ON EXCHANGE RATE POLICY:
THE CASE OF EGYPT 1970-2001[*]

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Working Paper 0312

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Abstract

Sound Estimates of equilibrium exchange rate have become a cornerstone for any country that adopts an outward oriented macroeconomic management policy. This paper attempts to construct an index for Egypt's Equilibrium Real Exchange Rate (ERER) for the period 1970-2001 so that misalignment episodes can to detected and analyzed. The paper starts by discussing the main concepts along with a brief summary of the literature on estimating ERER. The paper proceeds with a concise overview of Egypt's macroeconomic and exchange rate policies. Further, a model based on Edwards (1989) is developed and employed to test for and estimate both a short-run error correction regression, as well as a long run cointegrations specifications for ERER in Egypt. Estimated coefficients from the cointegration regression are used to generate a series of estimated long run real exchange rates and to construct misalignment index.

Empirical estimates underscore existence of substantial exchange rate misalignment over the examined period. The findings support the argument that Egypt, based on its macroeconomic fundamentals and external position, should adopt a flexible foreign exchange arrangement. As the exchange rate cannot be used, under the flexible arrangements, as an anchor for monetary policy, the study concludes by advocating inflation targeting as a framework for monetary policy in Egypt.

ان التقدير الصحيح لتوازن سعر الصرف قد اصبح حجر الاساس لأي بلد تتبنى اتجاها خارجيا بالنسبة لسياسة الاقتصاد الكلي. هذا البحث يحاول بناء مؤشر لسعر الصرف التوازني لمصر للفترة ما بين 1970 و 2001 حتى نستطيع اكتشاف وتحليل حلقات عدم توافق الرقم القياسي. يلقي البحث ايضا نظرة عامة مصغرة عن سياسات الاقتصاد الكلي لمصر وسياسات سعر الصرف. تصحيح الخطأ القصير المدى بالاضافة الى ذلك فقد تم تطوير نموذج مبني على نظرية ادواردز 1989 واستخدامها كوسيلة للاختبار من أجل تقدير كل من انحدار الى معالم التكامل لسعر الصرف التوازني لمصر. المعاملات المقدرةعلى المدى الطويل من تناظر الانحدار تستخدم لتوليد سلسلة أسعار صرف حقيقية وأيضا لبناء مؤشر عدم توافق الرقم القياسي.

توكد التقديرات التجريبية المسجلة وجود عدم توافق كبير للرقم القياسي لسعر الصرف في الفترة المدروسة، وتدعم هذه النتائج الرأي القائل بأن مصر بناء على أساسياتها الاقتصادية الكلية وموقعها الخارجي يجب أن تتبنى ترتيبات مرنة فيما يخص سعر صرف العملات الأجنبية. وبما أن سعر الصرف لايمكن أن يستعمل في ظل ترتيبات تتصف بالمرونة، كأساس للسياسة النقدية، فتختم هذه الدراسة بالدعوة لاستهداف التضخم كاطار للسياسة النقدية في مصر.

1. Introduction

Empirical studies tracking developments of Egypt's exchange rate policy and its impact on the country's economic performance and policy objectives are rare as well as sporadic. This paper attempts to update, as well as build on, some of the recent empirical studies of Egypt's exchange rate policies in an attempt to provide a more vivid and updated picture for policy makers. In doing so, the paper follows an approach which is built upon theory and dynamic specification, followed by estimation and validation, and finally by policy analysis.

Sound estimates of equilibrium exchange rate have become a cornerstone for any country adopting an outward oriented macroeconomic management policy. Recent theoretical discussions and empirical findings confirmed that excess volatility of real exchange rates and prolonged periods of real exchange rate misalignment would emit substantial welfare costs. On the contrary, countries that avoid substantial misalignments by means of maintaining appropriate levels of real exchange rate succeed in attracting higher levels of international capital flows, as well as promote their tradable sector's degree of competitiveness. Consequently, such countries enjoy episodes of macroeconomic stability, higher growth rates and improvement in the standard of living. Thus, topics such as real exchange rate determination and the estimation of the Equilibrium Real Exchange Rate (ERER)[1] in industrialized countries have been tackled thoroughly by researchers, yet such issues remain to analyzed completely in cases concerning developing countries. Although Egypt embarked on a comprehensive stabilization and economic reform program in the early 1990s, which has made the economy more liberalized and more open since that time, no attempt has been made by policy makers to officially evaluate or construct an ERER index to gauge and measure misalignments in foreign exchange market. Similarly, researchers and international institutions have overlooked the subject.

This paper aims to elucidate the main concepts concerning exchange rates, along with a brief summary of the literature on estimating Equilibrium Real Exchange Rates. The paper proceeds with a concise overview of Egypt's macroeconomic and exchange rate policies. Further, a model based on Edwards (1989) is developed and employed to test for and estimate short-run error correction regression, as well as long-run cointegrations specifications for equilibrium real exchange rate in Egypt. Estimated coefficients from the cointegration regression are used to generate a series of estimated long-run real exchange rates, as well as to construct misalignment index. The paper ends with concluding remarks.

2. Definition and Measurement of RER[2]

The most widely accepted definition of the real exchange rate is the relative domestic prices of tradables to nontradables $\{RER=(Pt/Pn)\}$.[3] The motivation behind using this definition, according to Edwards (1988), is twofold. First, it provides an index of the country's degree of competitiveness in international markets. Thus, a fluctuation in RER or real exchange rate-- holding international prices constant--reflects a fluctuation in the domestic cost of producing tradables, and hence a corresponding change in the country's international competitiveness rating. Second, Edwards' definition provides an internal index, which gauges change in

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[1] Researchers use terminologies such as Equilibrium Real Exchange Rate (ERER) or Fundamental Equilibrium Exchange Rate (FEER) or Desirable Equilibrium Exchange Rate (DEER) mainly to refer to the same concept with only slight differences in the assumptions and approaches adopted. However, there have been no attempts among scholars to force a standardization of terminology.

[2] For a detailed discussion of literature on RER measurement see Edwards (1985c), Wood (1987) and Dornbusch and Helmers (1988).

[3] According to Stanley Black and John Williamson, the Australian school was the first to acknowledge the significance of such relative price measure. However, the Real Exchange Rate earned its name from scholars in Chicago.

incentives across countries' sectors. Therefore, an increase in RER implies a relative increase in the price of tradable goods that will likely induce investors to increase their investment in the tradable sector, as it becomes more profitable. Hence, on the aggregate level, this will lead to a refocusing of resources from the nontradables sector to the tradable sector.

A major technical problem embodied in such a definition, and highlighted by Edwards (1989), is its failure to accommodate the issue of taxes on international trade. In an attempt to overcome this problem, RER was redefined by researchers as EP^*_t/P_n, where E is the nominal official bilateral exchange rate measuring units of domestic currency per unit of foreign currency, P^*_t represents the foreign price of tradables, and P_n is the domestic price of nontradables. However, given the practical difficulty of calculating such price terms and following many recent empirical studies[4], the most convenient and practical definition of bilateral RER is given by the formula RER= $WPITP/CPI_d$, where WPITP stands for *Wholesale Price Index of a country's trade partners*, and CPI_d for *country's domestic Consumer Price Index* (Domac and Shabsigh, 4). Such a definition supposes the given country to be fairly small, hence international prices are assumed to be determined abroad, i.e. exogenously determined.

Joan Robinson (1947) wrote,

> The notion of the equilibrium exchange rate is a chimera. The rate of exchange, the rate of interest, the level of effective demand and the level of money wages react upon each other like the balls in Marshall's bowl, and none of them is determined unless all the rest are given.

Armed with such elusive nature of ERER, several approaches have been designed to provide a practical and precise basis for estimating such an unobservable concept. Although such methods incorporate some limitations, recent approaches, especially the seminal methodology introduced by Edwards, have gained wide acceptance among scholars with relevant applicability to developing countries.

According to Edwards (1989), ERER is the relative price of tradable to non-tradable goods. Given sustainable optimal long-run equilibrium values of other relevant variables such as international prices, taxes, commercial policy, capital flows and technology, ERER results in simultaneously achieving both internal and external equilibrium. Internal equilibrium requires clearance of both goods and labor markets in the short- as well as long-term, which is assumed to exist with a non-accelerating inflation rate of unemployment (NAIRU). On the other hand, external equilibrium entails a devaluation of both present and future current accounts in order to bring them into accord with the country's expected long-run (sustainable) capital inflows.

Furthermore, such a definition is concurrent with the recent approach of modeling ERER, which, unlike the traditional view, shares the following principles:

1. The value of ERER that can be empirically measured is not a constant number but a function of other real variables ("the fundamentals"). Thus, the path of ERER will be affected by both current and expected values of the fundamental variables, which will change in response to exogenous and policy induced shocks. (El Badwai, 1994)
2. Equilibrium is essentially interpreted in terms of both internal and external equilibrium, with the latter incorporating both current as well as capital accounts.

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[4] See, for example, Ballasa (1990), Cottani et al. (1990) and Edwards (1990, 1998).

3. Finally, as mentioned by Williamson (1994, p.191), PPP doctrine is conceptually flawed, as it provides deceptive information, and therefore should be abandoned as a basis for calculating equilibrium exchange rates.

On the other hand, the traditional approach to ERER modeling follows the Purchasing Power Parity (PPP) doctrine, which assumes ERER as a constant number determined by choosing a certain base year in which a country enjoyed external equilibrium. Usually this would imply a positive or balanced current account, or more generally a surplus in the balance of payment.[5] Consequently, the value of the real exchange rate in such a year is considered to be the ERER value for such country. Any appreciation in such a value is therefore an overvaluation that will persist until the real exchange rate adjusts and returns to its original value.

Real Exchange Rate Misalignment[6] (RERMIS) refers to a situation in which a country's actual RER persistently and substantially deviates from its long-term sustainable ERER. In this case, an exchange rate that is more appreciated (or depreciated) than its equilibrium level will be classified as overvalued (or undervalued). However, literature has always allied RER misalignment with a consistently overvalued exchange rate instead of an undervalued one because the latter is theoretically associated with robust traded sectors and enormous trade surplus, hence triggering no harm or major risk to these countries at least in the short term.

Recent theoretical arguments, as well as empirical studies on developing countries, support the adverse effect of RERMIS on a country's economic performance. Conversely, countries which adopted sustainable and proper ER policies enabling them to keep their RER index in tandem with their estimated and variant long run ERER, were able to attract more FDI as well as achieve higher growth rates. (Keller et al, 2000). Such poor economic performance and macroeconomic instability takes place throughout various channels. For instance, an overvalued RER stimulates higher levels of domestic inflation and hence higher relative prices of exports, which hampers the country's competitiveness stance. Accordingly, this can lead to deterioration in the country's external position, international reserves depletion and drainage with the risk of a BOP crisis eventually occurring.

Also, the higher domestic inflation upshot of an overvalued RER distorts prices among different sectors of the economy, and also between domestic and international sectors. Consequently, a diversion of investments out of the usually more productive tradable sector implies a significant welfare loss encountered by the economy. Moreover, such overvalued RER can act as a catalyst for speculation, creating extra pressure on domestic currency with a possibility of huge capital flight or a macroeconomic collapse. In both cases, the economy will likely bear a high-priced bill to bail out the financial system (Domac and Shabsigh, 1999).

Furthermore, it is believed that overvaluation can cause an increase in the unemployment rate in the trade sectors. This is especially the case in the presence of rigidities and imperfect mobility of factors of production, as is the case in most developing countries. Such higher unemployment in the trade sectors will cause a decline in the aggregate income and demand, which will certainly entail a decline in the demand for nontradables, causing an even higher unemployment rate for the whole economy.

Finally, recent currency and financial crises, which dominated the 1980s and 1990s, prolonged fixed exchange rate arrangements associated with significant and unsustainable misalignments, i.e. overvalued RER, have resulted in a severe crisis. Simultaneously, these outcomes have had adverse effects on the credibility of countries' macroeconomic policies.

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[5] For detailed analysis of the PPP approach see Dornbusch, (1982).

[6] For formal discussion of the role of RERMIS see Dornbusch (1982) and Williamson (1985).

3. An Overview of Economic and Exchange Rate Policies in Egypt

The Egyptian economy has passed through four main developments, namely the nationalisation and heavy state intervention of the 1960s; the *infitah* (open door) policy adopted during the 1970s; an attempt for economic reform as a response to external shocks during the 1980s; and the initiation of a comprehensive Economic Reform and Structural Adjustment Program (ERSAP) in the early 1990s.

3.1. State Intervention

At the time of the 1952 revolution the economy was predominantly based on the private sector, which was responsible for 87 percent of the economy's value added and accounted for 95 percent of total civilian employment. Public sector activities were limited to the provision of public services such as electricity, water supply, railways and civil administration.[7] During the first five years following the revolution, no major changes in economic policy were apparent and the economy remained predominantly private.[8] However, the Suez Crisis of 1956 initiated a series of government interventions.

In 1961, the government implemented wide-reaching nationalisation measures, which marked the adoption an inward-oriented development strategy led by the public sector.[9] By 1963, all financial institutions, transportation and all significant manufactures were publicly owned. External trade and a significant amount of internal trade were also under state control, while agriculture and real estate--the only two sectors that were not totally owned by the government--were over-regulated by laws and decrees.

The 1967 war resulted in the loss of the oil revenues generated from oil fields and mines of the Sinai desert and the dues of the Suez Canal. At the same time, there was also a critical need for resources to rebuild the army. During the war period (from 1967 until 1973), military expenditure in Egypt reached an average of 25 percent of GDP, sacrificing investment and growth. Therefore, the government found it necessary to relax some of the restraints that had been imposed on the economy and to encourage foreign investment. Thus the government attempted to reduce the heavy restrictions on foreign exchange in 1968, and granted tax concessions as means of assurances to foreign investors against confiscation and sequestration in 1971.[10]

Although these attempts were not significant in terms of financial liberalisation and outward orientation, nevertheless they marked the start of a change in the Egyptian economic policy. These measures eventually led to a major development stride vested in the adoption of *infitah* (the open door policy) in 1974. This was a response to the internal economic problems related to heavy state intervention and to major external changes in international economic and political environment. In early 1970s, the economy suffered from severe maladies including sluggish productivity in the industrial sector dominated by publicly owned enterprises, slow growth in the agricultural sector, a large fiscal deficit and a prolonged imbalance of trade.

3.2. The Open-Door Policy (Infitah)

Arab petrodollars, Western technology and abundant Egyptian labor were the main pillars of the *infitah*. The stated objective was to increase exports, but the underlying strategy of import

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[7] World Bank (1987), pp. 124-126.

[8] The only significant change in economic policy before 1957 was the first stage of 'agrarian reform' in 1952, which was politically motivated to limit the power of the advocates of the old regime and gain some popular support from the recipients of the redistributed land.

[9] For an analysis of the Egyptian economy during the 1960s see Mabro (1974), El-Kammash (1968) and Hansen and Marzouk (1965).

[10] These measures are covered by Law 65 of 1971.

substitution remained without significant changes. The government endeavoured to attract foreign capital. Foreign investors were granted a five to ten years tax exemption, immunity from sequestration and unrestricted repatriation of profits.[11] Most of tax privileges granted to foreign investors were extended, after strong pressure, to cover indigenous firms in 1981.[12]

However, these measures only achieved partial liberalization of the Egyptian external sector,[13] leaving the 'internal sector' paralyzed with an array of restrictive regulations and a dominant public sector. Although the real growth rate of GNP during the early years of the *infitah* (from 1975 to 1979) averaged 8.6 percent, which was remarkably high by international standards, yet most of this growth was in the external sector, or in activities closely related to it, such as oil revenues, Suez Canal dues, tourism and remittance from Egyptian workers abroad. Meanwhile, the real growth rate in the agricultural sector, for example, was 1.9 percent over the same period.

Stimulated by the *infitah* policy and accompanied by a favorable external environment, the Egyptian economy continued to grow with an average of 8.5 percent until the mid-1980s. However, the *infitah* policy failed to produce sustainable growth or to generate sufficient employment for the growing labor force. The oil sector and the Suez Canal, for example, employed less than 1 percent of the labor force, even though they formed 16.5 percent of the GDP. Twelve years after the launching of *infitah* measures, state-owned enterprises were still dominating non-agricultural production activities. Then again, the private sector impact on the labor market was relatively high since it absorbed 59 percent of the labor force.[14]

3.3. The Reform Attempts of the 1980s

The Egyptian economy was not prepared to absorb the external shock in 1986 resulting from the sudden shortage in revenues, especially after the sharp decline in oil prices. The economy started to face serious difficulties in 1986: GDP growth rate declined, reaching 2.7 percent; fiscal deficit reached 23 percent of GDP, excluding debt amortization; current account deficit exceeded 10 percent of GDP; external debt accumulated to reach 119 percent of GDP with a debt service ratio of over 40 percent of total exports; and inflation accelerated to 25 percent in 1987 from an average of 17 percent during the preceding five years.[15]

Thus, towards the end of the 1980s, the economy suffered from several structural weaknesses including widespread price distortions (mainly due to extensive price controls and subsidies), negative real interest rates, a weak structured budget characterized by a highly inelastic and narrowly drawn revenue base, a balance of payments suffering from a limited non-oil export base, an imbalance between total export receipts and import payments, heavy dependence on workers' remittances, a high debt service burden and a complex exchange and inefficient trade system.[16]

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[11] According to Law 43 of 1974 and Law 32 of 1977.

[12] See Handoussa and Shafik (1993), p. 43.

[13] This was attained through Law 118 of 1975, which allowed the private sector to import goods, except those identified as 'strategic', which include essential food imports, such as wheat. It is worth noting that this law implicitly encouraged the use of black market foreign exchange through the so called 'import by the use of own exchange system', according to which the official currency exchangers were not responsible for providing importers with their foreign exchange requirements.

[14] Notice that the employment impact, as well as the contribution of the public sector to the GDP, were limited relative to the resources invested because of the higher capital-labor and capita-output ratios in this sector compared with the private sector. See World Bank (1987), pp. 5-8.

[15] World Bank (1988), pp. i-ii and pp. 10-11.

[16] IMF (1988), p. 2.

In 1987, the government started a macroeconomic reform program in coordination with the IMF and the World Bank, aiming at reducing external and internal imbalances. As a result, there were some improvements in the multiple exchange rate regime: exchange rates were reduced from at least five different rates to three, the Egyptian pound was gradually devalued by 25 percent in nominal terms and a free exchange market was established. Moreover, quantitative restrictions on imports were reduced, and exports were increasingly liberalized.[17]

The budget deficit was also reduced by significant cuts in consumer subsidies, bringing the prices of goods and services closer to their production costs, and increasing the price of energy closer to its international levels. Some measures were also taken into account to reduce government intervention in the pricing of agricultural products.[18]

In addition, a program to reform public sector enterprises and encourage the private sector was initiated. However, the pace of reform under this program was rather slow as the government faced difficulties in applying particular measures included in the program. This resulted in the temporary termination of the 1987 reform program following its implementation when the IMF refused to advance further drawings against the stand-by agreement after an initial disbursement in May 1987.[19]

3.4. The Economic Reform and Structural Adjustment Program of the 1990s

The Gulf War in 1990 and its consequences (substantial losses in workers' remittances, decline in tourist receipts and Suez Canal dues and deterioration of investment climate) resulted in a direct economic loss to Egypt, which was estimated at over US$ 2.5 billion. However, Egypt received significant financial assistance from the Gulf States, the United States and others. Financial assistance, coupled with higher oil export prices and a decrease in main import prices, especially foodstuffs, offset the losses incurred as a result of the Gulf crisis. The balance of payments experienced a surplus of around US$ 0.9 billion in 1990 and 1991, and debt forgiveness and debt rescheduling reduced the debt service from 46 percent of exports to approximately 16.5 percent, permitting an increase in the net international reserves from only US$ 1.7 billion to US$ 6.1 billion. These developments improved the creditworthiness of the Egyptian economy.

Nevertheless, by 1991 the economy was still suffering from serious imbalances, such as a budget deficit of 20 percent of GDP, an inflation rate of around 15 percent, deficits on the balance of payments that reached LE11.4 billion, an enormous foreign debt burden resulting from several years of expansionary fiscal policy, negative real interest rates and foreign exchange reserves that covered only around three months of foreign exchange payments. In addition, a loss of confidence in the domestic currency increased, shown by a rise in the "dollarization ratio" which reached 50 percent at that time.

In 1991, the government started an Economic Reform and Structural Adjustment Program (ERSAP), which was supported by a stand-by arrangement from the IMF and a structural adjustment loan from the World Bank, besides the bilateral debt forgiveness and debt service relief under the Paris Club. Such economic reform was designed to achieve macroeconomic stability, especially after recognizing that the partial reforms of the early eighties and debt rescheduling of 1987 were insufficient. This comprehensive program included financial

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[17] Dailami and Dinh (1991), op. cit., pp. 4-5 and World Bank (1990), p. 4.

[18] For an analysis of the impact of government intervention in agricultural prices and recent reform attempts see Dethier (1991), pp. 33-74.

[19] IMF (1988), p. 2 states that the 1987 reform program "was not completed because understandings could not be reached on policy actions in the areas of exchange system, interest rates, energy prices, and agricultural procurement prices, and on corrective steps relating to the 1987/88 budget and to departures in the exchange rate management from agreed commitments".

sector reform, interest rate liberalization, subsidies reduction, price decontrols, exchange rate unification, foreign trade liberalization, public sector reforms and a commitment to restrain the budget deficit. These measures intended to create a decentralized open market oriented economy receptive to FDI and private sector participation. Privatization was considered an integral part of the economic reform program.

The ERSAP consisted of three main phases over a period of seven years. The first phase, involved fiscal and monetary tightening, exchange rate liberalization, and price deregulation. The second phase, aimed mainly at further deregulation of prices, markets, investments, the financial sector and the encouragement of the private sector. Finally, the third phase was to further enhance the goals of the previous two phases with emphasis on paving the way for the private sector, encouraging capital inflows and guaranteeing financial liberalization of the Egyptian economy.

The economic reform program had several positive outcomes. As shown in Figure 1, fiscal deficit declined from 21 percent of GDP in 1987, to 1 percent in 1998. This rapid decline in fiscal deficit was achieved by revenue-increasing efforts and significant expenditure reductions. As for revenue, the main increases were based on exchange rate adjustment, which increased Suez Canal revenues and oil companies' profits, in addition to the introduction of a general sales tax. Concerning expenditure, deep cuts were made in the extensive capital investment budget, and significant reductions of untargeted subsidies were achieved. However, in 1999 the overall fiscal deficit started to increase, reaching 2.9 percent of GDP, and rose further in 2001 to 5.4 percent of GDP. The main cause of this increase was the government's long-term investments in Mega projects.[20]

As illustrated in Figure 2, foreign debt (as a percentage of GDP) started to decline in 1988. It fell from 209.3 percent in 1988, to 27 percent in 2001. The beginning of 1990s witnessed a huge fall in foreign debt, as it declined by roughly 30 percent compared to previous years. Despite the recent increase in fiscal deficit, foreign debt continued to fall indicating a reluctance to finance the current fiscal deficit by resorting to foreign borrowing.

The exchange rate in Egypt was pegged to the US dollar in 1991. A sterilization policy was followed to dampen the expansionary impact of capital inflows using T-bills sales at high positive real interest rates, with the proceeds deposited at the Central Bank of Egypt. This, among other things, led to a rapid accumulation of the foreign exchange reserves early in the stabilization program, amplified the authorities' commitment to the exchange rate peg and in turn reduced inflation expectations.[21] In addition, the relatively small fiscal deficit and tight monetary policy during that period contributed to the decline in inflation rates, as shown in the Figure 3.

On the other hand, the central bank's foreign exchange reserves increased from roughly US$ 10.5 billion in 1992, to more than US$ 20 billion in 1997. However, starting from 1998, the Egyptian economy faced three shocks that had a great adverse impact: namely, the worldwide decline in oil prices, emerging markets financial crisis, and the Luxor incident that negatively affected the tourism sector. Consequently, foreign exchange reserves, as shown in Figure 4, declined to reach US$ 13.8 billion in 2001.

As far as the external balance is concerned, the Egyptian economy has witnessed a growing current account deficit in the wake of the Asian financial crises. The sharp devaluation of the East Asian currencies adversely affected the competitive advantage of Egyptian exports,

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[20] Refaie (2000), p. 11.
[21] IMF (1998), pp. 2-4.

resulting in a decline in exports.[22] Moreover, the sudden decline in oil prices resulted in another export shock, and accordingly a deterioration in Egypt's terms of trade. All this adversely affected the capital account and resulted in a balance of payments problem that was aggravated by the decline in the tourism receipt following the Luxor incident. The capital account also witnessed an increase in capital outflow, and a decrease in capital inflows, which resulted in a capital account deficit of roughly 1 percent of GDP in the year 2000. However, preliminary estimates indicate that the current account deficit has greatly declined, roughly reaching 0.03 percent of GDP in 2001, due to an increase in exports proceeds and relative improvements in Egypt's terms of trade, as shown in Figure 5.

Thus, until 1998 the Egyptian economy managed to enjoy positive trends in its performance until its exposure to the three major shocks previously mentioned. It is normal for a small 'open' economy to be exposed to and affected by external shocks, however, exposure does not inevitably imply vulnerability. It is within the realm of economic management and governance to control the degree of exposure. After all, it is the responsibility of the management to deal with these shocks in order to minimize their negative consequences, while at the same time maximize their benefits.

However, the economic management at the time apparently adopted confusing economic measures with ultimate economic targets, thus creating some sacred economic values causing monetary and fiscal policies to be directed towards the goal of achieving and maintaining such targets. Moreover, affected by the media, it became a concern to the public, as well as some economic agents, to achieve a 1 percent fiscal deficit to GDP, 20 billion dollars of international reserves, and LE3.4 nominal value of the dollar against the pound.

It is widely accepted that there are four main economic targets, different from those emphasized by the government. Namely, these are sustainable real economic growth rate, low inflation rate, low unemployment rate and equity in the distribution of income and wealth. Thus, when the three shocks hit the Egyptian economy, the government did not use monetary policy as means of absorbing these shocks. The interest rate as shown in Figure 6, was almost flat in the late 1990s.

The main instrument used to defend the Egyptian pound was international reserves. But the inflexibility on the part of the government to use international reserves was a constraint, so it resorted to using it in a way that was described as doing too little too late. The intervention to supply dollars in the foreign exchange market was always delayed and with lower volumes than the requirement of the market, which many believed caused a credibility problem. This in turn resulted in an increase of speculative and artificial demand for dollars, and eventually caused a depreciation of the pound, a creation of multiple rates of the dollar, and an increase of the transactions undertaken in the parallel market, in addition to deepening the credibility problem with serious implications on foreign and domestic investment and savings.

Moreover, concerned with the draining of foreign reserves, the government then resorted to adjustment policies (which were a mixture of both expenditure reduction policies, such as reducing government spending and public investment, as well as constraining bank credit to the private sector), expenditure switching policies (that attempted to reduce imports and increase exports including the depreciation of the Egyptian pound), and commercial policies (such as imposing a 100 percent cover for opening import letters of credit for importers, and exports promotion strategies). In terms of capital market related adverse shocks and borrowing from abroad, Egypt's external debt has been relatively low with no maturity mismatch, while having a favorable debt service ratio by emerging economies standards.

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[22] The appreciation of the Egyptian pound could be another explanation. Exports declined by 4 percent in 1998 and further by 13 percent in 1999; however, it increased in 2000 by 44 percent compared to the previous year.

It is within the domain of economic management and governance that controlling the degree of exposure is most important. It is the responsibility of the management to deal with those external shocks in order to minimize their negative implications and at the same time maximize their benefits. However, the economic management adopted confusing measures, and unquestionably followed certain economic values and made them the target. Consequently, the country's external position deteriorated substantially putting extra pressure on domestic currency.

Developments of Egypt's nominal and real exchange rates

During the period of study, three distinct stages of foreign exchange arrangements are distinguishable.[23]

1. Before May 1987

Egypt employed a multiple exchange rate (MER) arrangement in 1969 to serve a twofold policy purpose. Firstly, this arrangement enabled the country to cushion the adverse impact of maintaining an overvalued exchange rate on the country's external and international competitiveness stances. Second, the heavy reliance of the government on workers' remittances as a source of foreign exchange, and its inability to control such flows, was another essential motive for adopting such an arrangement.

By the end of 1976, the foreign exchange market was segmented into three pools. First, a central bank pool which handled central government transactions; second, a commercial bank pool which received proceeds of workers' remittances, tourism revenues and other exports' revenues not going through the central bank pool, while at the same time governing transactions of public sector companies; third, a non-bank free market pool which was formally illegal, but officially tolerated, which attracted some of the remittances and tourism proceeds while governing private sector transactions.

2. From May 1987 to February 1991

The previous arrangement resulted in a steady appreciation of the RER of the pound, as well as an increase in the spread between different pools' rates, and encouraged the government to introduce a new ban on the foreign exchange market in May 1987. The initial rate was set at 2.165 per US dollar reflecting, at least in principle, the free market rate. Accordingly, the new rate was supposed to be adjusted by a committee to reflect market forces in the inter-bank market.

Gradually, this new market began to attract most of the transactions, eventually leading to the cessation of the old commercial bank pool in March 1989. This resulted in another major ER realignment and a significant depreciation of the pound RER. Subsequently, the new bank foreign exchange rate steadily depreciated and by the end of 1990 had reached LE3.0 per US dollar.

3. After February 1991

As a part of the comprehensive reform plan, MER was abolished in February 1991 and a unified exchange rate was introduced in October of the same year. Since then the pound has been traded in a single exchange market. Furthermore, in June 1994, easing capital account restrictions further liberalized the foreign exchange market.

Moreover, starting from the year 1991, Egypt opted for a hard currency policy with the exchange rate providing a nominal anchor in order to gain stability as well as to speed up disinflation. Although such arrangement achieved its policy purposes, the real effective exchange rate has appreciated significantly, undermining Egypt's competitiveness stance.

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[23] See Mongardini (1998), pp. 28-30.

Following Edwards (1989) definition of Bilateral RER[24] $\{(E*WPI_{US})/CPI_E\}$, where E stands for Egypt's nominal official exchange rate with respect to the US dollar, WPI stands for US whole sale price index (which contains primarily tradable goods) and CPI stands for Egypt's domestic consumer price index (greatly influenced by nontradable goods and services). Egypt's RER index was calculated for the period of 1970-2001.[25]

Detailed scrutiny of Figure 7 shows that, although a minor depreciation of Egypt's RER took place at the beginning of the seventies, starting from 1974 the RER index appreciated slightly from around 90 points to reach 78 points in 1978. This appreciation was mainly due to a relative decline in capital outflows and favorable terms of trade enjoyed by the country. However, this trend lasted shortly as RER depreciated significantly in response to the 1979 significant devaluation of the Egyptian pound.

During most of 1980s, RER appreciated uniformly as well as significantly from 135.2 points in 1980 to 47.8 points in 1988, affecting the country's competitive stance. This was mainly due to expansionary and unsustainable macroeconomic policies adopted by Egyptian authorities, allowing inflation to rise, a steady decline in capital outflows and lackluster performance of the tradable sector. However, successive devaluations taking place over the period from 1989 to 1991, along with significant deterioration in capital inflows, have managed to reverse this trend, depreciating RER to 146.4 points by end of 1991.

In aftermath of 1991, unification and liberalization of the Egyptian foreign exchange market, depreciation of official rate and relaxation of capital controls resulted in the extensive depreciation of the country's RER index. This was preceded by a continuous and steady appreciation period extending until 1999, but less significant compared with the appreciation of the 1980s. Thus, RER index declined to 111.7 points in 1994, and further down to 84 points in 1999. In addition to the role played by real fundamental variables such as higher confidence in Egyptian economy, several nominal forces were put into action contributing to such steady appreciation, such as substantial inflation differential gap between Egypt and U.S. during first half of the 1990s. This gap began to shrink substantially during the second half of 1990s, and the rate of appreciation slowed down simultaneously.

Consequently, this steady appreciation undermined the country's international competitiveness. This took place while the country experienced severe deteriorations in its trade balance and capital account in repercussion of the Asian crisis, while augmented by a decline in oil prices and tourism receipts. All these factors brought significant pressure on Egypt's official nominal ER, which in response started to increase slightly in mid-1999 causing RER to depreciate once more.

Moreover, according to Table (1) representing a statistical summary of Egypt's RER, the following general features are revealed: First, Egypt's RER has been fairly volatile over the period of study with the difference between the maximum and minimum values reaching almost 100 points. Second, during the 1970s, RER indexes showed a relatively stable motion, as measured by standard deviation. It scored 18.5 points unlike the 1980s and 1990s where standard deviation of RER index escalated to reach 32.3 and 25 points, respectively. Finally, Egypt's RER index fluctuated without exhibiting a definitive long-term trend with the mean oscillating from 92.3 points to 89.5 points, and finally up to 107.4 points during the 1970s, 1980s and 1990s, respectively.

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[24] Edwards's empirical study on 33 developing countries reveals that there was a considerable difference in behavior of these countries' bilateral and multilateral RER's. Hence, it is crucial when conducting any policy implications to use multilateral RER. Therefore, for simplicity this paper uses bilateral RER.

[25] According to such measurement, a rise in RER index entails depreciation while a decline implies appreciation.

A possible explanation for this ambiguous performance of RER indexes might be the offsetting and fluctuating behavior of the main fundamentals and nominal variables affecting Egypt's RER index over the studied period. Therefore, it is a daunting problem to try to disentangle changes induced by real and monetary shocks.

Developments in Black Market

Given the significant role played by the black market during the 1970s and 1980s and again in the late 1990s, it is crucial to incorporate it into this analysis. Based on the nature of such a market, it is quite difficult to find precise data of prevailing rates and thus caution should not be ignored when analyzing results.[26]

Statistical and graphical analysis of Egypt's black market RER index reveals the following general features: first, Egypt's BMRER has been fairly unstable over the period of study with difference between maximum and minimum index values reaching almost 95 points; however, it did not exhibit abrupt movements like the official index. Second and most importantly, the BMRER index, unlike the official RER index, shows a real appreciation RER index, shows a real appreciation in long term trend with index falling from 157.6 points on average in the 1970s to 113.6 points on average in the 1990s. Finally, following the 1991 unification and liberalization of foreign exchange markets, both indexes exhibited identical behavior until end of 1990s when a black market premium emerged and began to escalate again causing real depreciation of both indexes (Figure 8).

The previous section elucidates that movement in Egypt's official bilateral RER index can be explained by the behavior of both "fundamentals—real variables as well as transient nominal variables derived from theoretical analysis. However, it triggers several eminent inquiries that need further investigation such as the following important questions. First, whether movements in Egypt's real exchange rate (especially recent appreciation trends) represent a deviation from its equilibrium level, or represent a movement towards its optimal levels. Second, whether the long-term appreciation trend of the BMRER index (reflecting market forces) serves as a valid preliminary indicator that Egypt's ERER appreciated on average over the period of study (Figure 9). To be able to answer these important questions, the Egypt ERER index must be estimated for the period of study, a task to be accomplished by the remainder of this paper.

4. A Model of Real Exchange Rate Determination for Egypt

The model, which is based on research conducted in the late 1980s (Edwards 1989), is a simple dynamic optimization model of a small open economy with two basic sectors: tradable (including exportable as well as importable goods and services) and non-tradable. The model assumes several restrictions with the aim of establishing a simplified benchmark case with which dynamic paths and adjustment processes of real exchange rates (RER) can be analyzed vividly. Subsequently, this works toward conveying a more realistic economic environment. In short, the model attempts to examine the effect of both real "fundamental" variables and nominal variables on actual and equilibrium RER paths in both short and long terms.

The estimation procedures employed proceeds as follows: First, actual RER will be modeled applying Edwards's approach (Edwards 1989, 1994) which was extended by Elbadawi (Elbadawi, 1994) as a function of both fundamental variables in both the medium and long-term, as well as less persistent factors in the short-term. Subsequently, an estimate of ERER is then derived via use of optimal steady-state values of fundamentals. Afterwards, an index of Real Exchange Rate Misalignment (RERMIS) is computed representing the difference between actual and estimated ERER indexes.

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[26] In this study sources used for official and black market rates are International financial statistics and other various issues of World currency Yearbook.

Main arguments presented in the previous theoretical analysis section can be captured by the following reduced form of an equation that describes the dynamic behavior of the real exchange rate:

$$\text{Log (RER}_t) = \beta_0 + \beta_1 \log(\text{FUND}_{it}) + (1-\theta) \log(e_{t-1}) - \lambda (Z_t - Z_t^*)_t + \delta\text{NOMDEV}_t + V_t. \qquad (1)$$

Where **(FUND)** is a vector of fundamental "real" variables influencing ERER, **$(Z_t - Z_t^*)$** is a vector describing and quantifying deviation of policy variables from their optimal steady state values, and finally **(NOMDEV$_t$)** is the annual rate of nominal official depreciation.

Accordingly, long-term behavior of ERER represented as a function of main fundamentals can be specified by the following equation:

$$\text{Log RER}_t^* = \beta_0 + \beta_1 \log (\text{TOT})_t + \beta_2 \log (\text{NGCGDP})_t + \beta_3 \log (\text{TARIFFS})_t +$$

$$\beta_4 \log (\text{TECHPRO})_t + \beta_5 (\text{KAPFLO})_t + \beta_6 \log (\text{OTHER})_t + U_t. \qquad (2)$$

Considering the unavailability of long-term series spanning the period of study for most of these variables, In order for such a theoretically oriented equation to be estimated (as well as the relative importance of other variables for the Egyptian case), two solutions will be implemented. First, the most widely accepted and used proxies are to be employed instead of variables with unavailable data. Simultaneously, equation 2 will be augmented with other specific variables that played a major role in the Egyptian case.[27] Specifically, equation (2) will be estimated under the following conditions[28]:

1. Technological progress will be captured by Real growth of GDP.
2. As no data is available for government relative expenditure on non-tradables, government consumption as a percentage of GDP will be used.
3. Severity of trade restriction will be measured by the openness ratio.
4. When no well-defined measure of capital controls are available, capital outflows scaled by GDP will be used.
5. In order to measure Egypt's debt service ratio, short-term debt as percentage of GDP will be used.
6. Investment ratio to GDP will be measured instead by ratio of gross capital formation to GDP.
7. Measurement of external environment stance and its effect on country's export profitability is proxy by the external terms of trade.

The results of estimating general model[29] (including all suggested fundamentals) indicate that the estimated long-run coefficients of most variables have significant t-statistics However, real GDP growth and debt measure are exceptions in this regard. The null hypothesis that regressors are jointly insignificant is highly rejected at the 1 percent level of significance. Moreover, apart from the abnormality of residuals, diagnostic test statistics are satisfactory and consistent with the equation being a congruent model.

Subsequently, a recursive process[30] of eliminating statistically insignificant variables was carried out in order to derive a more parsimonious description of the model. In doing so, both the real growth rate of the GDP and a proxy measure of debt service ratio were eliminated.

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[27] Since a high number of proxies are being used, caution should be taken when interpreting estimated coefficients.

[28] A comprehensive description of both definitions and sources of the variables used is found in appendix I.

[29] For full details of regression applied and its outcomes refer to the technical appendix.

[30] This general-to-specific search methodology has gained wide acceptance recently by researchers, and is found to be superior to other methodologies (Hall, 1994).

The final estimated equation describing Egypt's long-term equilibrium RER behavior is set as follows:

ECM = LRER - 2.78209 - 0.358835*LTOT + 0.352201*LGCONS + 0.864635*LGCF - 0.912855*LOPENESS - 0.0148087*LCOUTFLOW;
WALD test: Chi^2(5) = 96.1658 [0.0000] **
(Check Table 3 for details)

Diagnostic tests indicating the null hypothesis that regressors are jointly insignificant are highly rejected at the 1 percent level of significance. Also, tests indicate a lack of significant evidence of misspecifications against historical sample information of data. Thus, the null hypothesis, which indicates that our model is fragile, can be rejected, as there was no sign of significant residual autocorrelation and hetroskedasticty.

Most of the estimates corroborate the theoretical model prediction since they display the expected signs, and are statistically significant at conventional levels. The ratio of government expenditure to GDP has a negative and significant elasticity in the case of Egypt. Hence excessive yet sustainable government expenditure leads to equilibrium RER appreciation. This confirms with economic empirical regularity that governments (Egyptian government in tandem with this view) tend to direct, relatively, a bigger portion of their expenditure to non-tradables, than does the private sector.

Similarly, investments to GDP ratios turned to have a significant negative elasticity and hence a rise in such ratios results in a relative augmentation of the relative price of non-tradables, thus appreciating the ERER. The implication of this result is that investment in Egypt during the period of study turned out to be predominately assigned to the non-tradable sector. A possible explanation might be intensifying government investment in infrastructure, which by nature consists mainly of non-tradable goods or services.

On the other hand, results indicate that an increase in the rate of net capital outflows (a decrease in net capital inflows) will induce real depreciation. This result is in harmony with what happened to Egypt recently after 1991 economic reform where the RER index appreciated steadily due to significant increase in the rate of capital inflows. Also, the statistically significant coefficient of openness specifies that a more liberalized and open economy requires a more depreciated ERER than a closed economy does. This explains vividly what happened in Egypt during middle and end of the 70s when the country liberalized its trade regime and started to open up with the rest of the world, which led to a period of real depreciation in observed RER.

Finally, terms of trade turned to have a positive and significant effect on Egypt's ERER, and hence an improvement in the country's terms of trade calls for equilibrium RER depreciation. Such results elucidate that in the Egyptian case,[31] unlike most of other developing countries, the substitution effect arising from better terms of trade tends to dominate the simultaneous income effect taking place. Accordingly, deterioration of Egypt's terms of trade during the second half of the 1980s can partially explain why a simultaneous RER appreciation occurred over the same period.

In brief, results in Table (4) are promising because they show that long-term coefficients are statistically significant at the 99th percentile. Hence we can deduce with confidence that the equilibrium real exchange rate index (ERER) derived from such estimates will be statistically significant.

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[31] For a detailed summary of the effects of terms of trade on ERER indexes in developing countries refer to Edwards (1989).

Existence of such long-term relationship requires the cointegartion of such fundamental variables. However, before carrying out any tests for cointegration, we need first to determine the order of integration of the fundamental series. Thus, a unit root test of fundamental variables was carried out and summarized in Table (4).

Testing stationarity of fundamental variables confirms non-stationarity of all variables. The results reported in Table (5) show that all the selected variables are integrated of order one. Such difference in stationary property of Real Bilateral exchange rate assents with majority of other empirical studies on RER. With regard to government consumption, ADF test results show that it is generated as integrated series of 1st order only at the 10th percent level of significance.

Hence, such results will influence the estimation procedure significantly in the following way: since all real variables suggested by theory turned out to be generated as integrated series of order one, they should be incorporated in first difference transformation when modeling short-term dynamics of RER. Otherwise, applying OLS method of estimation to non-stationary variables may induce estimators to tend to non-standard distributions.

Moreover, if such real variables' "fundamentals" have a long-term relationship with one other, given above results confirming that all variables are integrated of same first order I (1), then, an Error Correction Mechanism (ECM) will provide suitable specification that associate the short-term observed behavior of these variables with their long-term equilibrium growth paths. After all, the equilibrium relationship means that all variables cannot move independently from each other (Enders, 1995)

Thus, the next logical step to be taken is to conduct cointegration tests, which examine the existence of a long-term equilibrium relationship between the above selected fundamental variables. Two tests are carried out for such purpose. First, stationarity or order of the error term (ECM) in cointegartion regression is analyzed and determined and secondly a unit root test for the cointegration regressors is executed.

Results of former test reject the null hypothesis of no cointegration since residual was found to be stationary I (0) variable, while the latter test indicates that all variables appearing in the cointegartion regression are accepted as long-run level variables at conventional significance levels. Both results given below confirm the rejection of null hypothesis of no cointegartion, and hence we can proceed now to estimate an ECM specification for RER.

Aaugmented Dickey-Fuller tests for ECM (T=27, Constant)

	DF (0)	ADF (K)	Order of Series
ECM - (Cointegration residual)	4.301**	4.537** (1)	I (0)

It is important to mention, before proceeding with estimating the Error Correction Model (ECM) specification of RER, that the limited number of observations available make precise estimates of ECM specifications beyond reach.[32] Thus, caution should be applied while interpreting results. In my general error correction model specification I will incorporate up to 2nd lags[33] of regressors to avoid problems of serial correlation that might arise due to unspecified dynamics (i.e. due to exclusion of relevant lagged values of regressors) and then proceed by recursive elimination of insignificant lags.[34]

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[32] This casts some doubts about the validity of empirical findings.

[33] This implies that variables are included up to 3rd lags if considered in level formulation.

[34] For more details about estimation results see the technical appendix.

The final estimated error correction model for RER has the following specification with only insignificant lags excluded:

$$\Delta \text{Log RER}_t = \alpha_0 \, \Delta \text{Log RER}_{t-1} + \alpha_1 \, \text{ECM\_1} + \alpha_2 \, \Delta\log(\text{TOT})_t + \alpha_3 \, \Delta\log(\text{GCONS})_t, + \alpha_4 \, \log\Delta(\text{GCF})_t + \alpha_5 \, \log\Delta(\text{OPENESS})_t + \alpha_6 \, \Delta(\text{KAPOUTFLO})_t + \alpha_7 \, \log(\text{NOMDEV})_t + \alpha_8 \, \log\Delta(\text{IIFLATION})_t + \alpha_9 \, \log\Delta(\text{OTHER})_t + V_t \qquad (3)$$

Estimation results of such a model are presented in Table (6). The outcomes support error correction specification, as the negative coefficient of the error correction term is significant. Such a term incorporates forward-looking component of RER dynamics. Thus an estimated elasticity of (-0.328) in the case of Egypt points out that an observed overvaluation of previous period actual RER will induce a self correcting depreciation of next period actual RER, thus bringing it closer to its long-term optimal value. Such estimated automatic adjustment is larger than the average obtained by Edwards (1989) in his study on 33 developing countries, which turned to be (-0.19). Also, the coefficient of lagged RER was found to be significant and surprisingly large.

In addition, results elucidate that even in the short-term the RER is influenced by short-lived or temporary fluctuations in fundamentals. However, these effects were found not to be as uniformly significant as in the case of the automatic adjustment term as well as substantially smaller than long-term elasticities. The total effects (contemporaneous and lagged) of both government expenditure and investment ratios are negative, consistently with corresponding long-run influences, which imply that unsustainable growth of these ratios will induce a RER appreciation with overvaluation ensuing if the ratios exhibit permanent growth at accelerating levels.

In addition, both openness and capital outflow measures have positive short-term elasticities similar to their long-term elasticities, yet only former measure was found to be significant in the short-term. Finally, terms of trade turned out to have a negative short-term effect while the total effect, after considering lagged effect, swings back to signal a positive elasticity as in the case of cointegration regression.

Concerning the effect of policy shocks, results indicate that expansionary macroeconomic policies, whether in the form of excess supply of credit or high fiscal deficit ratio, will cause the inflation rate to soar. Given the negative elasticity of inflation in the estimated error correction regression, such expansionary policies will induce RER appreciation. Although estimated coefficient appears to be small (-0.032), permanent expansionary polices for a period of five years can generate substantial disequilibria.

Finally, estimated coefficient of nominal devaluation provides the final element of analyzing dynamics of RER. Results clarify that short-run effect (ignoring lag effect) is highly significant, yet its size is quite minimal (0.006). This validates the view that starting from an initial overvaluation scenario, nominal devaluation can be used by policy makers to speed up convergence process of RER towards its equilibrium optimal value. However, only if actual source of disequilibria is eliminated that such policy would serve as a short viable tool.

In a nutshell, results verify that an ECM specification of RER capture effectively the short-term dynamics of real exchange rate. Also, the assumption that the adjustment path of RER towards its equilibrium level is affected (accelerated or slowed down) by short-term policies such as monetary and fiscal polices, of which inflation as well as nominal depreciation are a consequence, turned out to be viable. Thus, both real and nominal variables influence short-term dynamic conduct of RER.

As previously mentioned, equation (2) is considered to represent behavior of long-term ERER. Following Edwards's and Elbadawi's approaches, estimates of Egypt's long-term ERER ($\underline{\text{Log RER*}_t}$) will be constructed as follows: long-term estimated coefficients of the

cointegration regression will be used as our coefficients, while monetary ("nominal") variables will be excluded since they are assumed to have a zero long-term elasticity (Edwards 1989, Elbadawi 1994). This limits our ERER constructing challenge to producing suitable time series reflecting sustainable or "permanent" values of ERER fundamentals incorporated in the cointegration regression. In doing so, a five-year moving averages of the fundamental variables will be employed to smooth transient volatility observed in these series. This will reduce the number of observations available by five. However, the constant variable is not smoothed for obvious reasons.

After constructing Egypt's ERER index according to the foregoing procedure, the index will be normalized using external balance criterion suggested and applied by Elbadawi, so as to assure that equilibrium index reflects the simultaneous attainment of both internal and external equilibriums (Elbadawi, 1994). In specific, the actual ERER index will be scaled so that its mean would equal the average of actual RER index for years at which Egypt's balance of payments account was almost in equilibrium (i.e. balanced).[35]

Figure 10 presents the time series of the actual bilateral RER as well as estimated ERER indexes for the period 1974-2001. An actual rate above (or below) the equilibrium value underscores that real exchange rate is undervalued (or overvalued). Figure 11 presents the difference between actual and equilibrium indexes for the same period.

The most salient features presented in these figures are the following: first, Egypt's ERER index exhibited quite a high degree of instability throughout the period of study which can partially explain the revealed sizeable volatile behavior of RER while other financial, macroeconomic and exchange rate policies would complement such observed RER fluctuation. Such point was interpreted by Elbadawi as a major proof against reliability of using PPP approach in analyzing RER misalignments (Elbadawi 1994). Second, such movements in the ERER index reflect major real structure changes and policy shifts, which took place in the Egyptian economy during the last three decades.

More importantly, the estimated scaled ERER index constructed can be used with success to explain major overvaluation and undervaluation episodes experienced by the Egyptian economy as well as major shifts in policy regimes adopted throughout the period of study. For example, according to Figure (11), the period spanning to 1978 can be considered as a period of minor overvaluation reversed only with the significant depreciation of domestic currency undertaken in 1979. Such depreciation led the country to an under-valuation episode as currency became more depreciated in real terms than equilibrium levels by 77 percent by 1979. Subsequently, such undervaluation kept on declining until it settled around 12 percent in 1982.

The estimated ERER index also captures major and elongated overvaluation episodes that took place throughout most of the 1980's. Such overvaluation was brought about by the adoption of an expansionary and unsustainable macroeconomic policy mix (while keeping a fixed exchange rate), the imposition of severe trade restrictions, and an increase in capital inflows. However, significant and successive devaluations undertaken in 1990 and 1991, as well as the implementation of economic reform program at the turn of 1990s which adopted strict macroeconomic policies brought an end to the real overvaluation incident. This was augmented by a substantial decline in capital inflows that took place at the beginning of the 1990s.

Once again the constructed scaled equilibrium index illustrates a period of real overvaluation during the second half of the 1990s, with overvaluation soaring to almost 20 percent in 1996

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[35] The years 1979, 1986, 1988 and 1993 were years at which Egypt enjoyed an almost balanced external position.

before starting to decline and converging back to equilibrium by the end of 1999. This was mainly due to the lax and unsustainable fiscal policy used by the government to finance mega projects needed to achieve targeted high growth rates.

In addition, statistical summary of Egypt's ERER index reveals the following general features: first, Egypt's ERER has been fairly stable during the 1970s with a clear swing in such trends in the following decades. Hence, the difference between maximum and minimum values of the scaled index escalated from a low of 16 points in the 1970s, to a high of 46.6 and 56.5 points in the 1980s and 1990s respectively. Second, Egypt's ERER index exhibits no definitive long-term trend since the index kept on oscillating during the period of study. Finally, despite such volatility of ERER index, it exhibited a cycle behavior over the studied period with no abrupt shifts.

5. Concluding Remarks

In this paper we attempt to construct an index for Egypt's ERER for the time period between 1970 and 2000 so that misalignment episodes can be detected and analyzed. The empirical estimates underscore that adopted exchange rate policies have resulted in substantial exchange rate misalignment over the examined period, which as suggested by economic literature is believed to have engendered negative outcomes on the economy. These results shed light on the importance of protecting the country's external competitiveness stance from effects of unsustainable and inconsistent macroeconomic policy.

Such findings should be interpreted only as a preliminary analysis of developments in Egypt's ERER since several shortcomings were encountered. Among these was the use of bilateral instead of real effective exchange rates in the course of estimation, accuracy of proxies used, and a limited number of observations available. Thus, viability of these results for policy formulation hinge on the ability of overcoming such hurdles.

All of the eight foreign exchange regimes described in appendix 3, which range from strictly fixed to strictly flexible, come with their shortcomings and associated benefits and risks. However, the analysis does support the argument that Egypt, based on its macroeconomic fundamentals and external position, can benefit from a more flexible foreign exchange regime. Such flexibility would mean abandoning the exchange rate anchor and searching for a nominal anchor. It would also require a different monetary and fiscal policies mix. In addition, it needs a good exit strategy in terms of timing, sequencing, announcement effects and supportive arrangements to provide the 'new' regime with the necessary elements of credibility.

Above all, a flexible exchange rate needs to be associated and supported by an inflation target and the adoption of a monetary policy rule. Egypt's track record of maintaining relatively low inflation rates, even before the start of the 1990s stabilization program, due to its monetary base relative to GDP, indicates a high possibility of success of an inflation targeting framework. We must admit that inflation targeting has so far not been adopted widely in emerging markets and there are skeptical arguments against its viability in a developing country like Egypt.

There are concerns that the monetary transmission mechanism is not efficient enough, quality of data and its analysis are not adequate, and that the financial sector development is insufficient. These problems, *inter alia*, would impede the development and implementation of inflation targeting. However, both Taylor and Goldstein make the case for inflation targeting in the absence of a typical OECD economic and institutional environment (Taylor 2000, Goldstein 2002). They emphasize that "some of the alleged required preconditions for

the successful l implementation of inflation targeting also apply to other currency regimes".[36] Moreover, monetary policy rules could be adjusted and modified in terms of the choice of instrument e.g. a monetary aggregate instead of interest rate in a 'strict Taylor rule,' or in the variables included in the rule and their weights, or the extent of change in the instrument to achieve the required change.[37]

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[36] Goldstein (2002), p. 64.

[37] Taylor (2000), p. 18.

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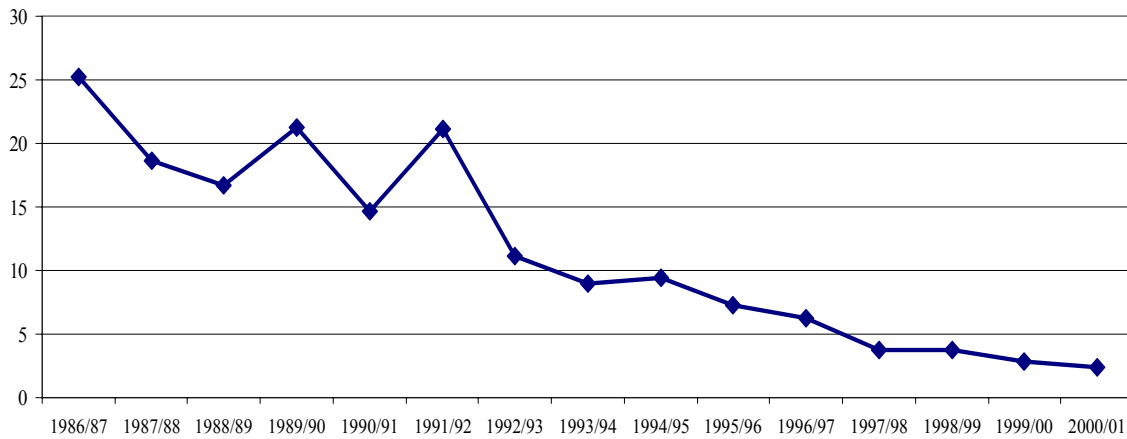**Figure 1: Fiscal Deficit (as a Percentage of GDP), 1990-2001**
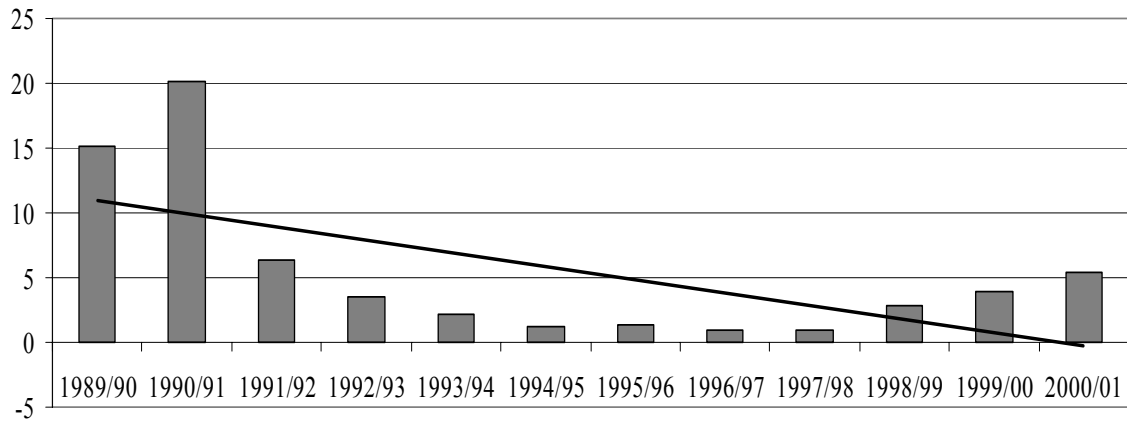
Source: Ministry of Finance

Figure 2: External Debt, 1989-2001

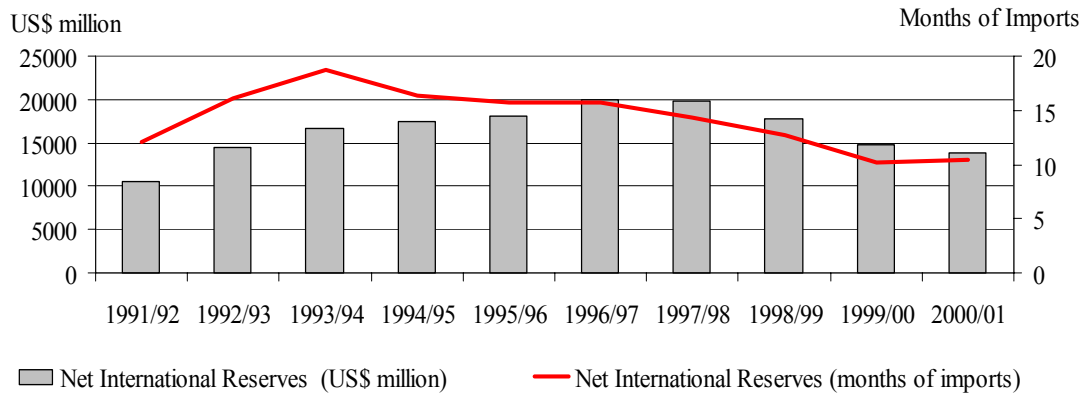Foreign Debt (%GDP)   Debt Service Ratio (%)
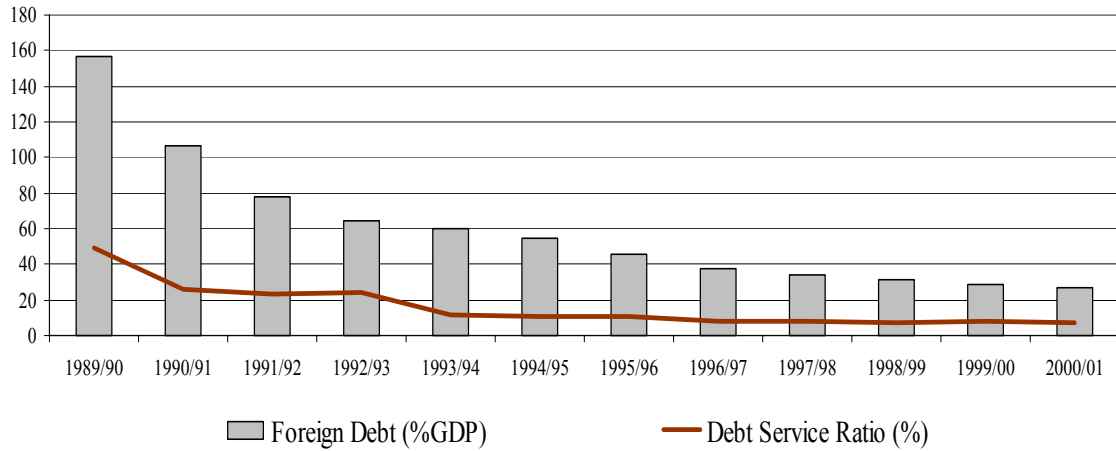
Source: Central Bank of Egypt

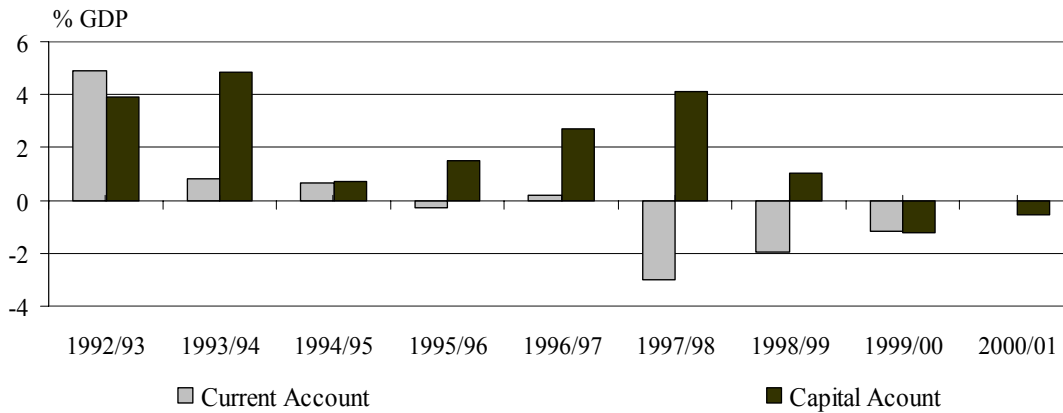**Figure 3: Annual Average Inflation Rate, 1987-2001**

Source: Central Authority for Public Mobilization Statistics

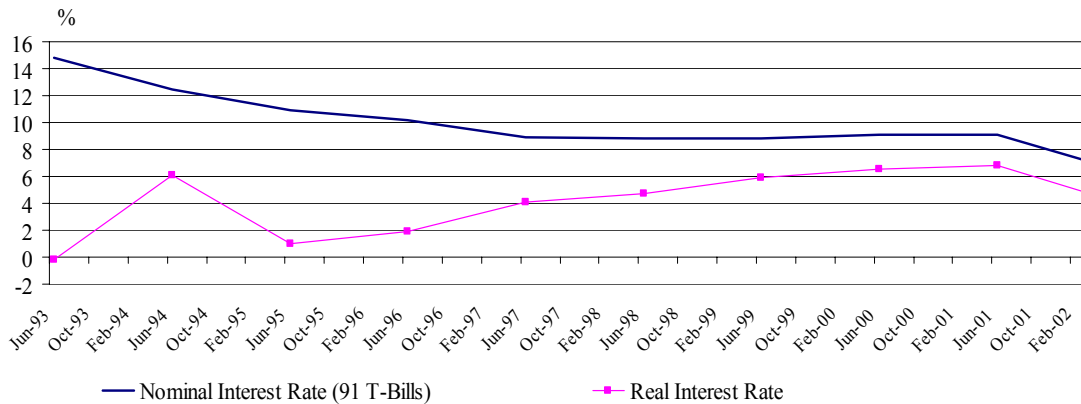**Figure 4: Foreign Exchange Reserves, 1990-2001**

Source: Central Bank of Egypt

Figure 5: Current and Capital Account Balance as a Percentage of GDP

Source: Central Bank of Egypt

Figure 6: Nominal Interest Rates (91 day T-Bills) & Real Interest Rates (1993-2002)

Source: Central Bank of Egypt

Figure 7: Evolution of Egypt's Nominal and Real Bilateral Exchange Rates
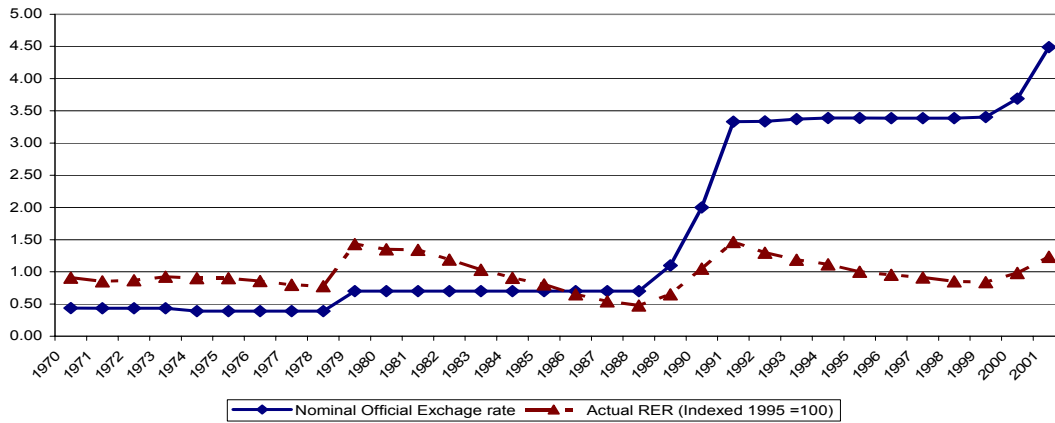
Source: IFS and Central Bank of Egypt.

Figure 8: Developments in the Egyptian Foreign Exchange Market.
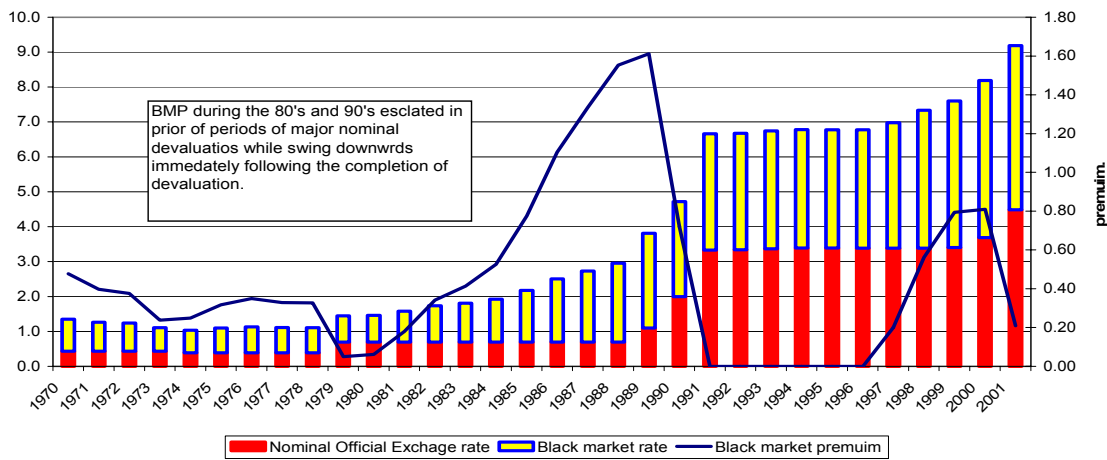
Source: IFS, Central bank of Egypt.

Figure 9: Evolution of Official and Black Market RER Indexes

Official V.S. Black market RER Indexes
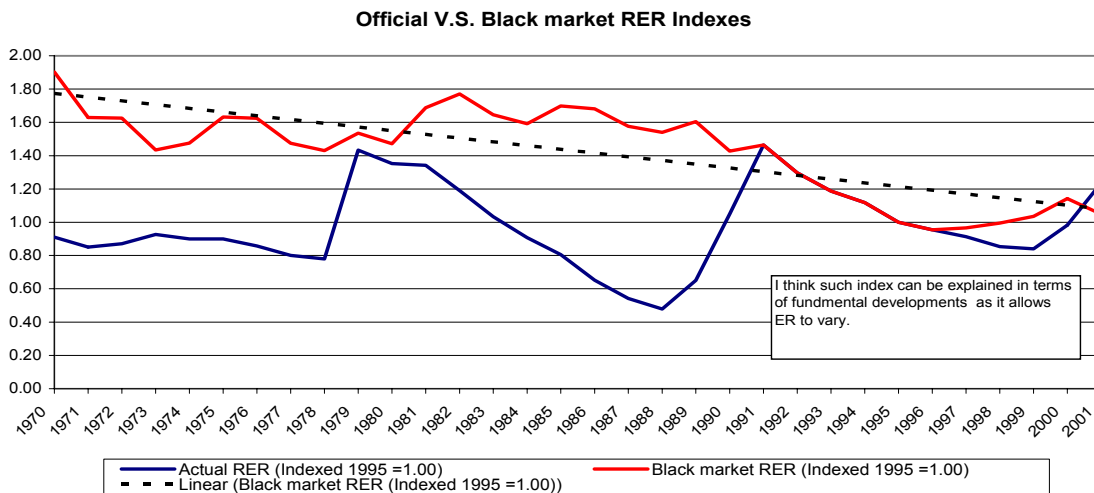
Source: IFS and, Central Bank of Egypt.

Figure 10: Evolution of Egypt's Actual and Equilibrium RER Indexes

Figure 11: Evolution of Egypt's RER Misalignment: *RERMIS = {(Actual RER- ERER) / Actual RER*100}*

Table 1: Statistical summary of Egypt's RER

Period	Mean	S.D	Max- Min	Min	Max
70's	92.257	18.509	65.3	77.879	143.181
80's	89.522	32.308	87.4	47.827	135.157
90's	107.410	19.110	62.5	83.925	146.423
1970 - 2001	97.084	24.481	98.6	47.827	146.423

Table 2: Statistical Summary of Egypt's Black Market RER

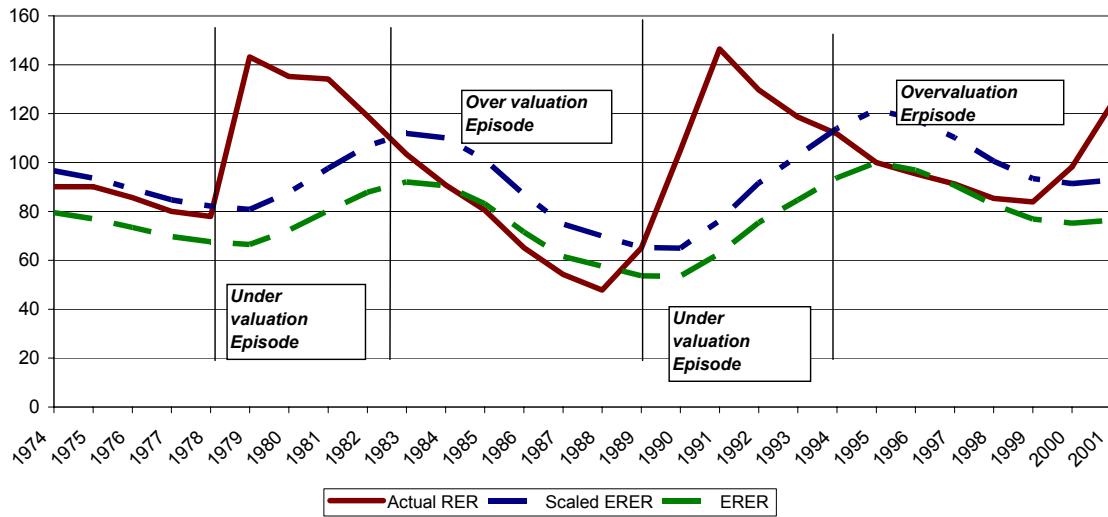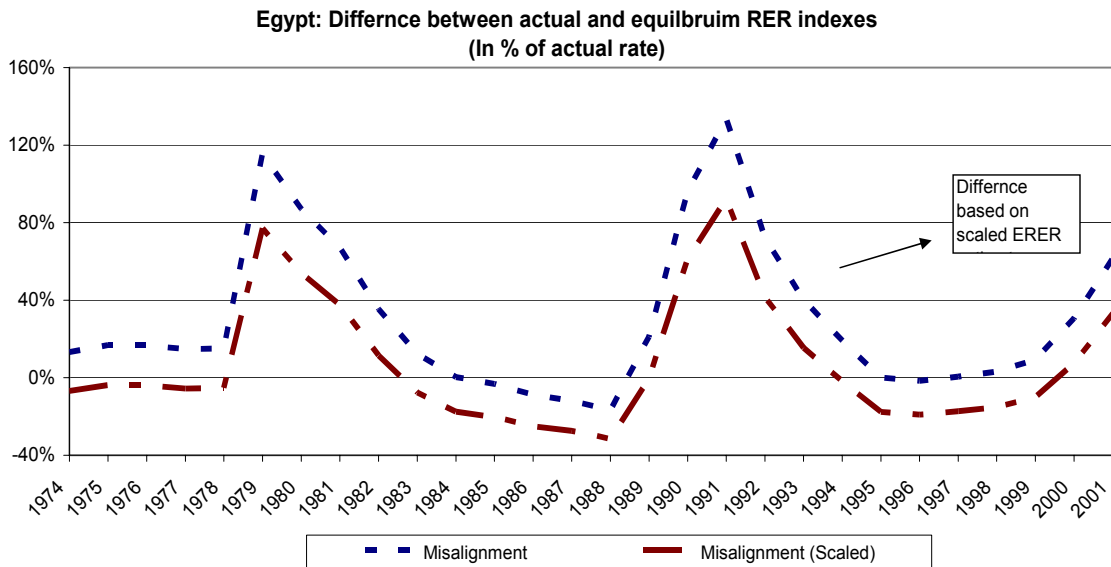| Period	Mean	S.D	Max - Min	Min	Max
70s	157.560	14.168	47.3	142.939	190.168
80s	162.607	8.734	29.86	147.139	176.999
90s	113.601	17.584	51.1	95.373	146.423
1970 – 2001	142.653	26.776	94.8	95.373	190.168

Table 3: Egypt Long-Term Cointegration Regression: Dependent Variable: log of RER Sample period 1970-2001

	Coefficient	Std Error	T-Value	T-Prob
Constant	2.788209	0.5488	5.07	0.000
LTOT	0.388835	0.1458	2.46	0.021
LGCONS	-0.352201	0.1230	-2.86	0.008
LGCF	-0.864635	0.1330	-6.50	0.000
LCOUTFLOW	0.0148087	0.005439	2.72	0.011
LOPENESS	0.912855	0.1605	5.69	0.000
$R^2 = 0.789$		DW = 1.75		F (6,25) = 15.65 [0.000]**

Notes: ECM = LRER - 2.78209 - 0.358835*LTOT + 0.352201*LGCONS + 0.864635*LGCF - 0.912855*LOPENESS - 0.0148087*LCOUTFLOW;
WALD test: Chi^2(5) = 96.1658 [0.0000**]

Table 4: Summary of Unit Root Tests (1970- 2001)[1]

	ADF (0) [2/]	ADF (K) [3/]		Order	Type
1- LRER	-1.787	-2.852	(4)	I (1)	Difference stationary
DLRER	-3.237*	-3.268*	(2)		
2- LTOT	-1.818	-1.508	(1)	I (1)	Difference stationary
DLTOT	-6.178**	-3.029*	(4)		
3- LCONS [4/]	-1.581	-2.112	(2)	I (1)	Difference stationary but at 10% level of sig.
DLCONS	-4.503**	-3.200	(4)		
4- LGCF	-2.305	-2.578	(3)	I (1)	Difference stationary
DLGCF	-7.062**	-4.907**	(1)		
5- LOPENESS	-2.035	-2.482	(3)	I (1)	Difference stationary
DLOPENESS	-3.738**	-4.154**	(1)		
6- LCFLOWS	-2.930	-1.590	(2)	I (1)	Difference stationary
DLCFLOWS	-5.592**	-8.861	(1)		

Notes: 1.Unit Root Test is based on Augmented Dickey Fuller tests (ADF) with an intercept but no linear trend. Such test is based on running an auxiliary regression: $\Delta X_t = \alpha_0 + \alpha_1 X_{t-1} + \Sigma \alpha_i \Delta X_{t-1}$. An asterisk (*) or (**) next to statistics indicates that the corresponding statistics is significance at 5% and 1% level of significance respectively according to critical values based on McKinnon (1991). Hence, confirming rejection of null hypothesis of unit root at corresponding significance levels. 2. AFD (0) test corresponds to Dickey-Fuller test. 3. Criteria adopted in choosing lag (K) is to select highest lag (k) for which corresponding b_i is significant, hence with lowest t-prob value to guarantee that they describe data generation process with the greatest accuracy. It is noteworthy to mention that the ADF statistics is given by the t-statistics on the X_{t-1} 's coefficient. 4. ADF test include a linear trend.

Table 5: Tests on the Significance of Fundamentals

	F-test	Value	Prob	Unit-root-test
Constant	F (1,26)	25.703	0.00**	
LTOT	F (1,26)	6.0535	0.0208*	2.4604
LGCONS	F (1,26)	8.1950	0.0082**	-2.8627
LGCF	F (1,26)	42.241	0.00**	-6.4993
LCOUTFLOW	F (1,26)	7.4135	0.0114*	5.6882
LOPENESS	F (1,26)	32.356	0.00**	2.7228

Table 6: Egypt Short-term error correction regression: Dependent variable: DLRER: Sample period is 1972-2001

	Coefficient	Std Error	T-Value	T-Prob
DLRER_1	0.907		7.54	
DLTOT	-0.0616		-.876	
DLTOT_2	0.1117		1.35	
DLGCONS	0.4209		1.36	
DLGCONS_2	-0.6033		-1.81	
DLGCF	-0.1583		-1.64	
DLGCF_2	0.1151		1.24	
DLOPENESS	0.336		2.81	
DLOPENESS_2	-0.1805		-1.51	
DLCOUTFLOW	0.0022		1.17	
ECM_1	-0.3279		-1.84	
NOMDEV	0.0061		8.15	
NOMDEV_1	-0.0066		-7.42	
DLINFLATION	-0.0032		-1.45	
DW 1.8		**$R^2 = 0.781$**		

Table 7: Statistical Summary of Egypt's Scaled ERER

Period	Mean	S.D	Max - Min	Max	Min
1974-79	87.856	6.355	15.759	96.595	80.836
80s	91.187	16.965	46.634	111.858	65.225
90s	98.094	16.711	56.510	121.526	65.016
1970 – 2001	93.433	15.350	56.510	121.526	65.016

Appendix 1

Abbreviation	Variable	Proxy for	Sources
RER	Real Exchange Rate	International Competitiveness	Calculated Index
ERER	Equilibrium Real Exchange Rate		Calculated Index
RERMIS	Real Exchange rate Misalignment		Calculated Index
RGDP	Real annual growth of Gross Domestic Product	Technological progress or "Ricardo-Ballasa effect"	
TOT	External Terms of Trade	Profitability of exports	World bank World Tables for period 1970-1990 and IFS for remaining of study.
GCONS	Ratio of government consumption to GDP	Government expenditure on non-tradable goods	IFS
GCF	Gross Capital Formation	Investment ratio	IFS
OPENESS	((Exports + Imports) of Goods and services)/ GDP	Severity of trade restrictions	IFS
COUTFLOWS	Net Capital Outflows = (Net change in international reserves – Trade balance)	Severity of capital controls	IFS
STDCAR	Ratio of Short Term Debt to Current Account Receipts	Debt service ratio	Calculated ratio
NOMDEV	Nominal devaluation of official exchange rate		IFS
INFLATION		Expansionary degree of Macroeconomic policies	IFS
BMP	Black Market Premium	Developments in foreign exchange black market	Calculated ratio
NOMDEV	Nominal Devaluation	Official Exchange rate policy	IFS

- Main sources of Data used are IMF"s (International Financial Statistics and world Economic Outlook), World Bank's (World Tables and World Debt Tables), Central Bank of Egypt, Ministry of Finance and CAPMAS.
- Because time series of TOT used in this paper is derived from two different sources a common indexation process was applied to the raw data.
- NOMDEV in this paper is assumed to be a policy tool adopted by government to achieve real depreciation and hence is treated as an exogenous variable.

Appendix 2: Egypt's Nominal Variables: Summary of Unit root Test

	ADF (0)	ADF (K)	Order	Type
1- NOMDEV	-3.257*	-3.049* (4)	I (0)	Trend stationary
DNOMDEV	-5.964**	-4.074** (1)		
2- INFLATION	-2.081	-0.9149 (4)	I (1)	Difference stationary
DINFLATION	-9.129**	-5.913** (1)		
3- BMP	-1.573	-3.074* (1)	I (0)	Trend stationary
DBMP	-2.538	-3.379* (4)		

General Model: Solved static long run equation for log of RER: OLS Estimation for period 1970-2001

	Coefficient	Std Error	T-Value	T-Prob
CONSTANT	3.052	0.629	4.85	0.000
LTOT	0.337	0.157	2.15	0.042
LGCONS	-0.538	0.23	-2.34	0.028
LGCF	-1.096	0.248	-4.42	0.000
LOPOENESS	0.054	0.058	0.932	0.361
LKAPOUTFL	0.014	0.406	2.38	0.026
LRGDP	1.107	0.247	4.48	0.000
LSTD	0.072	0.075	0.967	0.343
$R^2 = 0.797$		DW= 1.67		

Appendix 3

Description of Foreign Exchange Regimes

Regime	Description	Remarks
Free Float	Complete Freedom for market forces	Possible in theory but rarely sustained for very long in practice – the central bank usually wants to intervene to some degree.
Managed Float	Central bank intervenes, but usually only in attempt to smooth fluctuations	Very common; problem is that the central bank does not know whether a movement in the rate is a short-term fluctuation or the sign of a more fundamental trend.
Crawling peg	Central bank intervenes to achieve specific objective of controlled adjustment of rate, often on continuous basis.	Quite common, but only sustainable if market is in broad concurrence with central bank's view as to appropriate path of rate; adjustments may be in accordance with some formula (for example, to effect linkage to a basket of currencies, or to reflect inflation differential with competitor countries); formula or other basis for adjustment usually publicised).
Fixed, with margin or target zone	Permitted to fluctuate within margin, but central bank(s) intervene to prevent rate moving beyond margin	As with European Monetary System which has operated with margins ranging from 21/22 percent to 15 percent. If rate persists at or near limit, central bank faces some options and challenges as in fixed-rate system.
Fixed but adjustable	Fixed (with central bank support if necessary) for extended periods, perhaps within very narrow margins, but adjusted if in disequilibrium or if there is unwithstandable pressure	"Bretton Woods" system (where maximum permitted margin of fluctuation was 1 percent on either side of a declared parity against the dollar); widespread 1945-72 when the IMF had to adjudicate cases of "fundamental disequilibrium". May prove costly in terms of intervention if necessary adjustment delayed. Less common nowadays, since mobile international capital enforces adjustments sooner rather than later.
Fixed, by central bank	A stricter version of "fixed but adjustable"	Indefinite fixity intended, but cannot be guaranteed; adjustment may be necessary, even if the possibility is not openly admitted; otherwise required intervention may be prohibitively large. Rare nowadays, but may arise as prelude to European monetary union. Some historical examples of prolonged fixity when capital was less mobile or was subject to controls (for example, British pound and Irish pound up to 1979).
Fixed, by currency board (or gold standard)	Base money (=currency plus banks' balances at central bank) must be fully backed by foreign currency (or gold) at fixed rate	Strict and automatic discipline which ensures convertibility of base money at fixed rate and hence, by arbitrage, ensures close tracking by market rate. Nevertheless, resulting into pressure elsewhere in economy, for example, on banks, on activity, or on prices may give rise to political pressures for change in rate, or for abandonment altogether of currency board system.
Unified currency	Independent currency is abandoned and some other currency adopted	Question arises whether one country is entirely subservient to the other in terms of determining monetary policy and reaping seignorage, or is allowed a share.

Source: Latter (1996), p. 12.