Sustainability of Debt and Exchange Rate Policies in MENA: An Empirical Investigation*

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Abstract

In the wake of the recent financial and debt crises, the conduct of macroeconomic policies in the emerging MENA economies has recently become critical in determining those countries future economic situation, due to the accumulation since the early 1990s of a sizable level of external debt, and the pursuit by some countries of a fixed exchange rate regime. Using time series econometric models, this study assesses the sustainability of macroeconomic policies in a selected sample of 4 MENA countries. The empirical results point to sustainable fiscal and exchange rate policies in Tunisia and Morocco, and unsustainable external debt and exchange rate policies in Egypt and Jordan. While Egypt has recently moved to a flexible exchange rate regime, if Jordan still opts for maintaining a fixed exchange rate arrangement, it will have to implement crisis-prevention measures, namely by exercising fiscal discipline, and managing properly its external debt and foreign reserves.

Keywords: MENA; Exchange Rate; External Debt; Sustainability
JEL Classification: C22, E31, H63

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1. Introduction

The 2008 international financial crisis and the recent European Union (EU) debt crisis[1] have spawned a large amount of literature on their causes, consequences, impact on other emerging regions, and on the policies adopted to deal with them. It is time to take stock of the literature available on the subject, review it and identify the common and differing strands of analysis with particular emphasis on the changes made in the macroeconomic policy paradigms. If traditional macroeconomic policies and their modification in the context of the global crisis have not helped, are there any new directions that one can think of that will not only solve the current financial/debt crises and their impact on emerging economies, but also prevent future ones from developing?

The Middle East and North Africa (MENA) region has been suffering from large macroeconomic imbalances and sluggish economic growth since the 2008 United States (US) financial crisis, and the recent political and military turmoil since 2011 under the so-called Arab Spring movements. Rising budget and current account deficits have been associated with large increases in government internal and external public debts, volatile exchange rates, soaring inflation and interest rates, declining international reserves; lowering subsequently credit ratings and foreign investment inflows. This volatile macroeconomic environment is impeding growth and contributing to soaring unemployment and inflation rates, rendering debt and exchange rate regimes unsustainable. Moreover, it is well known that in times of crises, international lenders tend to reduce their lending to developing countries due to political instability and financial fragility making those countries more prone to be affected by financial/debt crises. [2]

[1] For a detailed discussion of the European Union debt crisis see Neaime (2015a).
[2] For a complete discussion of the impact of the international financial/debt crises on MENA's financial markets, the growth rates of GDP, and interest rates see Mora et al (2013), Guyot et al, (2014), Neaime (2005, 2012, and 2016), and Neaime and Colton (2004).

With low GDP growth rates and oil prices and high public debt levels, fiscal policy is for sure not a macroeconomic stabilization policy option anymore due to limited fiscal space in many MENA countries. Also with fixed exchange rates and free capital movements, monetary policy ceases to constitute an effective macroeconomic stabilization policy tool. Thus, the introduction of macroeconomic stabilization programs to curb MENA's macroeconomic imbalances is no longer a policy option for policy makers who need to consider alternative policy tools to deal with the current macroeconomic crises. Moreover, MENA's central banks have adopted policies that were not in consonance with the received wisdom. Opting for fixed exchange rates with an open capital account renders monetary policy ineffective in dealing with external financial shocks like the one emanating from the US financial crisis and the EU's debt crisis, and in dealing with internal shocks such as low GDP growth rates and high inflation and unemployment rates. However, the Central Bank of Egypt has recently announced its decision to move to a floating exchange rate system in order to quell any distortions in the domestic foreign currency market and render monetary policy more effective.

On the other hand, it is well known that some MENA countries have been running permanent current account and budget deficits for the past decade, resulting in an external debt that became close to 100 percent of GDP on average by the end 2015. With the accumulation of a sizeable foreign debt, the pursuit of a fixed exchange rate regime was perhaps justified in order to keep debt service costs under control. Subsequently, and while monetary policy became subordinated to preserving the exchange rate peg, MENA's central banks lost an effective policy tool that constituted an effective mechanism to neutralize monetary and macroeconomic imbalances, as well as external financial shocks emanating from the recent financial crises.

Pressures on Egypt's Pound (EP) started in 2011, the year that earmarked the beginning of the economic and political turmoil following widespread protests against Mubarak's government. Adding to this are the subsequent protests against Morsi's regime in 2012 through 2013, when Egypt's military toppled the regime and assumed power. The 2011 political turmoil led to current and capital account deficits. Egypt's main sources of hard currency are from remittances, tourism, and the Suez Canal. Tourism revenues dropped significantly amid rising political instability and a spate of high-profile terrorist attack. Remittances from Egyptian workers in the Gulf Cooperation Countries (GCC) also dropped due to the GCC's low oil prices and revenues, while revenues from the Suez Canal also decreased amid a slowdown in global economic trade. In order to maintain the exchange rate peg, and finance the current deficits, the central bank lost approximately USD 20 billion in foreign exchange reserves. As foreign reserves hit critical levels (just enough to cover three months of imports), forward looking economic agents, convinced that a currency devaluation was forthcoming, started speculating against the pound. On the other hand, to halt losing foreign reserves the central bank introduced capital controls and banned capital outflows exceeding US$ 10,000 in cash for travel purposes. This translated subsequently into further speculative attacks on the domestic currency fueling fears of further currency devaluation. In June 2016, the central bank lost USD 2 billion in one month following the central bank governor's declaration that the fixed exchange rate regime was a "grave mistake" signaling by this announcement an imminent devaluation. Finally, political tensions with Saudi Arabia in October 2016 led to further cuts in oil supply which constituted a second round effects fueling further wave of speculations against the pound which reached 16 pounds to the US dollar in November 2016.

Using time series econometric models, this study aims at examining empirically the sustainability of MENA's macroeconomic policies in a sample of 4 MENA counters over the period 1975-2015. It also establishes the links if any between external debt and exchange rates, to see whether they are sustainable. After identifying the sources of external and internal fiscal and monetary imbalances, the study proposes a set of macroeconomic adjustment measures for implementation in future policy formulation to avert future exchange rate and external debt crisis.

The rest of the paper is divided as follows. After a brief review of related literature in Section 2, the theoretical model to analyze empirically the sustainability of foreign debt in the MENA region is laid down. Section 3 highlights the empirical results obtained. The last section concludes the paper with some policy implications.

2. Theoretical Framework and Related Literature

The traditional literature on the sustainability of external debt and exchange rate policies has always distinguished between domestic and foreign debt. Within this context foreign debt has always been perceived as a more serious threat to an economy because it involves a transfer of wealth to foreign lenders, and because debt service payments are limited by foreign exchange earnings. Domestic debt, however, rests mainly on domestic borrowing and may be financed through either seigniorage revenues, or through the resort of increasing domestic taxes.

Two separate strands of literature address the issue of external debt and its linkages with the exchange rate regime. One such strand is the literature on sovereign debt. Following the debt and exchange rate crises of the last two decades, several authors focused on how a no-default debt equilibrium could be explained for sovereign borrowers (see Eichengreen, 1991 for a review) using models based on reputation (Grossman and Van Huyck, 1988) or sanctions (Bulow

and Rogoff, 1989). Some early empirical work associated with this literature (for example, Edwards (1984), Cline (1985)) attempted to link sovereign default to exchange rate policy, by considering how the exchange rate regime prevailing prior to a debt crisis would influence the occurrence of such a crisis. The central idea was that a flexible exchange rate may constitute a mean of adjustment to external shocks, and could have the effect of reducing the likelihood of an external debt crisis. However, when the exchange rate is fixed, monetary policy will be subordinated to defend the exchange rate peg, and could in no way be used to absorb external shocks, rendering the likelihood of a crisis occurring more significant.

A second strand is the variant of the currency crisis literature (for example, Obstfeld, 1996), which examines the factors that influence an optimizing government's choice to alter an existing exchange rate peg. While this literature considers such a choice as part of a wider menu of policies that also includes a fiscal instrument and a debt default option, it fails to link external debt to the prevailing exchange rate regime. This paper can thus be perceived as addressing gaps in both the debt crisis and currency crisis literatures by simultaneously looking at the interaction among exchange rate policy, fiscal policy, and potential default on external debt within the context of the small open MENA economies.

The analysis of both the sustainability of internal public and external debts is structurally identical. In fact, both frameworks are based on the study of government inter-temporal budget constraints. While the former rests on the financing constraint of the public sector, which relates the primary deficit plus nominal debt servicing to changes in outstanding debt, the latter relates external debt to debt service and next exports. Specifically, consider the following process of external debt accumulation in period t+1, denoted by B_{t+1}

$$B_{t+1} = (1+r)B_t - NX_{t+1}, \tag{1}$$

where NX_t represents net exports in period t, r is the nominal interest rate, and rB_t is debt service in period t.

Iterating equation (1) forward n periods and summing up we get the government's external inter-temporal constraint

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}} + \lim_{n\to\infty} \frac{B_n}{(1+r)^n}. \quad (2)$$

If the last term in (2) approaches zero as the number of periods increases, then the No-Ponzi-Game Constraint will be satisfied, i.e.,

$$\lim_{n\to\infty} \frac{B_n}{(1+r)^n} = 0. \quad (3)$$

The No-Ponzi-Game Constraint in (3), also known in the literature as the transversality condition is stating that the present value of external debt in the indefinite future converges to zero. For this to occur, external debt B in the numerator must grow more slowly than the rate of interest r. The government cannot finance interest payments on external debt by continuously issuing new external debt. This will happen when equation (3) is not violated, and equation (2) reduces to

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}}. \quad (4)$$

This is the solvability condition that has to be satisfied for external debt sustainability.

Empirically if the external debt series is non-stationary, then it means that it is growing without bound over time, which means that subsequent debt will also grow without bound rendering external debt unsustainable. This will also violate the No-Ponzi-Game constraint in equation (3). A stationary external debt series means that the series is reverting to a certain mean overtime and is not growing without bounds. If that were the case, then obviously external debt

would be sustainable, since it will be under control. Moreover, according to Feve and Henin (1998), for external debt to be sustainable in the long run, the ratio of external debt to exports should be stationary (i.e. effective sustainability condition), or else the hypothesis of unsustainable debt should be accepted.

To formally test for the existence of unit roots in the variables of interest for the four MENA countries, the following regressions are employed

$$\Delta P_t = \beta_1 + \beta_2 P_{t-1} + \sum_{i=1}^{k} \delta_i \, \Delta P_{t-i} + \varepsilon_t , \qquad (5)$$

where Δ is the first–difference operator; β_i, δ_i, are constant parameters; and ε_t is a stationary stochastic process. The number of lags (k) will be determined based on the Akaike Information Criterion.

To determine the order of integration of the series, model (5) is modified to include second differences on lagged first and k lags of second differences. That is,

$$\Delta^2 P_t = \lambda_1 \Delta P_{t-1} + \sum_{i=1}^{k} \mu_i \, \Delta^2 P_{t-i} + \varepsilon_{1t} , \qquad (6)$$

where, $\Delta^2 P_t = \Delta P_t - \Delta P_{t-1}$,; λ_i, μ_i, are constant parameters; and ε_{1t} is a stationary stochastic process. The k lagged difference terms are included so that the error terms ε_t and ε_{1t} in both equations are serially independent. To test for stationarity, the (ADF) and (PP) tests are applied to equations (5) and (6) and the results are summarized in the tables below. The null Hypothesis are $\beta_2 = 0$, and $\lambda_1 = 0$ respectively, i.e., a unit root exists in P_t and ΔP_{t-1} implying that the series are non–stationary.

Equivalently, cointegration tests between the different components of the balance of payments are also used in the empirical literature to depict the sustainability of external debt. If the export and import series are cointegrated, then again equation (4) will not be violated, since net exports in the numerator will not grow without bounds, and therefore external debt B will tend to converge to zero, and the No-Ponzi-Game Constraint in equation (3) will hold in this case. For instance, Fisher (1995) studies the long-term sustainability of the balance of payments deficit by testing the cointegration between imports and exports for the period 1947-1973 in the United States. Due to the existence of a cointegrating vector (-1; <1) for those two variables, the conclusion was that the current account deficit and therefore external debt are sustainable for the period under consideration.

Leachman and Francis (2000), believe that traditional unit root tests are not sufficient for the analysis of external debt sustainability, and should be paired with cointegration tests either between exports and imports, or between external debt and exports. In order to complete the analysis, the authors propose to integrate the intertemporal dimension in the dynamic debt accumulation by testing the existence of a cointegration relation between external debt and exports. If such relationship exists then external debt would be sustainable.

The empirical literature on MENA remains scarce with only a few studies analyzing the sustainability of debt and macroeconomic policies. For instance, and using time series econometric models over the period 1969-2009, and the Present Value Constraint model, Neaime (2010) examines the sustainability of MENA public debt. The empirical results point to strong sustainability of fiscal policies in Tunisia, weak sustainability in Egypt, mixed results for Morocco, and unsustainable debt and fiscal policies in Jordan and Turkey. In two other papers Neaime (2004, 2015b) analyzed the sustainability of public debt and exchange rate policies, as

well as, the relationship between current account and budget deficits in the emerging small open economy of Lebanon. The empirical results point to unsustainable debt and exchange rate policies. Other empirical results support the existence of a uni-directional causal relationship between the budget and current account deficits, indicating that rising fiscal deficits have started to put even more strain on the current account deficits and on the national public debt.

3. Econometric Analysis and Results

3.1 Data and Sample

The data used in this section are retrieved from the International Monetary Fund's (IMF) International Financial Statistics (IFS) and Direction of Trade Statistics for exports, imports, and the current account, as well as from the World Bank's Global Development Finance, and World Development Indicators. We gather data on government revenues (IMF, IFS: Line 81), expenditures (IMF, IFS: Line 82), budget balance (IMF, IFS: Line 80), government total public debt (domestic debt: IMF, IFS: Line 88a), and foreign debt: (IMF, IFS: Line 10 89a), exports (IMF, IFS: Line 70), and debt service (WDI). Depending on data availability, the sample period spans the years 1975-2015 for the MENA economies of Egypt, Jordan, Morocco, and Tunisia.

3.2 Empirical Results

Figure 1 (a) indicates that Egypt's exports and imports have been growing constantly over the past two decades with the exception of the period 2008-2015 right after the US financial crisis. The gap between exports and imports started widening significantly after 2008 resulting in consecutive current account deficits, reaching USD 16 billion in 2015 (see Figure 1(b)). In between 2000-2008, the depreciation of Egypt's Pound has stimulated exports, reaching in 2015, USD 20 billion. Egypt's central bank has been able to accumulate foreign reserves since 1989,

reaching a high of USD 30 billion in 2008 (Figure 1 (d)). After the 2008 financial crisis, foreign reserves experienced an alarming decline from USD 30 billion in 2008 to below USD 10 billion by the end of 2015. This significant fall in foreign reserves pushed the central bank to float its currency in November of 2016.

Similarly and right after the 2008, Egypt's external debt started to increase again reaching USD 35 billion in 2009 (Figure 1 (c)). After a series of controlled depreciation, Egypt's exchange rate was floated in 2016 after significant pressure in foreign exchange markets and the huge decline in foreign exchange reserves (Figure 1(e)). Finally Egypt's interest rates have been hovering around 12 % since 2000 after peaking in 1992 at 20 %. The recent move to flexible exchange rates is expected to ease off the pressure on interest rates, stimulate exports and reduce inflation rates (Figure 1(f)).

INSERT FIGURE 1 ABOUT HERE

Table 1 reports the unit root test results for the ratios of external debt (D) to exports (X), the current account (CA) to exports, and external debt to GDP.[3] Both the PP and ADF unit root tests point to the non-stationarity of the 3 variables, indicating that they are I(1) non-stationary series. Thus, according to Feve and Henin, the non-stationarity of the external debt to export ratio implies that external debt is not sustainable. Also, the non-stationarity of the external debt to GDP ratio and the current account to export ratios indicate that external debt is not sustainable.

INSERT TABLE 1 ABOUT HERE

[3] Unit root tests were also performed on the ratio of external debt to the current account. These tests also indicate that this ratio is I(1), pointing to the non-stationarity of external debt and therefore to its unsustainability.

Moreover, Table 1 reports, the ADF and PP tests for exports, imports and external debt series. It is clear that all 3 series are non-stationary I(1) series. Since the external debt series is non-stationary, then it means that that the No-Ponzi-Game constraint in equation (3) is violated, which means that Egypt's external debt is not sustainable. Moreover, following Fisher and Leachman and Francis, we next look for a long-run relationship between imports and exports, and between exports and external debt.

INSERT TABLE 2 ABOUT HERE

The Johansen test, a widely used econometric tool for co-integration analysis, examines the possibility of a long run relationship between the respective variables. The test is based on the λ- trace and the λ-max-eigenvalue of the stochastic matrix. Table 2 reports no long-run relationship between the exports and imports series. As is also clear from Figure 1(a), there exists a significant gap between the two series over the three decades under consideration. Moreover, Table 3 reports no long-run relationship between external debt and exports. Therefore, one can safely conclude that Egypt's current account deficit and therefore external debt are not sustainable for the period under consideration.

INSERT TABLE 3 ABOUT HERE

Egypt has successfully shifted to a flexible exchange rate regime in 2016. This move is perceived by policy makers as an important step in the right direction. Egypt's exchange rate float will help ease up the pressure on interest rates and subsequently on external debt service. The move to flexible exchange rates, will also help stimulate exports and reduce the pressure on foreign reserves. That means that despite the unsustainability of Egypt's external debt, the potential negative spill over effects on the sustainability of exchange rate policies appears be insignificant.

INSERT FIGURE 2 ABOUT HERE

Figure 2 (a) indicates that Jordan's exports and imports have been on an upward trend since 2005, where imports reached 20 billion level in 2015, while exports have remained below USD 8 billion. Moreover, exports and imports appear to follow divergent paths, with a significant gap between the two series over the 2008-2015 right after the US financial crisis. This translated into recurrent current account deficits estimated at USD 3 billion in 2015 (Figure 2 (b)). With the exception of the 2008-2011 period, these current account deficits have been offset by capital inflows, and the subsequent accumulated foreign reserves have exceeded USD 14 billion in 2015 (Figure 2 (d)).

On the other hand, Jordan's economy has been characterized by a rising external public debt since 2010, reaching in 2015 USD 8 billion (Figure 2 (c)). After the 1987 currency crisis, Jordan's exchange rate was pegged to the US dollar with no significant movements in the local currency since 1989. This contrasts with the volatility of interest rates ranging over the same period, from a low of 2 percent in 2003, to close to 8 percent in 2015 (Figure 2 (f)).

Table 4 reports the unit root test results for the ratios of Jordan's external debt to export, the current account to export, and external debt to GDP.[4] Both the PP and ADF unit root tests point to the non-stationarity of the debt to export and debt to GDP ratios, indicating that they are I(1) non-stationary series. According to the effective sustainability approach, the non-stationarity of the external debt to GDP ratio indicates that external debt is not sustainable. The ratio of current account to exports, on the other hand, is found to be stationary under both ADF and PP unit root tests.

INSERT TABLE 4 ABOUT HERE

[4] Unit root tests were also performed on the ratio of external debt to the current account. These tests also indicate that this ratio is I(1), pointing to the non-stationarity of external debt and therefore to its unsustainability.

Additionally, Table 4 reports, the ADF and PP tests for exports, imports and external debt series. It is clear that all three variables are non-stationary I(1) series. Since the external debt series is non-stationary, then it means that that the No-Ponzi-Game constraint in equation (3) is violated, which means that Jordan's external debt is not sustainable. Following Fisher and Leachman and Francis, we next look at a long-run relationship between imports and exports, and between external debt and exports.

INSERT TABLE 5 ABOUT HERE

Based on the λ- Trace and the λ- Max- eigenvalue of the stochastic matrix, Table 5 reports no cointegration between Jordan's exports and imports. It is clear that there is no long-run relationship between the two series. As is also clear from Figure 2(a), there exists a significant and widening gap between the two series over the three decades under consideration. Moreover, Table 6 reports no long-run relationship between external debt and exports. Therefore, one can safely conclude that Jordan's external debt is not sustainable.

INSERT TABLE 6 ABOUT HERE

Jordan is still following a fixed exchange rate regime to the US dollar. Jordan has not yet been able to introduce any flexibility in its exchange rate. Given the accumulation of a sizeable external debt, any exchange rate devaluation would mean that Jordan's external debt service would increase significantly, triggering perhaps a currency and debt crisis, pushing subsequently the monetary authority to float the currency. Before introducing some flexibility into the exchange rate, Jordan would need to introduce appropriate fiscal adjustment measures and external debt management policies to reduce the level of a significant accumulated external debt.

Unless introduced timely and effectively, Jordan may experience further pressure on interest rates, and external debt service, and subsequently on foreign reserves.

INSERT FIGURE 3 ABOUT HERE

Figure 3(a) indicates that Morocco's exports and imports have been moving closely together in between 1975-2008. However, and right after the 2008 US financial crisis the gap between the two series started widening at alarming rates. This translated into a series of current account deficits in between 2008-2012, with a trend reversal afterwards (Figure 3 (b)). Foreign exchange reserves have remained relatively low until the early 1990s, when they started to increase exceeding the USD 20 billion in 2006, but with a trend reversal right after the US financial crisis of 2008 (see Figure 3(d)). Coinciding with the decline in foreign reserve is the trend reversal in Morocco's foreign debt which peaked at USD 140 billion in 2015 (Figure 3(c)). This significant increase in foreign debt is the result of fiscal adjustment measures introduced right after the US financial crisis.

On the other hand, exchange rates have been quite volatile over the period under consideration (Figure 3(e)), while interest rates have been on a decelerating trend since 1991 (Figure 3(f)), decreasing from 8.5 percent in 1990, to less than 4 percent in 2010. This contributed to lowering the service of the external debt and into the containment of the debt since 1992.

We next turn to testing formally for the existence of unit roots in the 6-variables of interest. Table 7 reports the unit root test results for the ratios of external debt to exports, the current account to exports, and external debt to GDP.[5] Both the PP and ADF unit root tests point to the stationarity of the 3 variables, indicating that they are I(0) stationary series. Thus,

[5] Unit root tests were also performed on the ratio of external debt to the current account. These tests also indicate that this ratio is I(1), pointing to the non-stationarity of external debt and therefore to its unsustainability.

according to Feve and Henin, the stationarity of the external debt to export ratio implies that external debt is sustainable. Also, the stationarity of the external debt to GDP ratio and the current account to exports ratio indicate that external debt is sustainable.

INSERT TABLE 7 ABOUT HERE

Additionally, Table 7 reports, the ADF and PP tests for exports, imports and external debt series. It is clear that with the exception of the external debt series, the exports and imports series are non-stationary I (1) series. Since the external debt series is stationary, it means that the No-Ponzi-Game constraint in equation (3) is not violated, which means that Morocco's external debt is sustainable. Following Fisher we next look at a long-run relationship between imports and exports. Based on the λ- trace and the λ- max- eigenvalue of the stochastic matrix, Table 8 reports one cointegrating vector between Morocco's exports and imports series. This is in line with what is observed in Figure 3, where the two series are converging and the gap between them is widening down. Based on the unit root test results obtained above, one can safely conclude that Morocco's external debt is sustainable.

INSERT TABLE 8 ABOUT HERE

Morocco's exchange rate policies appear to be in line with its external and fiscal policies. Morocco has been able to properly manage its rising external debt while maintaining a flexible exchange rate regime. This has helped ease up the pressure on interest rates and subsequently on foreign reserves. Therefore, the monetary and fiscal policy mix appears to be benefiting Morocco's economy rendering both policies sustainable.

Figure 4 (a) indicates that exports and imports in Tunisia have been moving closely to together in between 1975-2008 but with a growing gap since the 2008 financial crisis. The gap between the two series is clearly insignificant, expect after 2008. Imports have reached USD 25

billion in 2015, while exports did not exceed the USD 15 billion level. Tunisia's current account has been fairly volatile over the 1975-2008 period turning into significant deficits since 2007 (Figure 4 (b)). Foreign reserves have remained below USD 2 billion until 2000. However, they started to increase thereafter to peak at USD 10 billion in 2009, but with a trend reversal afterwards (Figure 4 (d)). Tunisia's foreign debt, on the other hand, has been on a steady rising trend since 1975, reaching in 2015 USD 25 billion. Finally, both interest and exchange rates have been quite volatile, with interest rates peaking in 1990 at 12 percent, but reaching a low of 7 percent in 2006 (see Figures 4 (e) and (f) respectively).

INSERT FIGURE 4 ABOUT HERE

Table 9 reports the unit root test results for the ratios of external debt to exports, the current account to exports, and external debt to GDP.[6] Both the PP and ADF unit root tests are pointing to the stationarity of the 3 variables, indicating that they are I(0) stationary series. Thus, according to Feve and Henin, the stationarity of the external debt to export ratio implies that external debt is sustainable. Also, the stationarity of the external debt to GDP and current account to exports ratios indicate that external debt is sustainable.

INSERT TABLE 9 ABOUT HERE

Additionally, Table 9 reports, the ADF and PP tests for exports, imports and external debt series. It is clear that with the exception of the external debt series, the exports and imports series are non-stationary I(1) series. Since the external debt series is stationary, it means that the No-Ponzi-Game constraint in equation (3) is not violated, which means that Tunisia's external debt is sustainable.

[6] Unit root tests were also performed on the ratio of external debt to the current account. These tests also indicate that this ratio is I(0), pointing to the stationarity of external debt and therefore to its sustainability.

INSERT TABLE 10 ABOUT HERE

Following Fisher we next look at a long-run relationship between imports and exports. Based on the λ- Trace and the λ- max- eigenvalue of the stochastic matrix, Table 10 reports one cointegrating vector between Tunisia's exports and imports series. This supports the unit root test results obtained above, and is also supported with what we observe in Figure 4, where the two series are converging, and the gap between them is widening down. Based on the unit root and cointegration test results obtained above, one can safely conclude that Tunisia's current account deficits are sustainable pointing therefore to the sustainability of external debt.

Tunisia's exchange rate policies appear to be in line with its fiscal policies. Tunisia has been able to properly manage its rising external debt while maintaining a flexible exchange rate regime. This has helped ease up the pressure on interest rates and subsequently on foreign reserves. Therefore, the monetary and fiscal policy mix appears to be benefiting Tunisia's economy rendering both policies sustainable.

4. Conclusion and Policy Implications

This study has evaluated empirically the sustainability of exchange rate and external public debt policies in four MENA countries using time series econometric models. The unit root and cointegration tests have pointed to sustainable fiscal and exchange rate policies in Tunisia and Morocco, and unsustainable external debt and exchange rate policies in Egypt and Jordan.

Egypt's current exchange rate regime change follows the typical Krugman's (1979) type of currency crises models, whereby depleted foreign exchange reserves signals an upcoming devaluation of the domestic currency. Rational and forward looking economic agents anticipate such devaluation by selling the EP for US dollars to avoid capital losses. The latter vicious circle

usually translates in a spate of speculative attacks on the currency until central bank stops defending it and decides to float the currency either willingly or because it is unable to defend it anymore.

Despite the accumulation of a sizeable external debt, Egypt has successfully moved to a flexible exchange rate regime in 2016. This move was perceived by policy makers as an important step in the right direction. Egypt's exchange rate float will help ease up the pressure on interest rates, and has subsequently reduced the servicing of a huge accumulated external debt. The move to flexible exchange rates, will also help stimulate exports and reduce the pressure on the current account deficits and subsequently on foreign reserves. That means that despite the unsustainability of Egypt's external debt, the potential negative implications on the sustainability of exchange rate policies have become insignificant with the move to a free float.

Jordan is still following a fixed exchange rate regime to the US dollar. Given the accumulation of a sizeable external debt, any exchange rate devaluation would mean that Jordan's external debt service would increase significantly, triggering perhaps a currency and debt crisis, and obliging the monetary authority to float the currency. Before introducing some flexibility into the exchange rate, Jordan would need to introduce proper fiscal adjustments measures and debt management policies to reduce the level of a significant external debt. Unless introduced timely and effectively, Jordan will experience further pressure on interest rates and subsequently on foreign reserves.

Morocco and Tunisia's exchange rate policies appear to be in line with their fiscal policies. Both countries have been able to properly manage their rising external debt, while maintaining a flexible exchange rate regime. This has helped ease up the pressure on interest

rates and subsequently on foreign reserves. Therefore, the monetary and fiscal policy mix appears to be benefiting Morocco and Tunisia's economies rendering both policies sustainable.

In the absence of fiscal space in Jordan and Egypt due to the accumulation of large public debts and recurrent budget and current account deficits on one hand, and the ineffectiveness of monetary policy in the presence of fixed exchange rates and free capital movements on the other, both countries are currently in a bind. While Egypt has successfully floated its currency, rendering monetary policy an effective tool to deal with macroeconomic imbalances, Jordan needs to swiftly implement structural adjustment measures to correct for its macroeconomic imbalances, in the absence of effective government policies (fiscal and monetary policies) to deal with the current macroeconomic imbalances. All 4 MENA countries will have to further reduce the public sector in favor of the private sector and channel additional liquidity to the private sector through loans, encouraging investments in productive ventures. MENA countries need to further reduce government spending and increase supply side taxes.

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Table 1. Unit Root Statistics-Egypt

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	2	-1.95	-1.88	I(1)
CA/X	3	-1.12	-1.55	I(1)
D/GDP	3	-2.36	-2.03	I(1)
X	2	-2.51	-2.01	I(1)
M	2	-1.22	-1.55	I(1)
D	2	-1.20	-1.70	I(1)

Notes: All variables are in logs unless otherwise indicated. The asterisks indicate a rejection of the null hypothesis at the 5% (*) or the 1% (**) level. ADF denotes Augmented Dickey–Fuller test with the null hypothesis of non-stationarity. The lag length has been chosen on the basis of the Akaike Information. PP denotes the Phillips-Perron test with the null hypothesis of non-stationarity. Due to the apparent time trend in all series, the ADF and PP tests have been specified to include a trend variable. In case of conflicting conclusions, the corresponding result is that of the PP statistic.

Table 2. Cointegration Tests (X&M): Egypt

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	14.12	26.12	0.50	12.36	20.31	0.52
r ≤ 1	r = 2	6.31	13.21	0.52	7.86	13.11	0.55

Notes: 1-The Johansen Cointegration Likelihood Ratio Test is based on the Trace and the λ- Max-Eigenvalue of the Stochastic Matrix. 2-r represents the number of cointegrating vectors. 3-A * indicates significance at the 5% level of significance. The asymptotic critical values are from Oservald-Lenum (1992), and the Probabilities (p-values) are from Mckinnon-Haug-Michelis (1999). 4- Test Assumes restricted linear deterministic trend in the data, and a constant.

Table 3. Cointegration Tests (D&X): Egypt

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	6.56	16.32	0.65	3.02	12.55	0.75
r ≤ 1	r = 2	1.23	3.84	0.49	0.88	4.83	0.49

Notes: Refer to Table 2.

Table 4. Unit Root Statistics: Jordan

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	2	-1.36	-1.88	I(1)
CA/X	2	-5.02*	-6.66**	I(0)
D/GDP	1	-1.22	-1.23	I(1)
X	4	-2.22	-1.55	I(1)
M	5	-2.33	-1.01	I(1)

D	2	-1.11	-1.44	I(1)

Notes: Refer to Table 1.

Table 5. Cointegration Tests (X&M): Jordan

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	21.03	26.47	0.20	17.44	20.13	0.12
r ≤ 1	r = 2	5.01	13.14	0.75	5.01	13.52	0.75

Notes: Refer to Table 2.

Table 6. Cointegration Tests (D&X): Jordan

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	8.25	16.78	0.55	8.94	15.23	0.51
r ≤ 1	r = 2	0.13	5.12	0.73	0.14	4.04	0.73

Notes: Refer to Table 2.

Table 7. Unit Root Statistics: Morocco

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	2	-5.21**	-3.66**	I(0)
CA/X	2	-4.25*	-3.55*	I(0)
D/GDP	2	-5.21**	-7.22**	I(0)
X	2	-0.09	0.74	I(1)
M	3	2.13	1.52	I(1)
D	4	-5.12**	-6.21**	I(0)

Notes: Refer to Table 1.

Table 8. Cointegration Tests(X&M): Morocco

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	28.25*	25.63	0.65	22.01*	20.14	0.61
r ≤ 1	r = 2	4.33	11.23	0.52	6.23	13.24	0.52

Notes: Refer to Table 2.

Table 9. Unit Root Statistics: Tunisia

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	2	-5.21**	-4.32**	I(0)
CA/X	2	-4.11**	-4.33**	I(0)
D/GDP	3	-4.66**	-3.99**	I(0)
X	3	-1.51	-1.46	I(1)
M	2	-1.36	-1.48	I(1)
D	4	-4.25**	-3.52*	I(0)

Notes: Refer to Table 1.

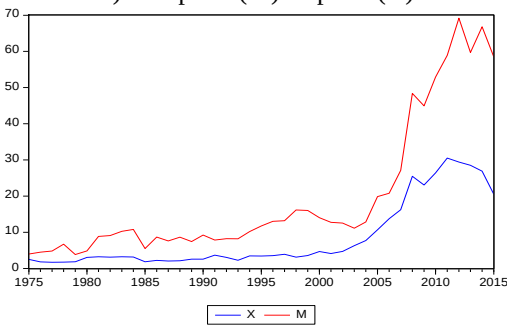
Table 10. Cointegration Tests (X&M): Tunisia

Hypothesis		λ- Trace Statistics	Critical Values	Prob.	λ- Max-Eigen Statistics	Critical Values	Prob.
Null	Alternative		5%			5%	
r = 0	r ≥ 1	18.95*	15.49	0.03	19.18*	15.15	0.04
r ≤ 1	r = 2	0.99	4.45	0.46	0.99	4.85	0.46

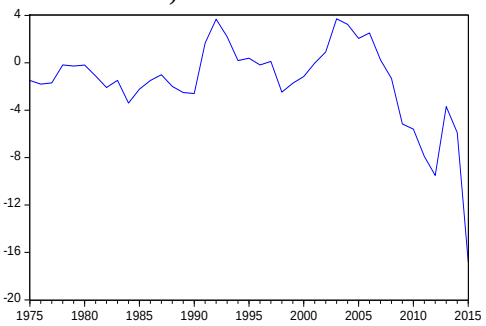
Notes: Refer to Table 2.

Figure 1. Macroeconomic Developments in Egypt: 1975-2015

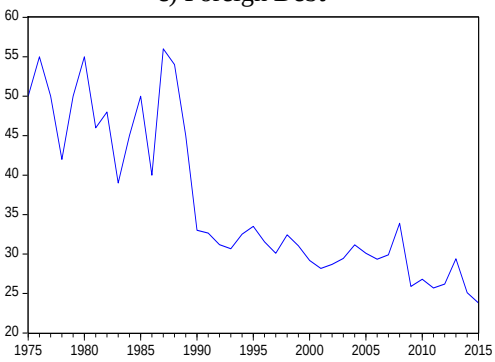
a) Imports (M)/Exports (X)



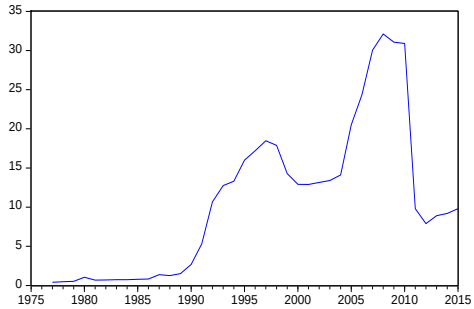
b) Current Account



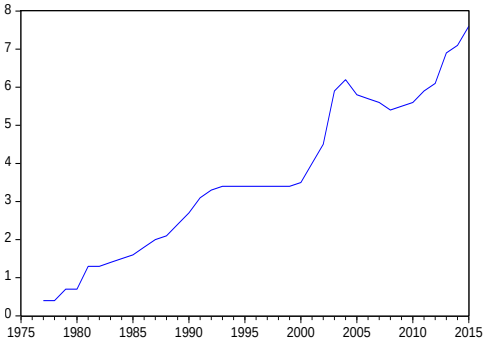
c) Foreign Debt



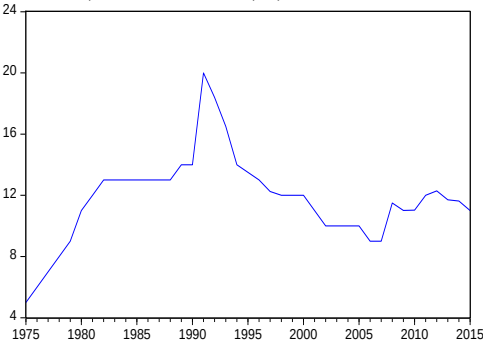
d) Foreign Reserves



e) Exchange Rate

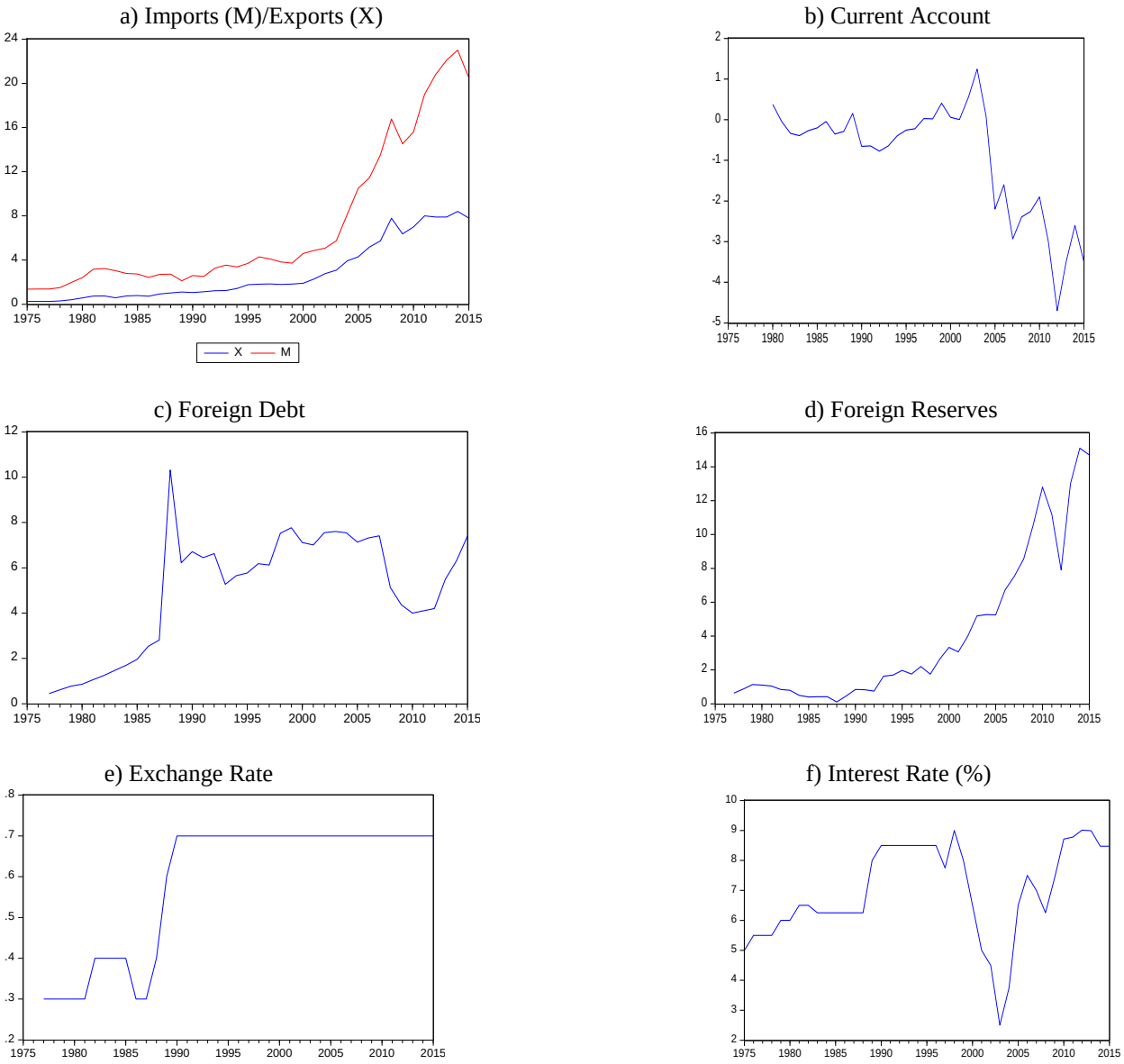


f) Interest Rate (%)



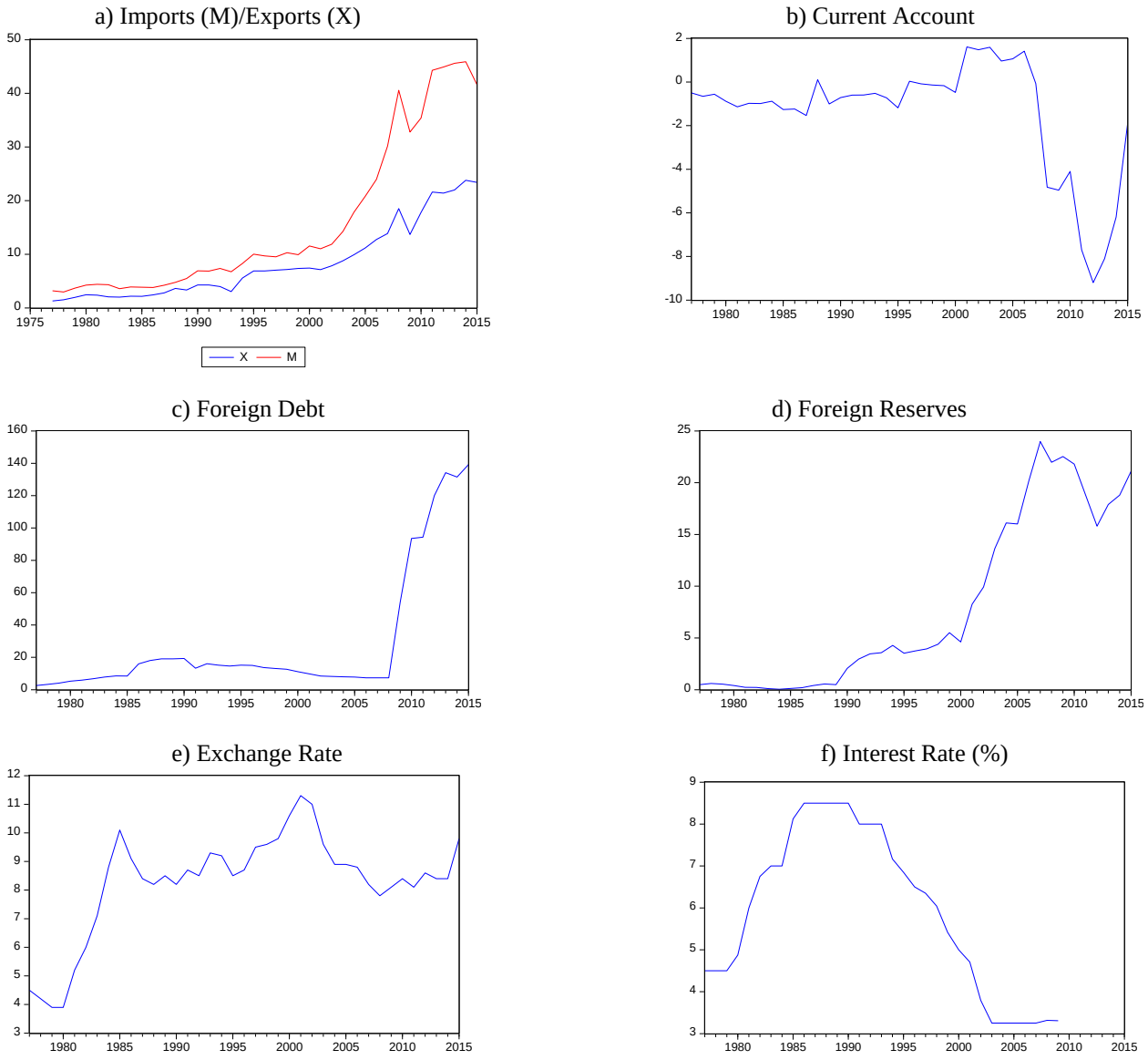
Source: International Monetary Fund's IFS database, and World Development Indicators (2015).
Notes: 1-The Exchange Rate is defined as the domestic currency per one USD. 2-The interest rate is the discount rate (end of period). 3- All figures are in USD billion unless otherwise specified.

Figure 2. Macroeconomic Developments in Jordan: 1975-2015



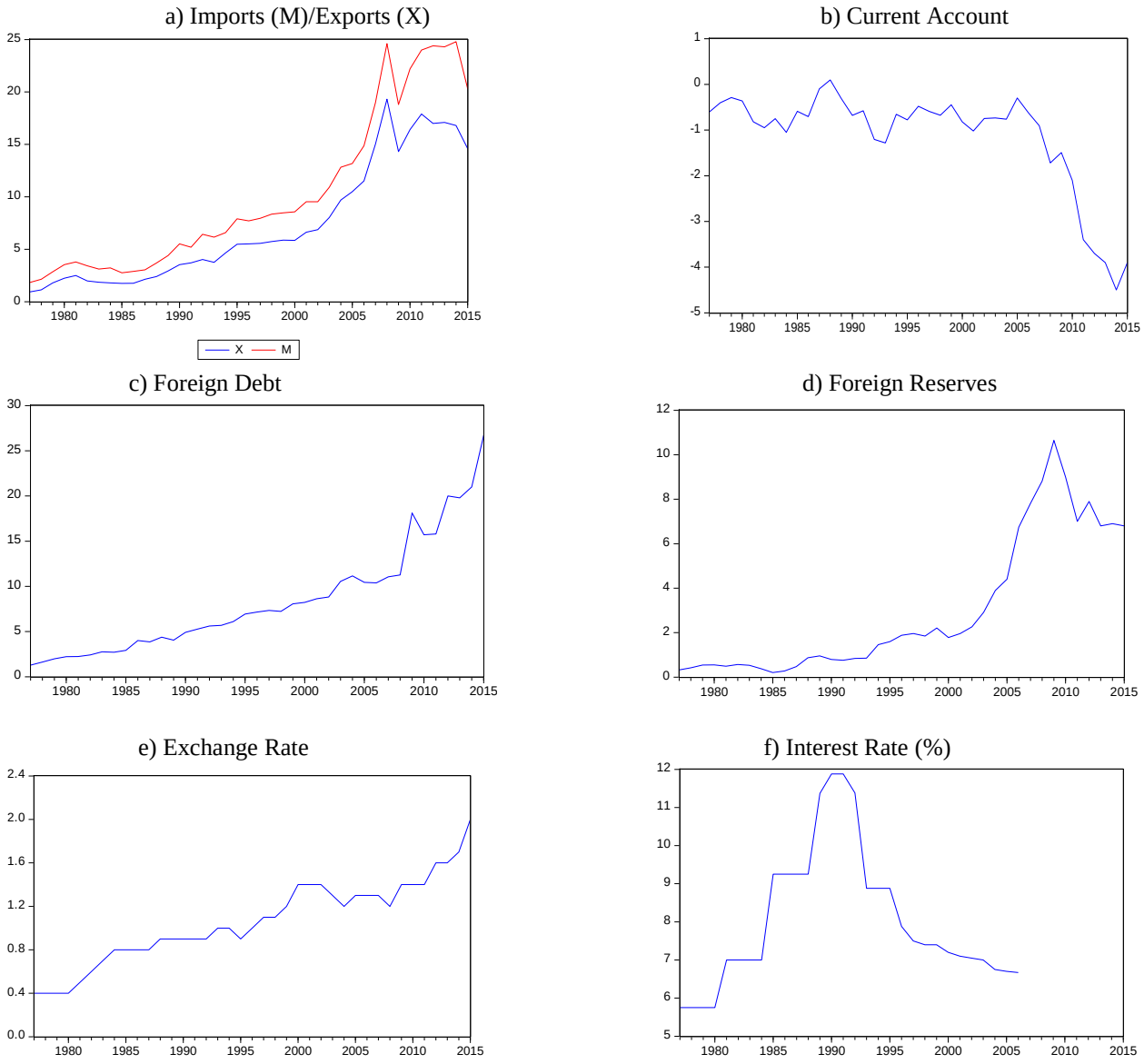
Source: International Monetary Fund's IFS database, and World Development Indicators (2015).
Notes: 1-The Exchange Rate is defined as the domestic currency per one USD. 2-The interest rate is the discount rate (end of period). 3- All figures are in USD billion unless otherwise specified.

Figure 3. Macroeconomic Developments in Morocco: 1975-2015



Source: International Monetary Fund's IFS database, and World Development Indicators (2015).
Notes: 1-The Exchange Rate is defined as the domestic currency per one USD. 2-The interest rate is the discount rate (end of period). 3- All figures are in USD billion unless otherwise specified.

Figure 4. Macroeconomic Developments in Tunisia: 1975-2015



Source: International Monetary Fund's IFS database, and World Development Indicators (2015).
Notes: 1-The Exchange Rate is defined as the domestic currency per one USD. 2-The interest rate is the discount rate (end of period). 3- All figures are in USD billion unless otherwise specified.