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Full Length Research Paper

Sustainability of exchange rate policies and external public debt in the Mena region

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The conduct of exchange rate and fiscal policies in the small open Mena economies has recently become critical in determining those countries future economic and fiscal 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. This study presents thorough empirical analysis of the sustainability of exchange rate and external public debt using time series econometric models. The empirical results point to sustainable fiscal and exchange rate policies in Tunisia and Morocco, unsustainable external debt but sustainable exchange rate policies in Egypt and Turkey, and unsustainable external debt and exchange rate policies in Jordan. If Jordan still opts for maintaining a fixed US dollar 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.

Key words: MENA, exchange rate, foreign debt, sustainability, JEL classification: C22, E31, H63.

INTRODUCTION

The conduct of exchange rate and fiscal policies in the emerging middle east and north Africa (MENA) economies of Egypt, Jordan, Morocco, Tunisia and Turley has recently become critical in determining those countries future economic and fiscal stance, due to the accumulation since the early 1990s of a sizable level of external debt and the pursuit of a fixed exchange rate regime. It is well known that some MENA countries have been running permanent current account deficits for the past decade, resulting in an external debt that was close to 100% of GDP by the end 2006. With the accumulation of a sizeable foreign debt, the pursuit of a fixed exchange rate regime became a must in order to keep debt service costs under control. Subsequently, monetary policy became subordinated to preserving the exchange rate peg and MENA central banks lost an effective tool that constituted an effective mechanism to neutralize monetary and macroeconomic imbalances, as well as external shocks. Policy makers and academics have thus devoted considerable efforts in trying to study the sustainability of external debt, as well as the links between external debt and exchange rate regimes, particularly in MENA countries that are exposed to various external shocks. These ef-forts were primarily devoted at establishing the links if any between external debt and exchange rates, and at studying whether they are sustainable. In the instance where foreign debt is not sustainable, then reforming fiscal and exchange rate policies will be a must in avoiding a fiscal, monetary and exchange rate crisis.

There is substantial evidence in the literature stipulating that foreign debt and exchange rate crises are strongly linked in emerging economies. Reinhart (2002), for example, finds that 84% of all default episodes in her 59 country sample over the period 1970 - 99 were followed within 24 months by currency crises, while 66% of all currency crises in her developing-country subgroup were followed within 24 months by debt defaults. It remains to understand why the link between the 2 phenomena should be so strong empirically, as well as why in some cases the 2 types of crisis tend to occur together while in others they do not.

This paper will attempt to identify the underlying macroeconomic characteristics that help explain the links between these phenomena within the context of the MENA region. Using sophisticated econometric tests, this study aims at examining empirically the sustainability of ME NA's external debt policies, and at establishing the links between foreign debt and exchange rate policies. After identifying the sources of fiscal and monetary imbalances, the study will propose a set of 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.

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.

2 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 2 decades, several authors focused on how a no-default debt equilibrium could be explained for sovereign borrowers (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, Edwards (1984) and 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 intertemporal 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}

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

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

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

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

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

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

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

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 will be 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.

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 co-integrated, 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 co-integration between imports and exports for the period 1947 - 1973 in the United States. Due to the existence of a co-integrating vector (-1; <1) for those 2 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 co-integration tests either between exports and imports, or between external debt and exports. In order to complete the analysis, the authors propose to integrate the inter-temporal 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.

ECONOMETRIC ANALYSIS AND RESULTS

Data and sample

The data used in this section are from the international monetary fund's (IMF) international financial statistics (IFS) and direction of trade statistics and the World Bank's global development finance. The sample used spans the period 1970 - 2006.

Empirical results

Figure 1a indicates that Egypt's exports and imports have been growing constantly over the past 3 decades with the exception of the periods: 1988 - 1991 and 2000 - 2003. The depreciation of Egypt's Pound (EP) has stimulated exports since 2003, reaching in 2006 the USD 29 billion level. In addition, the prevailing gap between the 2 series since 1973 has been eradicated after 2003. Subsequently, Egypt experienced current account surpluses since 2003, where the current account recorded surpluses of around USD 4 in 2005 (Figure 1b). Egypt's central bank has been able to accumulate foreign reser-ves since 1989. As a result of the current account sur-pluses, foreign reserves exceeded in 2006 the USD 24 billion levels (Figure 1d).

By 1988, Egypt's external debt amounted to about USD 48 billion (Figure 1c). It has however been brought down in 1991 to USD 30 billion and has remained around that level after a series of fiscal adjustment measures, and a serious privatization scheme. Egypt's exchange rate has been in general fixed to the US dollar. However, in 2001, Egypt floated its currency, and the pound depreciated from EP 4.5 to 8 per USD in 2006 (Figure 1e).

The move to flexible exchange rates eased off the pressure on interest rates and the central bank was successful in decreasing interest rates from a high of 20% in 1991, to less than 10% in 2006. The shift to a flexible exchange rate paved the way for a decrease in interest rates of about 4% in between 2001 - 2006 (Figure 1f). This resulted in lowering significantly the service of a huge external debt.

To formally test for the existence of unit roots in the variables of interest for the 5 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, that is, a unit root exists in P_t and ΔP_{t-1} implying that the series are non-stationary.

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 (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). 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 accountto export ratios indicate that external debt is not sustainable.

Moreover, Table 1 reports, the ADF and PP tests for ex-ports, imports and external debt series. It is clear that

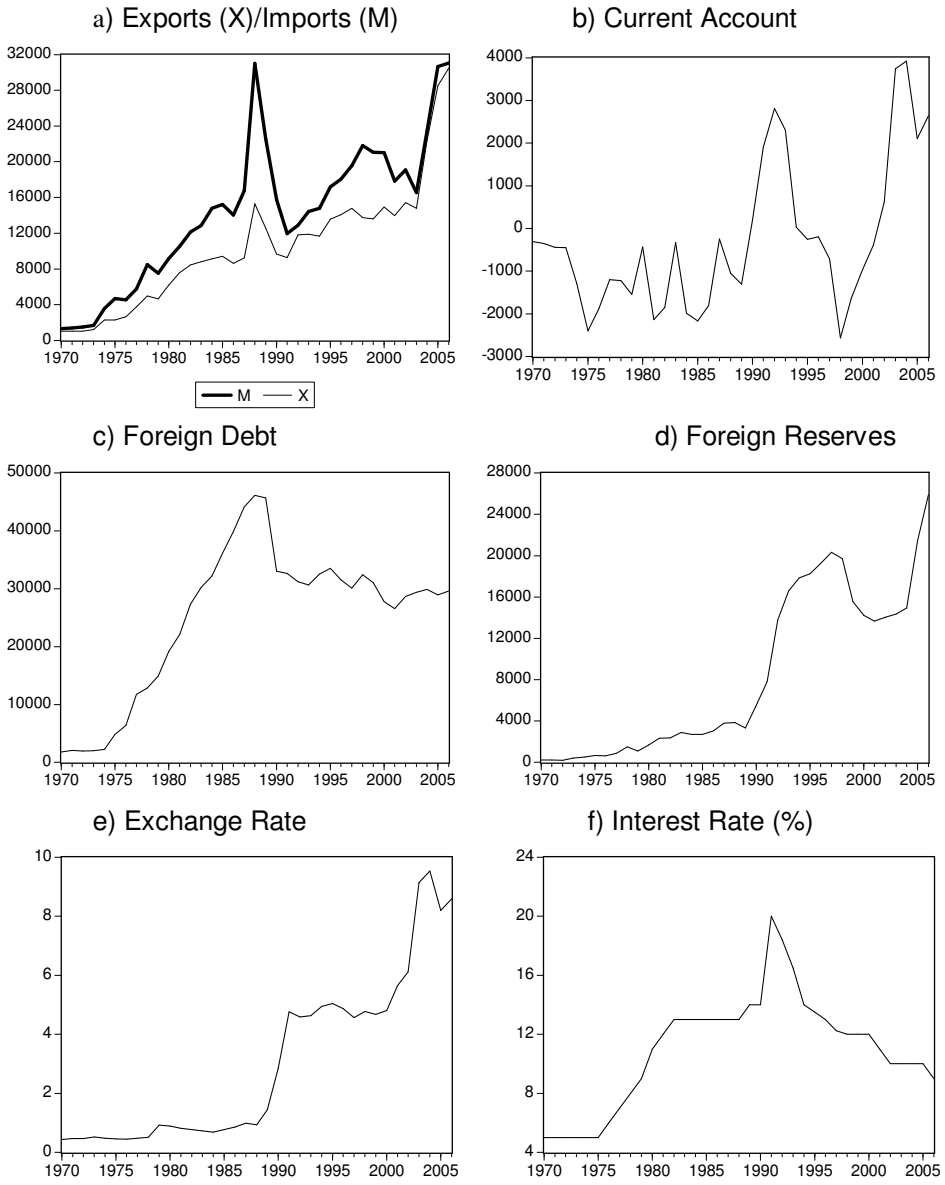

Figure 1. Macroeconomic developments in Egypt: 1970 - 2006

Source: International Monetary Fund's IFS database, and World Development Indicators (2006).
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 million unless otherwise specified.

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.

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 2 series over the 3 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.

Egypt has successfully shifted to a flexible exchange rate regime in 2001. This move was perceived by policy makers as an important step in the right direction. Egypt's

Table 1. Unit root statistics-Egypt

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	3	-1.87	-1.73	I(1)
CA/X	4	-2.96	-3.00	I(1)
D/GDP	2	-2.41	-1.65	I(1)
X	1	-2.41	-1.42	I(1)
M	1	-3.19	-2.52	I(1)
D	1	-1.20	-0.70	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 and M): Egypt.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	15.67	25.87	0.51	10.28	19.38	0.58
r ≤ 1	r = 2	5.38	12.51	0.54	5.38	12.51z	0.54

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 co-integrating 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 and X): Egypt.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	4.76	15.49	0.83	4.04	14.26	0.85
r ≤ 1	r = 2	0.72	3.84	0.39	0.72	3.84	0.39

Notes: Refer to Table 2.

exchange rate float has helped ease up the pressure on interest rates and subsequently on external debt service. The move to flexible exchange rates and the 2001 - 2003 devaluation of the EP have also helped 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.

Figure 2a indicates that Jordan's exports and imports have been on an upward trend during the past three decades, where imports have reached the USD 11 billion level in 2006, while exports have remained below USD 4 billion. Moreover, exports and imports appear to follow divergent paths, with a significant gap between the two series over the 1970 - 2006 period. More alarming is the widening of the gap since 1989. This translated into slight but recurrent current account deficits with the exception of the year 2005, where the current account recorded a significant deficit amounting to USD 2.3 billion (Figure 2b) These current account deficits have been gradually offset by capital inflows, and the subsequent accumulated foreign reserves have exceeded USD 8 billion in 2006 (Figure 2d).

On the other hand, Jordan's economy has been characterized by a rising external public debt since the early 1970s, reaching in 1989 the USD 8 billion level (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(figure 2e). This contrasts with the volatility of interest rates ranging over the same period, from a low of 5 percent in 1970, to close to 7 percent in 2006 (Figure 2f).

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 (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 there-

Table 4. Unit root statistics: Jordan.

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	1	-2.54	-2.46	I(1)
CA/X	1	-4.40*	-7.56**	I(0)
D/GDP	1	-1.7	-1.86	I(1)
X	3	-3.31	-2.64	I(1)
M	6	-3.49	-1.99	I(1)
D	1	-2.79	-2.76	I(1)

Notes: Refer to Table 1.

Table 5. Cointegration tests (X and M): Jordan.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	20.65	25.87	0.19	16.55	19.38	0.12
r ≤ 1	r = 2	4.09	12.51	0.72	4.09	12.51	0.72

Notes: Refer to Table 2.

Table 6. Cointegration tests (D and X): Jordan.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	7.33	15.49	0.53	7.21	14.26	0.46
r ≤ 1	r = 2	0.11	3.84	0.73	0.11	3.84	0.73

Notes: Refer to Table 2.

fore to its unsustainability). 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 by both ADF and PP unit root tests.

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.

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 2 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.

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 and obliging 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.

Figure 3a indicates that Morocco's exports and imports have been moving closely together over the past three decades. However, the gap between exports and imports appear to have been widening since early 2000. This, however, did not translate into current account deficits. We see surpluses since 2000 (Figure 3b) to peak in 2006 at about USD 2.8 billion. Foreign exchange reserves have remained relatively low until the early 1990s, where they started to increase exceeding the USD 20 billion in 2006 (Figure 3d). Coinciding with the rise in foreign re-

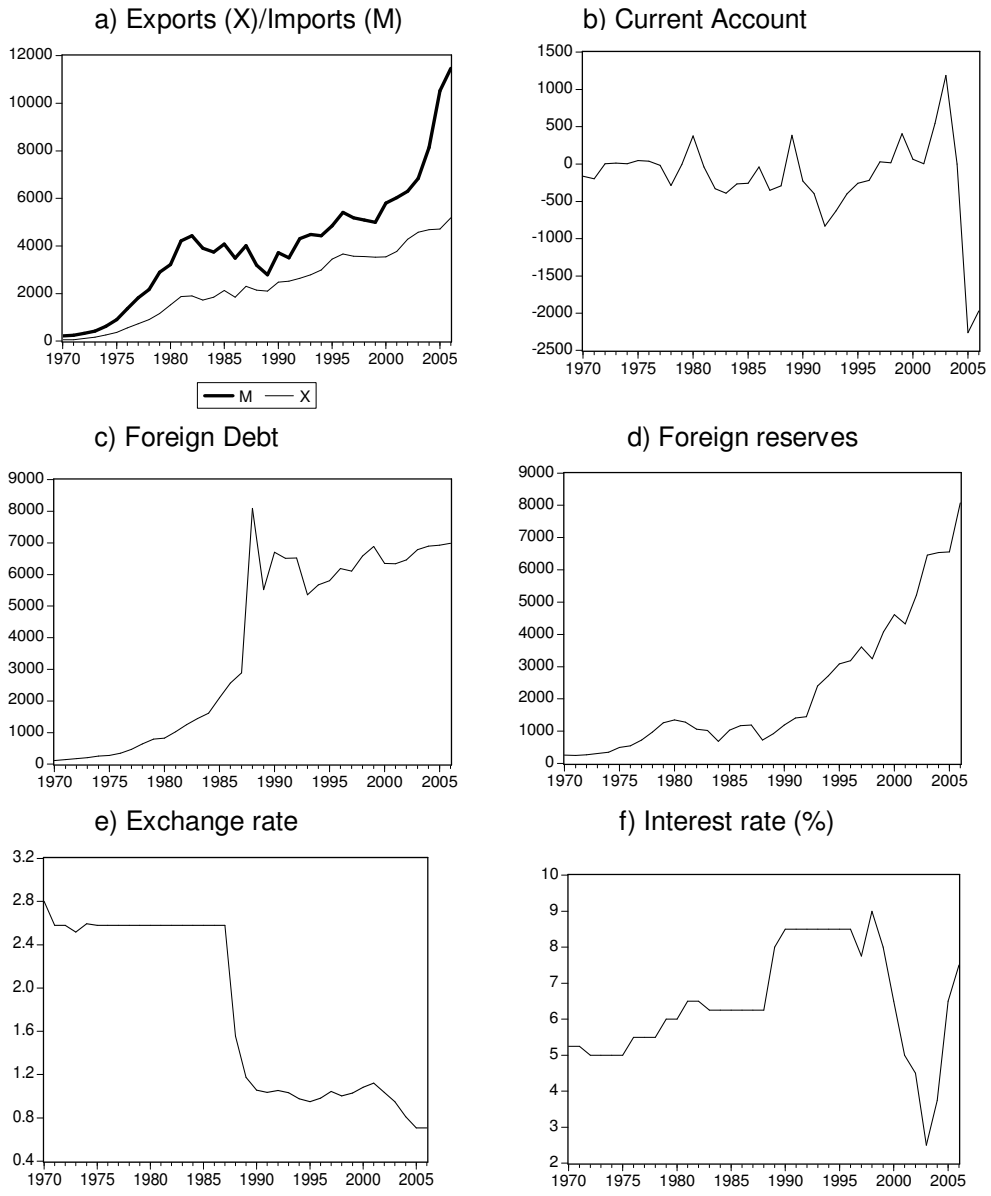

Figure 2. Macroeconomic developments in Jordan: 1970 - 2006

Source: International Monetary Fund's IFS database, and World Development Indicators (2006).
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 million unless otherwise specified.

serve is the trend reversal in Morocco's foreign debt which peaked at USD 20 billion in 1990, to then gradually drop to USD 8 billion in 2006 (Figure 3c). This significant drop in foreign debt is the result of fiscal adjustment measures introduced in early 1990.

On the other hand, exchange rates have been quite volatile over the period under consideration (Figure 3e), 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% in 2006. 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 (Unit root tests were also performed on the ratio of external debt to the current account. These tests also in-

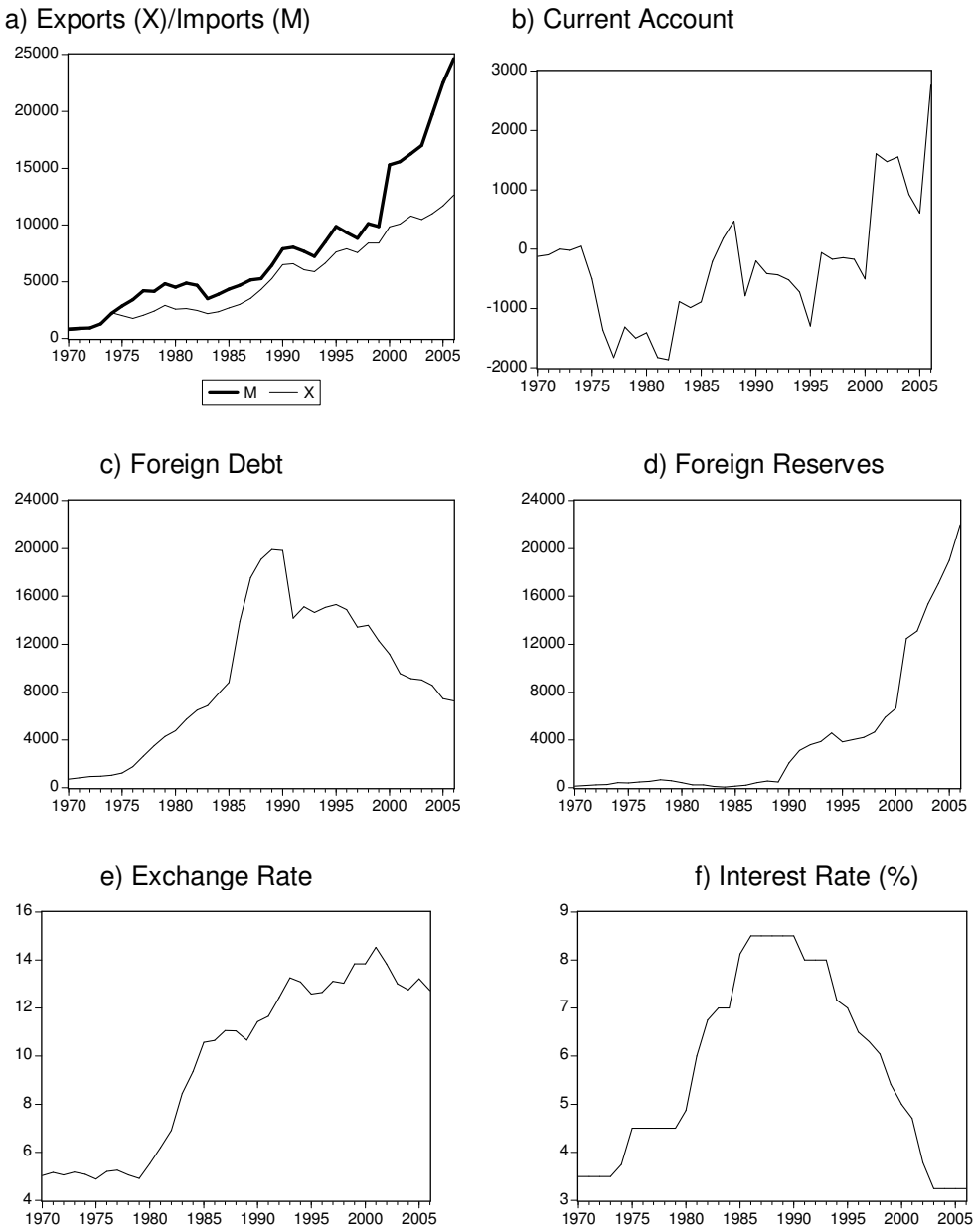

Figure 3. Macroeconomic developments in Morocco: 1970 - 2006

Source: International Monetary Fund's IFS database, and World Development Indicators (2006).
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 million unless otherwise specified.

dicate that this ratio is I(1), pointing to the non-stationarity of external debt and therefore to its unsustainability). Both the PP and ADF unit root tests point to the stationnarity 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 ratio and the current account to exports ratio indicate that external debt is sustainable.

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

Table 7. Unit root statistics: Morocco.

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	4	-4.91**	-3.75**	I(0)
CA/X	9	-3.98*	-3.11*	I(0)
D/GDP	1	-4.63**	-3.72**	I(0)
X	2	-1.30	0.33	I(1)
M	7	1.27	-0.07	I(1)
D	3	-3.92**	-4.45**	I(0)

Notes: Refer to Table 1.

Table 8. Cointegration tests(X and M) Morocco.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	26.59*	25.87	0.60	20.03*	19.38	0.58
r ≤ 1	r = 2	5.55	12.51	0.51	5.55	12.51	0.51

Notes: Refer to Table 2.

the λ- max- eigenvalue of the stochastic matrix, Table 8 reports one co-integrating vector between Morocco's exports and imports series. This is in line with what is observed in Figure 3, where the 2 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.

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 4a indicates that exports and imports in Tunisia have been moving closely to together since the early 1970s. The gap between the two series is clearly insignificant, expect after 2000. Imports have reached the USD 15 billion level in 2006, while exports did not exceed the USD 12 billion level. Tunisia's current account has been fairly volatile, experiencing periods of surpluses and deficits (Figure 4b). Foreign reserves have remained below the USD 1 billion level until 1995. However, they started to increase thereafter to peak at USD 8 billion in 2006 (Figure 4 d). Tunisia's foreign debt on the other hand has been on a steady rising trend since 1970, reaching in 2006 the USD 15 billion level (Figure 4 c). Finally, both interest and exchange rates have been quite volatile, with interest rates peaking in 1990 at 12%, but reaching a low of 7% in 2006 (Figures 4 e and f) respectively).

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(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). 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.

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.

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 co-integrating 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 2 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.

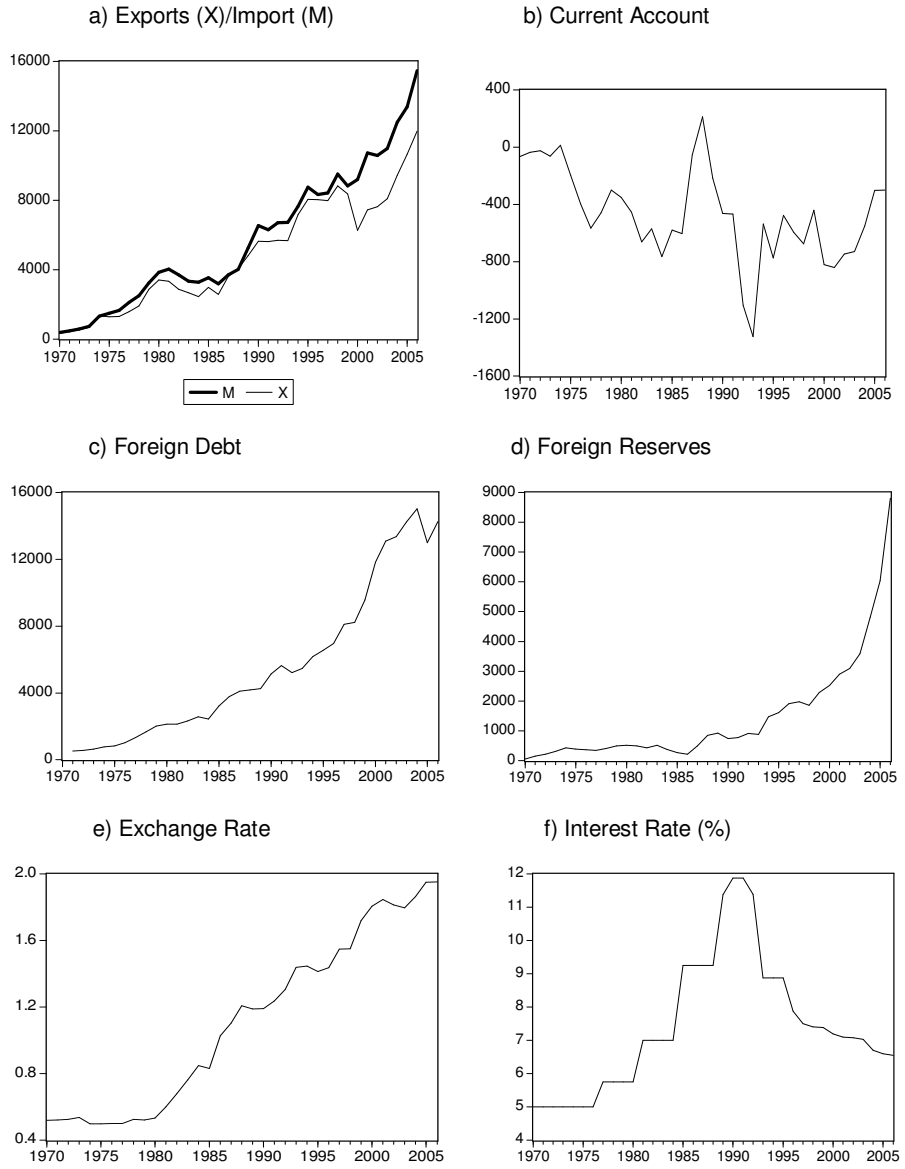

Figure 4. Macroeconomic Developments in Tunisia: 1970 - 2006

Source: International Monetary Fund's IFS database, and World Development Indicators (2006). 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 million unless otherwise specified.

Table 9. Unit root statistics: Tunisia.

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	4	-2.76	-2.83	I(0)
CA/X	9	-3.33	-2.80	I(0)
D/GDP	1	-1.51	-2.28	I(0)
X	2	-1.51	-1.46	I(1)
M	1	-1.36	-1.48	I(1)
D	2	-4.25**	-3.52*	I(0)

Notes: Refer to Table 1.

Table 10. Cointegration tests (X and M): Tunisia.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	**Alternative**						
r = 0	r ≥ 1	17.04*	15.49	0.02	16.17*	14.26	0.02
r ≤ 1	r = 2	0.87	3.84	0.34	0.87	3.84	0.34

Notes: Refer to Table 2.

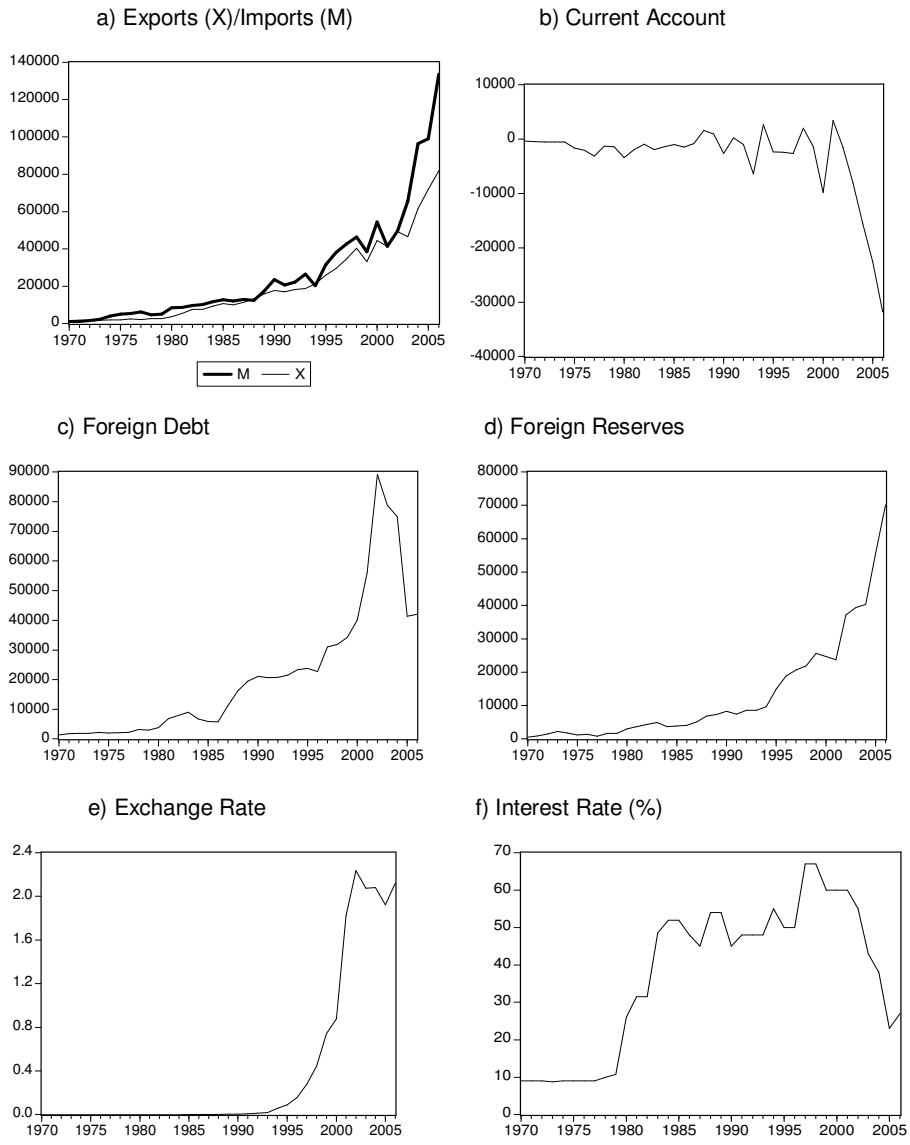

Figure 5. Macroeconomic developments in Turkey: 1970 - 2006

Source: International Monetary fund's IFS database, and World Development Indicators (2006).
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 million unless otherwise specified.

Figure 5a indicates that Turkey's exports and imports have been moving closely together over the past 3 decades. Imports have reached the USD 130 billion level in 2006, while exports were at USD 80 billion. Exports have

Table 11. Unit root statistics: Turkey.

Variable	Lag	ADF t-statistic	PP t-statistic	Result
D/X	1	-2.84	-2.71	I(1)
CA/X	2	-1.80	-3.67*	I(1)
D/GDP	2	-3.07	-3.07	I(1)
X	8	1.58	3.22	I(1)
M	8	4.23	2.15	I(1)
D	3	-1.68	-1.71	I(1)

Notes: Refer to Table 1.

Table 12. Cointegration tests (X and M): Turkey.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	15.22	15.49	0.05	11.46	14.26	0.13
r ≤ 1	r = 2	3.75	3.84	0.05	3.75	3.84	0.05

Notes: Refer to Table 2.

Table 13. Cointegration tests (D and X): Turkey.

Hypothesis		λ- Trace Statistics	Critical Values 5%	Prob.	λ- Max-Eigen Statistics	Critical Values 5%	Prob.
Null	Alternative						
r = 0	r ≥ 1	15.22	15.49	0.05	11.46	14.26	0.13
r ≤ 1	r = 2	3.75	3.84	0.05	3.75	3.84	0.05

Notes: Refer to Table 2

benefited from the huge depreciation of the Lyra in 1998 (Figure 5e). Turkey's current account has exhibited a high degree of volatility during the past three decades, recording a huge deficit in 2006 of about USD 30 billion (Figure 5b).

Foreign reserves have been steadily rising since the early 1980s, with a trend reversal during the currency crisis of 2001. Turkey has however benefited from external support in the form of grants and concessional loans from the international monetary fund (IMF). Reserves have thus resumed their upward trend reaching in 2006 the USD 70 billion level (Figure 5d). External debt has been steadily increasing since 1986, peaking in 2002 at USD 85 billion (Figure 5c). Turkey's exchange rate has been pegged to the US dollar until the early 1990s, where it depreciated significantly afterwards (Figure 5e). Finally, interest rates have been quite volatile peaking at around 68% in 1998, with a significant trend reversal in 2001 reaching a low of 26% in 2006 (Figure 5f).

Table 11 reports the unit root test results for the ratios of external debt to export, the current account to export, and external debt to GDP (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). Both the PP and ADF unit root tests are pointing to the non-stationarity of all 3 series, indicating that they are I(1) non-stationary series. According to the effective sustainability approach, the non-stationarity of the external debt to exports ratio indicates that external debt is not sustainable. Also, the non-stationarity of the external debt to GDP and current account to exports ratios indicate that external debt is not sustainable.

Additionally, Table 11 reports, the ADF and PP tests for exports, imports and external debt series. It is clear that all of exports, imports, and external debt 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 Turkey'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.

The Johansen Cointegration tests between external debt and exports (Table 13) and between exports and imports (Table 12) indicate no cointegration between them at the 5% significance level. This result suggests that both exports and imports series are not moving in the same direction in the long-run and thus that Turkey's external debt is not sustainable. This conclusion is further emphasized by looking at Figure 5. After the currency

and debt crisis of 2001, Turkey has successfully shifted to a flexible exchange rate regime. This move was perceived by policy makers as an important step in the right direction. Turkey's exchange rate float has helped ease up the pressure on interest rates and subsequently on foreign reserves. The move to flexible exchange rates and the 2001 huge devaluation of the Lyra have also helped stimulate exports and reduce the servicing of a huge accumulated external debt. That means that despite the unsustainability of Turkey's external debt, the potential negative spill over effects on the sustainability of exchange rate policies appears to be insignificant.

Conclusion and policy implications

This study has evaluated empirically the sustainability of exchange rate and external public debt policies in 5 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, unsustainable external debt but sustainable exchange rate policies in Egypt and Turkey and unsustainable external debt and exchange rate policies in Jordan.

Despite the accumulation of a sizeable external debt, Egypt has successfully moved to a flexible exchange rate regime in 2001. This move was perceived by policy makers as an important step in the right direction. Egypt's exchange rate float has helped 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, and the 2001 - 2003 devaluation of the Pound have also helped 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 are insignificant.

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.

Recurrent current account deficits and a fixed exchange rate system imply explicitly that Jordan will have to generate foreign currency from sources other than exports to (i) cover a widening huge gap between exports and imports (ii) to service a fast growing external debt and (iii) to maintain its exchange rate peg to the US dollar. If such hard currency is not generated, then the by-product would be the continuous accumulation of a sizeable unsustainable external debt and a significant depreciation of the Dinar. In all cases, if Jordan still opts for maintaining fixed USD exchange rate arrangements, it will have to implement crisis-prevention measures, namely by exercising fiscal discipline, managing properly its debts and foreign reserves, and avoiding future real exchange rate appreciations

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 successfully moved to a flexible exchange rate regime. This move was perceived by policy makers as one step in the right direction. Turkey's exchange rate float has helped ease up the pressure on interest rates and subsequently on foreign reserves. The move to flexible exchange rates and the 2001 huge devaluation of the Lyra have also helped stimulate exports and reduce the servicing of a huge accumulated external debt. That means that the unsustainability of Turkey's external debt is not expected to impact on the sustainability of exchange rate policies.

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