 2001, as the tourism sector inputs decreased, the value of exports and the foreign capital inflows decreased. in addition, the deadlines for repaying the debts of Paris Club were due, and the first payment of the Egyptian dollar bonds was also due, thus the balance of payments was sharp negatively affected, and it continued Pressure on the Egyptian pound and the black market return to be active again (Ezzat, 2006).

The Egyptian foreign exchange rate crisis was exacerbated again, thus Egyptian government decided to float the pound in January 2003, as the exchange rates announced by CBE has canceled, and left the banks to determine exchange rates, so exchange rate depreciates to

6,153 per dollar, representing a 36% decrease at the end of 2003. Besides, CBE at the end of 2004 approved the mechanisms of work with the dollar interbank, which allowed the sale and purchase of the Egyptian pound against the dollar between the banks (CBE, 2004). and in 2005, the CBE adopted a more flexible policy in dealing with exchange companies.

This led to providing foreign exchange in the banking market upon request and reduced bottlenecks in the exchange market. indeed, these Measures contributed to achieving a relative improvement in the exchange rate, so the exchange rate of us dollars fell to 5,697 pounds by the end of 2007.

Figure No. (1) demonstration the sharp depreciation in the Egyptian pound in 2003.

2.5. Floating of Egyptian Pound in November 2016

CBE followed a more flexible policy in dealing with the exchange rate, which led to a relative appreciation of the Egyptian pound against the dollar, as the price of the US dollar fell to 5,697 Egyptian pounds by the end of 2007.

CBE was also able to absorb the negative effects resulting from the global financial crisis in 2008. as this time CBE succeeded in controlling the exchange rate problem and overcome the black market and controlling inflation rates. also, during this period, the foreign exchange reserves rose from 14.1 billion US$ in 2002 to 15.3 billion in 2004, 21.9 billion in 2005, 26 billion US$ in 2006. that trend in foreign exchange reserves continued as reached a record of 37 billion US$ in 2010.

January 25 caused an unexpected political, economic and social instability, CBE resisted the sharp decline in the value of the Egyptian currency against the dollar, as it only fell from 5.8 in January 2011 to 6.1 pounds per 1 dollar in November 2012. To achieve that, CBE depreciated from foreign exchange reserves about billion US$ 19 to reach at the end of 2011 to 18.6 billion US$.

The reflection of the of 25 January 2011 on the Egyptian economy was catastrophic, as there was a significant decrease in the foreign exchange reserves, as Egypt lost 21 billion dollars until December 2012. Despite IMF classified Egypt as a stabilized.

The sharp decline in foreign exchange reserves forced CBE to take new measures. (see Figure No. (1), (2), and (3))

So, the CBE announced in December 2012 its adoption for a new system of putting the USD on auction to float the exchange rate in

practice. this led to new depreciation of the Egyptian pound against the USD, the British pound, and the Euro, this created an increasing demand for foreign exchange. Thus, Egyptian pound depreciated by 13% after the adoption of the CBE's managed foreign exchange auctions.

the large support from gulf countries allows the CBE to stabilize the official exchange rate, which depreciated by less than 2% against the USD.

However, the real exchange rate appreciates by 18% at the end of November 2014, due to high inflation and the appreciation of the dollar against the Euro. In December 2014, the CBE raised the weekly auctioned amounts by 25% (IMF, 2015).

furthermore, On March 14, 2016, CBE adopt a more flexible exchange rate policy based on supply and demand mechanisms to overcome

distortions in the foreign exchange market, as reducing the value of the Egyptian pound by 12.7% in the bids to banks, through the liberalization of exchange rates to give flexibility to banks operating in Egypt to buy and sell foreign exchange in order to restore trading within the legal channels and end the black market for foreign exchange, so the average exchange rate reached 8,85 pounds in 2016.(CBE, 2016).

On the 3rd of November 2016, CBE had announced again new adoption of a free-float exchange rate regime. at the same time, fuel prices were raised to contain the widening budget deficit. These decisions aimed to increase foreign currency flow into the formal channels raise private transfers, trade competitiveness, attract foreign investment, and return tourism revenues.

As a result, inflation rates increased, so the government undertook a set of measures, which are raising interest rates by 3% to reach

14.75%,15.75%, thus, State banks such as "National Bank of Egypt", "Banque Misr", and "Banque Du Caire" has presented certificates 18-months and 3-year investment certificates at 20% and 16% interest rates respectively, that led to increasing the converting into Egyptian pound. in addition, Selling 100 million US$ to local banks in an exceptional foreign exchange auction at exchange rate of EGP13. furthermore, banks worked overtime until 9 PM every day, plus Friday and Saturday, only for foreign exchange transactions, and elimination of limits or conditions on foreign currency deposits in banks (CBE, 2016).

Figure No. (1) demonstration the sharp depreciation in the Egyptian pound in 2016.

The US Dollar was traded during the first-week post devaluation at EGP16.3 inside banks, witnessed severe fluctuations for the following period till reaching its equilibrium point.

As a result, the increased inflation rate, as consumer price index (CPI) rose sharply in 2017 and 2018 so exceed in some period 30%, led to rising social pressures and the cost of living. as, the cost of local borrowing on level of Both the government and private sector witnessed the increasing rising due to elevating in interest rates, as interest rates of T−Bills for on 182 and 357−day uplift to 19.5% and 20.5% respectively compared to 16.1% and 16.8% one week earlier.

Figure No. (1) ER (Right Axis) & Broad Money % of GDP in Egypt

Source: Data from WB: World development bank.

37
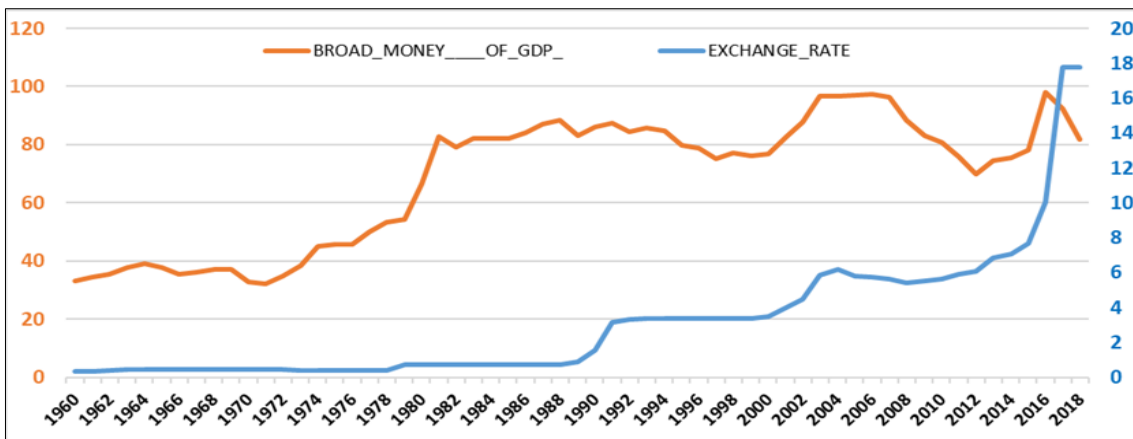
Figure No. (1) shows also the changes in Broad Money % of GDP in Egypt, where

Despite the bad inflationary effects of implement float exchange rate on 3 Nov 2016, obtained a positive effect on several aspects such as:

1. Foreign currency dealings were eliminated outside the formal channels, which supported the availability of more foreign currency in the banking sector.

2. Foreign exchange reserves increased to reach about $ 44 billion in 2019.

3. The agreement between Egypt and the International Monetary Fund discussed and Egypt obtained a $ 12 billion as loan in three stages. after fulfilling one of its main conditions.

4. Support exports and improve current account balance and balance of payments

5. Support tourism flows and return of tourism revenues.

6. Increase in remittances of Egyptian workers abroad.

7. Improve conditions for attracting foreign investments and Improve in indicators of Egyptian Stock Exchange.

8. Improve Egypt's credit rating.

9. Increase the economic growth rate and low unemployment rates.

2.6. The Gap Between Exports and Imports

The gap between total exports and total imports is the backbone of the Egyptian economic problem, as the demand for goods and services in Egypt exceeds the volume of output.

Figure No. (2) shows Gap Between Exports and Imports as % GDP
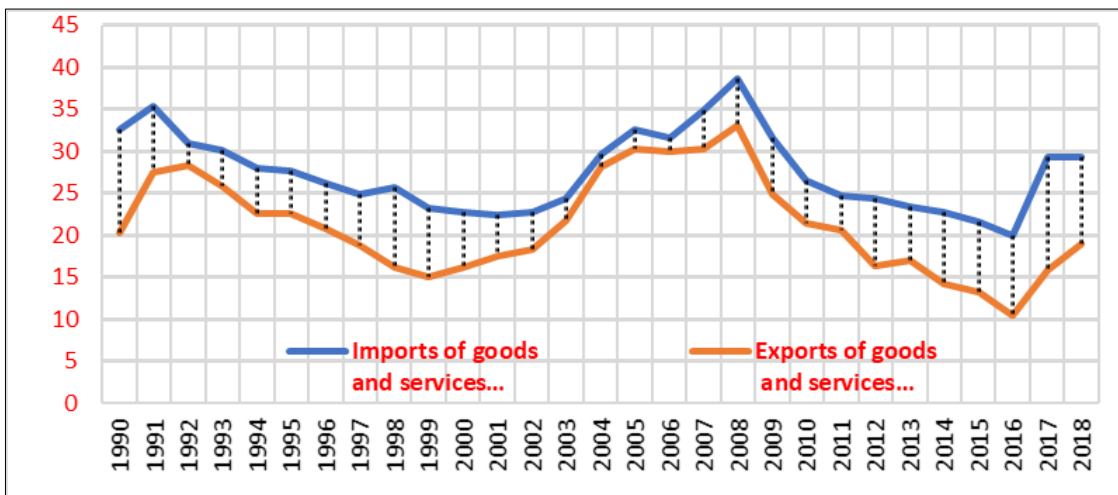
Source: Data from WB: World development bank.

Hence, the gap between exports and imports represents an important factor in determining the equilibrium real exchange rate.

The appreciation Egyptian pound leads to an increase in the gap, a decrease in the GDP, an increase in the unemployment rate, an increase in the current account deficit, and fall other economic indicators. This situation is considered a true embodiment of the problem of the imbalance of the exchange rate in the Egyptian economy.

Figure No. (2) illustrates the continuous shortage of net Imports (Gap)

The gap was estimated as a percentage of the GDP, as it demonstrates

that the gap exceeded 13% of the GDP in 2017, 10.45% in 2018. This

gap was more extensive in 1990 repented about 12.21% of GDP and

represented its lowest estimate in the years 2003, 2004, 2005, where

the shortage was about 1−2%GDP.

Therefore, when the level of trade openness increases in cases of

current account deficits, the impact is positively related to real exchange

rate in the short run.

2.7. Foreign Exchange Reserves

Figure No. (3) total foreign exchange reserves

and total foreign exchange reserves in months of imports
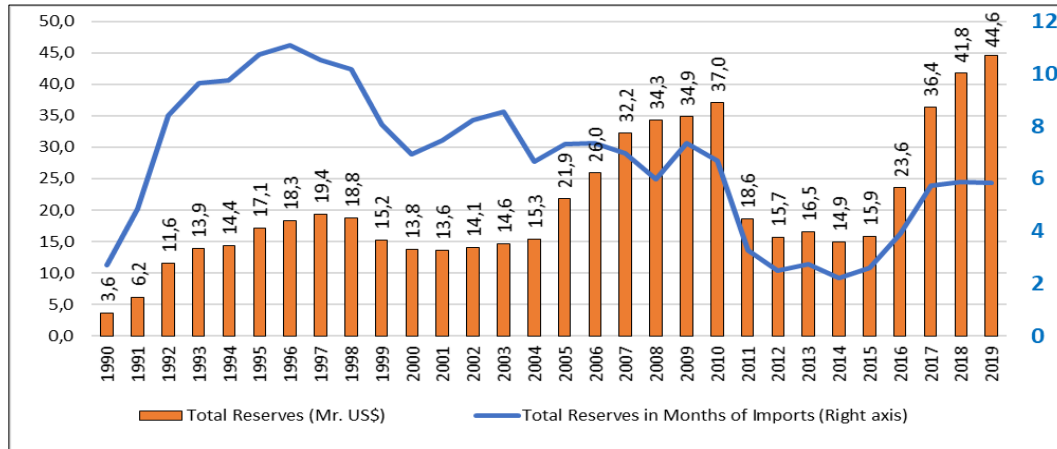
Source: Data from WB: World development bank.

Foreign exchange reserves play an important role in not only securing imports of goods and services but also in the ability to withstand and contain economics shocks. As the increase in foreign exchange reserves supports the Central Bank's ability to intervene to reduce the severity of shocks caused by internal or external conditions, and then maintain the stability of the exchange rate. on the other hand, the increase in foreign exchange reserves also leads to absorb part of the liquidity from the foreign currency market, and then its value increase.

Figure No. (3) illustrates the total foreign exchange reserves and total foreign exchange reserves in months of imports. the worst situation was after the incidence of 25 January till 2016.

2. Methodology

3.1. Data and Variables

This paper uses annual macro-economic data from 1990 (the economic reform) to 2018. All variables are expressed in logarithms.

The purpose is to normalize the variables and decrease outliers. So, the parameters are interpreted as elasticities. The data were collected from World development bank

- **Real exchange rate**

The research used RER because it accounts for change in prices, unlike nominal exchange rate. In order to calculate real exchange rate, we used the following formula (Ellis, L., & Ellis, L. (2001).

$$RER = E \times \frac{p}{p^*}$$

Where E is the nominal exchange rate, p is the price level of Egypt, and

p^* is the price level in United states.

- **Money supply:**

Plentiful money supply reveals the accessibility of funds in the market

used in purchasing goods and services. This leads to higher inflation

and depreciation of exchange rate.

- **Trade openness**

Measured as the sum of imports and exports as a percentage of GDP.

Trade openness indicates trade liberalization or the degree of rigidity of

restrictions on international trade. Trade openness affects foreign

investors' decisions to invest. Thus, affect the exchange rate (Nkalu, et

al. 2016).

- **Foreign Exchange Reserves**

Foreign exchange reserves have both direct and indirect effects on exchange rate stability. The direct effect is that it reduces the fragility of the economy against foreign shocks. whereas the indirect effect is through its encouragement to foreign investors to invest in long term assets.

Table No. (1): Variables

Abbreviation of Variable	Description	Source
LOG(RER)	Real Exchange Rate	World Bank: World Development Indicators
Log Trade	Trade Openness	World Bank: World Development Indicators
Log RES	Reserves in a Number of Months of Imports	World Bank: World Development Indicators
Log Broad	Broad Money as Percentage of GDP	World Bank: World Development Indicators

3.2. Model specification

This research uses the ARDL technique suggested by Pesaran and Shin (1999) and Pesaran et al. (2001) to detect the determinants of real exchange rate in Egypt in the period from 1990 to 2018. Where according to Mundell–Fleming model, in an open economy, the macro variables interact and affect each other with lags (Nakijoba, 2018).

The ARDL approach is a multiple–step procedure (M.H. Pesaran, B. Pesaran, 2009). First, we test for the co–integration (long run relationship) between variables using the bounds–testing procedure.

3.3. Co–integration

Co–integration makes it possible to save the long run relationship between the variables under study. Where, it mixes short run dynamics with long run equilibrium. So, in this research we are going to test for long run relationship using Autoregressive Distributed Lag (ARDL) Co–

integration technique or bound test of Co−integration (Pesaran and Shin 1999 and Pesaran et al. 2001).

Co−integration test inspects how time series, which though may not be separately stationary, can be combined such that the mechanisms of equilibrium forces will guarantee that they do not drift too far apart and share stationary linear combination.

The null and alternative hypotheses can be stated as follow:

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (no co-integration relationship)

While the alternate hypothesis,

H1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ (a Co-integration relationship exists)

Where coefficients β_1, β_2, β_3, β_4, β_5 represents the coefficients of the lagged $X_{1,t-1}$, $X_{2,t-1}$, Y_{t-1} and so on where (β_1, β_2, β_3, β_4, β_5) correspond to the long−run relationship, while ($\alpha_1 - \alpha_2$) represent the short−run dynamics of the model.

The hypothesis is tested by means of the f-statistic (Wald test).

If f-statistic beneath lower bound then we cannot accept the null hypothesis, so there is co-integration between variables under study.

On the other hand, if f-statistic above higher bound, then we accept the null hypothesis.

Finally, if f-statistic falls between two bounds, no decision can be made, and the researcher should verify co-integration with another co-integration test.

Our test results confirm that there is a long-run relationship among variables under study at a level of significance 1 percent.

3.4. Lag length criteria

Determining the appropriate lag length for variables in the ARDL model is extremely vital in order to obtain standard normal error terms that do not suffer from non-normality, autocorrelation, heteroskedasticity etc. we

use information criteria such as the Akaike Information Criterion (AIC),

Schwarz Bayesian Criterion (SBC) or Hannan−Quinn Criterion (HQC) to

determine the optimal lag length (k) to be able to estimate a proper

model of the long run.

According to SBC, our model lag order is (2, 1, 0, and 0) for the

variables log real exchange, log trade openness, log foreign exchange

reserves and log broad money as % of GDP respectively.

3.5. Unit Root Test

The ARDL approach can be applied if the underlying variables are

purely I (0), I (1), or a mixture of both. However, this technique will not

be valid in the presence of integrated variables of I (2) (Emeka N.,

Kelvin U., 2016)

So we test whether any of our variables are I (2), and we found that all

variables are stationary at the level of integration I (1) except broad

money is stationary at a level according to augmented Dicky fuller and

Philips perron (See Table No, (1) in the appendix)

3.6. The long Run Relationships

The long-term equation can be formulated as:

$$LogREX_t = a_0 + \sum_{i=1}^{p}(\beta_1\, logREX_{t-i}) + \sum_{i=0}^{Q}(\beta_2\, logTrade_{t-i}) + \sum_{i=0}^{M}(\beta_3\, LogReserves_{t-i})$$
$$+ \sum_{i=0}^{M}(\beta_4\, Log broad\, money_{t-i}) + U_t$$

Table No, (2): Long Run Relationships

Variable	Coefficient	t-Statistic	Prob.
Log Trade	-0.063240	-0.601677	0.5535
Log(reserves imports)	0.103704	2.537652	0.0188
Log(broad money as % of GDP)	1.122251	4.823377	0.0001
C	-2.995366	-3.178978	0.0043

We found that foreign exchange reserves and broad money have a

positive and significant impact on the real exchange rate in the long run.

50

As foreign exchange reserves increase by 1%, the real exchange rate increases by 0.1%, as increasing foreign exchange reserves lead to a decrease in the supply of foreign currency in the market, thus appreciate the real exchange rate and depreciating the Egyptian pound.

As broad money (money supply) by 1%, the real exchange rate increases by 1.12%. As broad money (money supply) increases, so inflation increases real exchange rate increases, depreciating the Egyptian pound.

3.7. The Short Run Relationship

The last step in this analysis is to estimate the parameters for the short-term by applying the Error Correction Model (ECM),

The following equation represents the general formula for the error correction form:

$$\Delta LogRExc_t = a_0 + \sum_{i=1}^{p-1} (\beta_{1i}\, \Delta LogRexc_{t-i}) + \sum_{i=0}^{Q-1} (\beta_{2i}\, \Delta Logres_{t-i})$$
$$+ \sum_{i=0}^{M-1} (\beta_3\, \Delta Logtrade_{t-i}) + \varphi ECT_{t-1} + U_t$$

Where:

φ represents the speed of adjustment in the short term to reach a stable equilibrium situation in the long term.

ECT represents the correction factor as a result of the fluctuations affecting the variables in the short run, in other words, it shows the period that the dependent variable needs in order to achieve equilibrium (Co-integration) with the independent variables in the long run.

Table No. (3): Error Correction Model (ECM)

Variable	Coefficient	t-Statistic	Prob.
DLOG(REAL_EXCHANGE(-1))	0.274270	2.617721	0.0165
DLOG(TRADE_OPENESS)	0.652617	5.005087	0.0001
DLOG(RESERVES_IMPORTS)	0.248950	3.938509	0.0008
CointEq(-1)*	-0.578742	-6.467773	0.0000
R-squared	0.787488		
Adjusted R-squared	0.760924		
Durbin-Watson stat	2.042369		

Both trade openness and foreign exchange reserves affect positively the real exchange rate in the short run. when trade openness increases which means the imports and exports as a percentage of GDP increase by 1%, the real exchange rate increases by 0.65 % in the short run. This means depreciation in the value of Egyptian pounds. This can be explained by the fact that Egypt is mono economy which means that its imports exceed its exports.

As foreign exchange reserves increase by 1%, the real exchange rate increases by 0.24%, to increase foreign exchange reserves requires a decrease in the supply of foreign currency in the market, which causes an increase in the value of the exchange rate and depreciating the value of the Egyptian pound.

ECT is significant at a level of 5% and has a negative sign. The value of the ECT parameter (-0.58) indicates 58% of distortions in the real exchange rates are adjusted yearly. Thus, the real exchange rate needs about two years to return to equilibrium.

The explanatory ability of the model is very good, as around 78 % of changes in the real exchange rate is described by the variables included in the model, and it does not suffer from autocorrelation problem as shown by the Durban−Watson statistic.

3.8. ARDL results

Table No. (4) demonstration ARDL results

Variable	Coefficient	T-statistics	Prob.*
LOG(REAL_EXCHANGE(-1))	0.644717	6.493937	0.0000
LOG(REAL_EXCHANGE(-2))	-0.310662	-3.966895	0.0007
LOGTRADE	0.364053	2.772565	0.0111
LOGTRADE(-1)	-0.406167	-3.418459	0.0025
LOG(RESERVES_IMPORTS)	0.069061	2.316519	0.0302
LOG(BROAD_MONEY____OF_GDP_)	0.747357	4.762808	0.0001
C	-1.994748	-3.101112	0.0052
R-squared	0.921928		
Adjusted R-squared	0.900636		
Durbin-Watson stat	2.317274		
F-statistic	43.29862		
Prob(F-statistic)	0.000000		

3.9. Robustness

In this research we conducted Jarque–Bera to test for normality, Breusch–Pagan–Godfrey to test for heteroscedasticity and the Serial Correlation, LM Test to test for autocorrelation to ensure that residuals

55

are not correlated. From the Jarque−Bera test results, we can identify that residuals follow a normal distribution.

After running Breusch−Godfrey (Also known as LM Test) Autocorrelation test, we can notice that the value of each of the (F−statistic and Chi−Square) are insignificant which means accepting null hypothesis (H_0), and therefore, the model does not have a problem of autocorrelation (see table 2 in the appendix).

According to Breusch−Pagan−Godfrey, the null hypothesis is that residuals are homoscedastic (has equal variance). So, the estimated parameters are more reliable in forecasting and, therefore, they can be relied on them in setting economic policies. if the probability of $\square^2$ exceeds 5% then we accept the null hypothesis. After running the test, we found that the statistics of chi−square is insignificant, and its

56

probability is 0.9997. Thus, the model does not suffer from the problem of heteroscedasticity. (See table 3 in the appendix)

To test for model stability, we used CUSUM and CUSUM square test. We can notice from the graphs that both the sum of the residuals and the sum of their squares move within the limits of significance (5%). This means that stability in the coefficients over the sample period and that the model is appropriate for the analysis, and its results are of high match quality. (see Figure No. (1) & see Figure No. (2) in the appendix).

3. 4. Findings and Recommendations

First, the result of the econometric model:

The findings of this study are approved, by using co-integration and vector error correction models. so, there is co-integration between

variables under study. and our test results confirm that there is a long-run relationship among variables understudy at a level of significance 1 percent.

We found that foreign exchange reserves and broad money have a positive and significant impact on the real exchange rate in the long run.

- As foreign exchange reserves increase by 1%, the real exchange rate increases by 0.1%.

- As broad money (money supply) by 1%, the real exchange rate increases by 1.12%.

We found also that Both trade openness and foreign exchange reserves affect positively the real exchange rate in the short run.

- when trade openness increases which means the imports and exports as a percentage of GDP increase by 1%, the real exchange rate increases by 0.65 % in the short run.

- As foreign exchange reserves increase by 1%, the real exchange rate increases by 0.24%.

ECT is significant at a level of 5% and has a negative sign. The value of the ECT parameter (-0.58) indicates 58% of distortions in the real exchange rates are adjusted yearly. Thus, the real exchange rate needs about 21 months to return to equilibrium.

The explanatory ability of the model is very good, as around 78 % of changes in the real exchange rate is described by the variables included in the model, and it does not suffer from autocorrelation problem as shown by the Durban-Watson statistic.

Second, the result from descriptive analysis and previous study:

The study confirmed that money supply, foreign exchange reserves, and trade openness are the main determinants of the exchange rate in Egypt.

The appreciation or depreciation of the exchange rate affects the overall economic activity of the state, affects domestic product and the volume of consumption, and then unemployment and income rates, as it affects inflation rates, and on the other hand, the exchange rate is affected by these factors.

External shocks have affected greatly the real exchange rates in Egypt during the study period and forced him to change the exchange rate regime more than once to adapt to the situation and achieve equilibrium.

Authorities in Egypt have succeeded in overcoming crises of the exchange rates, but it was characterized by a delay in applying solutions, which led to an increase in the cost of this on the economy and prolonged the recovery.

The study concluded that Egypt did not apply a floating exchange rate system as announced in January 2003 and in November 2016, but rather a managed float regime and this is consistent with what was stated in the results of the Paper of (Massoud and Willett, 2014).

Egypt exaggerated the depreciation of Egyptian pound in the first months to announce the float in 2003 and 2016 aiming to give a strong push to achieve:

- The definitive elimination of dealing in foreign currencies in informal markets and increase the supply of foreign exchange to Egyptian banks and eliminating dollarization and speculation.

- Attract remittances of Egyptians working abroad again

- Reduce the gap between exports and imports

- Confirm the confidence in the seriousness of implement a floating exchange regime.

Authority has already succeeded in achieving these goals, but this negatively affected the high rates of inflation, which was fuelled by the abolition of a large part of energy subsidies, which led to Egypt's record inflation rates and it causes itself in turn depreciation of Egyptian pound. The increase in interest rates contributed to attracting foreign investments in the local currency besides domestic investments, but it did not contribute to control inflation rates, as it is known, but rather increased it due to the increase in financing cost, which affected negatively on physical investments, So after the cut of interest rate decreased the inflation rates, increased physical investment, improved the value of the Egyptian pound against the dollar, and recovered the economic indicators comparatively.

Third, the recommendations are summarized in the following three points:

1. In determining the exchange rate, it is necessary to consider the impact of money supply in the long run and the impact of changes in foreign exchange reserves in the long and short run, as well as the effect of trade openness.

2. If it is difficult to implement a free-floating exchange rate regime, it should implement a managed floating exchange rate regime with a large degree of flexibility to maintain equilibrium and move the exchange rate gradually, to eliminate the gap between exports and imports and address the deficit in the BOP. In addition, save enough foreign exchange reserves capable of absorbing internal and external shocks.

3. Foreign exchange reserves must be used carefully, in cases that

    can be controlled to achieve exchange rate stability, and don't

    depreciate it merely as though support for the outflow of foreign

    currency, as happened in 2011. Thus, in cases of shocks and

    crises that exceed the absorption by foreign exchange reserves, it

    is better to move the exchange rate with great flexibility and

    enough speed.

4. References

1. Abdel-Aziz, Khairia Abdel-Fattah (1995), "The relationship of the exchange rate system to the rates of self-sufficiency of the most important food commodities in Egypt", PhD thesis, Faculty of Commerce, Zagazig University.

2. Abdel-Khaleq, Jouda (1999), "Economic Reform or a Dutch Disease", The Fourth Scientific Conference of the Arab Association for Economic Research, Arab Association for Economic Research, Cairo.

3. Abul-Eyoun, Mahmoud. 2003. "Monetary policy developments in the Arab Republic of Egypt and future trends." Working Paper No. 78 February 2003.

4. Atya, Eyad Mohammed (2017) The effect of Real Exchange Rate on Unemployment, Evidence from Egypt, Arab Journal of Administration, Vol. 37, No. 4.

5. Central Bank of Egypt (CBE), Years Book Various Issues. & https://www.cbe.org.eg/en/EconomicResearch/Statistics/Pages/Time Series.aspx

6. Dailami, M. and H. Dinh. .1991. "Interest Rate Policy in Egypt: Its Role in Stabilization and Adjustment", World Bank WPS 655. Washington, D.C: World Bank

7. Davidson, Russell; MacKinnon, James G. (2004). Econometric Theory and Methods. New York: Oxford University Press.

8. Dickey, D. A.; Fuller, W. A. (1979). "Distribution of the Estimators for Autoregressive Time Series with a Unit Root". Journal of the American Statistical Association. 74 (366).

9. Dolado, J. J., T. Jenkinson and S. Sosvilla-Rivero (1990).,

"Cointegration and Unit Roots." Journal of Economic Surveys 4,

249–273

10.   Domac, I. and G. Shabsigh. 1999. "Real Exchange Rate

Behavior and Economic Growth: Evidence from Egypt, Jordan,

Morocco, and Tunisia", IMF Working Paper WP/99/40. Washington,

D.C: IMF.

11.   Duffy J, Papageorgiou C and Pérez-Sebastian F (2004) Capital-

Skill Duffy J, Papageorgiou C and Pérez-Sebastian F (2004)

Capital-Skill complementarity? Review of Economics and Statistics.

12.   El-Erian, Mohamed and Mahmoud El-Gamal. 2001. Prospects

for Arab Monetary Policy in the International Financial System.

Working paper series. No. 52. February. Egypt: The Egyptian

Center for Economic Studies.

13.   El-Essawy, Ibrahim (2007) Egyptian Economy in Thirty Years, Academic Library. Cairo.

14.   Ellis, L., & Ellis, L. (2001). Measuring the real exchange rate: Pitfalls and practicalities (pp. 2001-04). Reserve Bank of Australia.

15.   Engle, R. and C. Granger, (1987). "Co-integration and Error Correction Representation, Estimation and Testing." Econometrica 55, 251-267

16.   Ezzat, Ahmed Mohamed (2006), "Linking the Egyptian pound exchange rate to a basket of currencies and its effect on the performance of exports. econometric study: Master's Thesis, Faculty of Economics and Political Science, Cairo University.

17.   Galal, A. 2001. "Egypt's Export Puzzle," Policy Viewpoint # 9. Cairo: ECES.

18.   Gujarati, Damodar N.; Porter, Dawn C. (2009). Basic Econometrics (5th ed.). Boston: McGraw-Hill Irwin. Durbin-Watson stat DW

19.   Harb, Reham Talaat (2007), "The exchange rate of the Egyptian pound and its effect on the weight Agricultural Trade during the period 1996 - 2005 ", Master Thesis, College of Commerce, Ain-Shams University.

20.   International Monetary Fund. (2013). Annual Report on Exchange Arrangements and Exchange Restrictions. Washington, DC: IMF, Publication Services

21.   International Monetary Fund. (2015), Country Report: Arab Republic of Egypt, No. 15/33. Washington, DC: International Monetary Fund.

22.   International Monetary Fund. 1998. "Egypt, Beyond Stabilization,

Toward a Dynamic Market Economy," IMF Occasional Paper 163.

Washington, D.C: IMF.

23.   Johansen, S., "Statistical Analysis of Cointegration

Vectors." Journal of Economic Dynamics and Control 12, 231–254

(1988).

24.   Keller, J., M.A. Veganzonnes, M. Nabil, D. Dasgupta and P. Alba

2000. "The Choice of Exchange Rate regimes in The MENA Region:

The Economic Cost of Lobby Groups", World Bank. mimeo.

25.   Khan, Muhammad Arshad and Qayum, Abdul (2008) Exchange

rate determination in Pakistan: evidence based on purchasing power

parity theory, MPRA Paper No. 6754, posted 15. January 2008

23:58 http://mpra.ub.uni–muenchen.de/6754/.

26.   Kilicarslan, Z. (2018). Determinants of exchange rate volatility:

empirical evidence for Turkey. Journal of Economics, Finance and

Accounting, 5(2), 204-2013.

27.   Massoud, A. A., & Willett, T. D. (2014). Egypt's Exchange Rate

Regime Policy after the Float.Int'l J. Soc. Sci. Stud.,2, 1.

28.   Mishkin, Frederic S (2016) the economics of money, banking and

financial markets the, 11th edition Pearson.

29.   Mohieldin, M & Ajok, A (2002) Exchange rate policy in Egypt In

Al-Sadiq, A et al. (2002) Arab Monetary Fund, Economic Policy

Institute, Exchange rate systems, and policies, United Arab Emirates.

30.   Muhammed O. Z., Fatima P. I. & Omade S. I., (2011), "Co-

integration Analysis of Foreign Direct Investment Inflow and

Development in Nigeria", Developing Country Studies, Vol. 1, No. 1,

PP 56-66, www.iiste.org.

31.   Nakijoba, S. (2018). Determinants of Nominal Effective Exchange

Rate in Uganda (2000-2017): A Vecm Approach. Applied

Economics and Finance, 5(5), 45-58.

32.   Nkalu, N., Urama, N., & Asogwa, F. (2016). Trade Openness

and Exchange Rate Fluctuations Nexus in Nigeria. European Journal

of Scientific Research, ISSN, 139-144.

33.   Noureldin, D. (2018). Much ado about the Egyptian pound:

Exchange rate misalignment and the path towards

equilibrium. Review of Middle East Economics and Finance, 14(2).

34.   Pesaran, M. H., Y. Shin and R. J. Smith, "Testing for the

Existence of a Long-Run Relationship." DAE Working Paper, No.

9622, Department of Applied Economics, University of Cambridge,

1996.

35.   Pesaran, M. H., Y. Shin, and R. Smith, 2001, Bounds testing

approaches to the analysis of level relationships. Journal of Applied

Econometrics, 16.

36.   Phillips, P. C. B.; Perron, P. (1988)."Testing for a Unit Root in

Time Series Regression" Biometrika. 75 (2).

37.   Shah, Abid Ali & Mehboob, Iftikhar & Raza, Syed Hassan (2012)

The impact of the exchange rate fluctuations on pakistan's export

sectors: an empirical analysis based on the sectorial data, Asian

Economic and Financial Review, October 2012, Volume 2, Issue 6.

38.   W. Charles Sawyer, Richard L. Sprinkle, (2009) International

Economics, Pearson Prentice Hall.

39.   Williams, H. T., & Sola, A. T. (2018). An Empirical Investigation

of the Determinants of Foreign Exchange in Nigeria. Archives of

Business Research, 6(6), 54−65.

40.   World development bank:

https://databank.worldbank.org/home.aspx

5. Appendix

Table No. (1): Unit root tests ADF

ADF				
Variable	intercept	Trend and intercept	intercept	Trend and intercept
Real exchange rate	-2.377	-2.13	-5.64	-5.60
Trade openness	-3.82	-3.72	-4.24	-4.21
Reserves in number of months of imports	-1.77	-4.00	-3.55	-3.46
Broad money	-4.38	-4.32	-3.86	-3.75

Table No. (1): Unit root tests Philips-Perron

Philips-Perron					
Variable	intercept	Trend and intercept	intercept	Trend and intercept	Level of integration
Real exchange rate	-2.69	-2.78	-5.52	-5.51	I(1)
Trade openness	-1.85	-1.88	-4.24	-4.21	I(1)
Reserves in number of months of imports	-2.07	-3.68	-3.40	-3.23	I(1)
Broad money	-2.11	-2.08	-3.81	-3.70	I(0)

Table 2: Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.623217	Prob. F(2,20)	0.5463
Obs*R-squar	1.701302	Prob. Chi-Square(2)	0.4271

75

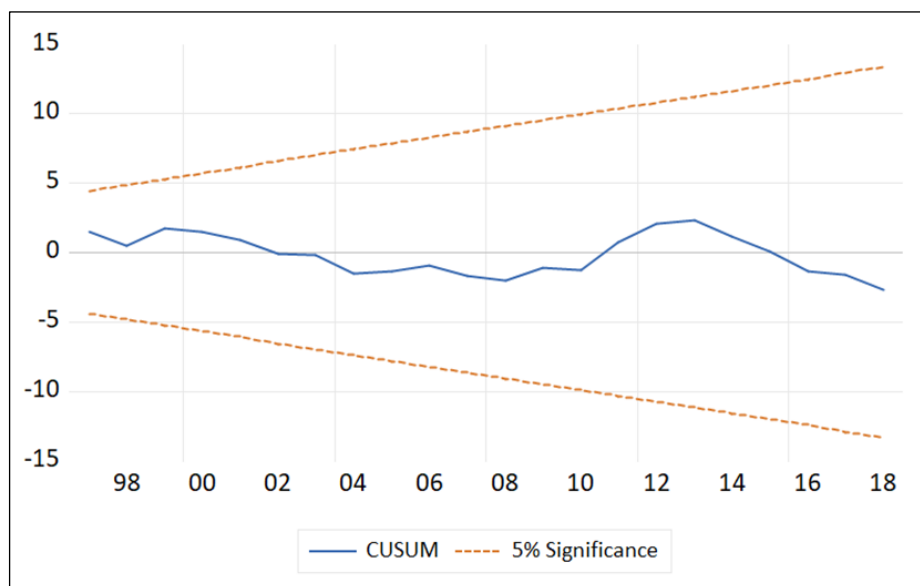| Table 3: Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	1.483981	Prob. F(6,22)	0.2296
Obs*R-squared	8.355348	Prob. Chi-Square(6)	0.2132
Scaled explained SS	3.891784	Prob. Chi-Square(6)	0.6913

Figure No. (1) CUSUM

Figure No. (2) CUSUM of Squares