

**On the Predictability of Currency Crises:  
The Use of Indicators in the  
Case of Arab Countries**

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## 1. Introduction

A currency crisis, defined as a sharp decrease in the nominal value of the currency, could have a significant impact on the economy in terms of contraction of output, increase in unemployment and even collapse of banks. Over the last three decades, the frequency of currency crises has increased; but it is the increase in their magnitude, particularly that of the East Asian crisis of 1997, that is most significant.

The increase in the number of these crises and the importance of their impact on the economy has generated a large amount of research into their causes. At the theoretical level, the literature distinguishes between two main types of models of currency crises. The first, which was prevalent over the 1980s, identifies weaknesses in economic fundamentals as the causes of the crisis and the persistence of these weaknesses makes maintenance of the pegged exchange rate regime unsustainable and thus the crisis inevitable. The second type of models was motivated by the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) crisis of 1992-93 in which a speculative attack on some currencies resulted in a widening of the band despite the fact that based on fundamentals the pegs were sustainable. This type of models focuses on the self-fulfilling features of currency crises and its major implication is that these crises are very hard to predict.

Based on theoretical priors, a number of models have been developed and applied for the purpose of predicting currency crises. The idea is that if a model that could predict a currency crisis with some degree of accuracy were available, then policymakers could take the necessary actions to avoid the crisis or at least minimize its impact. A few models have claimed success based on in-sample prediction, but have failed when applied for out-of-sample prediction.

The purpose of the present paper is to discuss the issues mentioned above and then apply the main currency crises indicators identified in the literature to the case of Arab countries. Section 2 reviews the main theories of currency crises. Section 3 analyzes three of the most cited models as having provided some conclusive results regarding predictability of currency crises. Based on the discussion in the previous two sections, section 4 focuses on a group of Arab countries that officially adopt a pegged exchange rate regime. The objective of the exercise is to detect any potential vulnerability of these countries to currency crises. Section 5 concludes.

## 2. Theoretical models of currency crises

The issue of predictability of currency crises will ultimately be settled at the empirical level. In the next section, the main empirical models that have recently attempted to predict currency crises will be discussed. The objective will be to highlight the main indicators that have been identified by these models, before using them in the case of Arab countries. However, empirical models are based to different degrees on theories of currency crises. From this perspective, a brief review of these theories is called for.

Over the last twenty years, quite a few theoretical models of currency crises have been developed. However, these models have been classified in the literature into two main types commonly called the “first generation” and the “second generation” models. The first generation models, which started with the work of Krugman (1979), focus on the incompatibility between domestic conditions and the maintenance of a pegged exchange rate. The second generation models emphasize the trade-off between the benefits and the costs of maintaining a peg.

In his model, Krugman assumes a small open economy which produces a single tradable good whose price is determined on world markets; through purchasing power parity, the domestic price of the good is equal to the nominal exchange rate. Full flexibility of prices and wages assures that output is always at full employment. The difference between output and spending determines the balance of payments. Only two assets are available to investors, domestic and foreign money with nominal interest rates on both set at zero. The expected rate of inflation is the expected rate of depreciation of the domestic currency. Under a pegged exchange rate regime, the government keeps a stock of foreign reserves and uses it to maintain the peg.

In this model, a budget deficit due to an expansionary fiscal policy can be financed either by issuing new money or by running down the stock of foreign reserves held by the central bank. The rate at which the stock of foreign reserves decreases depends on the willingness of the private agents to acquire additional domestic money. When the level of foreign reserves reaches a critical threshold, a speculative attack is launched on the currency, eliminating the remaining stock of foreign reserves held by the central bank and thus the peg is abandoned and the currency depreciates. Therefore, according to the Krugman model, a currency crisis is caused by weak macroeconomic fundamentals such as excessively expansionary fiscal and monetary policies which lead to a continuous loss of foreign reserves until the peg can no longer be maintained. In this model, the persistent weakness in the fundamentals makes the crisis inevitable.

Following Krugman's work, a number of models have extended the original framework in several directions. Agenor et al. (1992) provide a review of these extensions. First, regarding the postcollapse exchange rate regime, a number of alternatives can be considered. One is for the central bank to adopt a floating rate for a certain period before returning to a peg. Under this

scenario, the size of the expected devaluation and the length of the expected transitional float affect the timing of the crisis; in other words, the larger the expected devaluation and the shorter the expected transitional float, the earlier the speculative attack on the currency and therefore the crisis. Second, some models have introduced uncertainty about domestic credit growth and about the level of foreign reserves that the central bank is willing to use to defend the peg. In the first case, uncertainty helps explain increases in domestic interest rates prior to a crisis. In the second case, the implication is that the time of collapse of the pegged exchange rate regime cannot be determined explicitly. Third, in the presence of forward-looking wage contracts, an anticipated future collapse of the pegged exchange rate regime causes wages to rise and therefore prices start to increase. Consequently, the real exchange rate appreciates. This loss of competitiveness shows in the trade balance which deteriorates in the period preceding the collapse of the currency. Fourth, the issue of capital controls, not addressed by Krugman, was considered in extensions to his model. If the government imposes permanent controls on capital movements, this measure will prolong the maintenance of the pegged exchange rate regime. However, it will cause the development of a parallel market for foreign exchange to the detriment of the level of official foreign reserves. If capital controls are temporary, official foreign reserves will be reduced through current account transactions in the form of increased imports which may speed up eruption of the crisis.

Unlike the first generation models of currency crises in which the persistent weakness in fundamentals makes the collapse of the pegged exchange rate regime inevitable, the second generation models emphasize the trade-off between the benefits and the costs of maintaining a peg. These models were developed following the ERM of the EMS crisis of 1992-93 in which it was observed that the exchange rates that were attacked were not unsustainable in the sense that fundamentals of the economies in question were weak and foreign reserves crossed the critical threshold.

One feature of these models is that policymakers continuously weigh the benefits and costs associated with maintenance of the peg. As long as the benefits exceed the costs, the peg will be maintained. However, whenever the costs outweigh the benefits, policymakers will find it optimal to abandon the peg. In Ozkan and Sutherland (1995), for instance, one benefit derived from maintenance of the peg is to obtain credibility in the fight against inflation. However, an increase in foreign interest rates will lead to an increase in domestic interest rates. The cost comes in the form of a lower level of output. If foreign interest rates rise beyond a certain level, the cost of maintaining the peg becomes larger than the benefits and policymakers will abandon the peg. Therefore, it is the changes in some important economic variables, due to certain shocks either domestic or external, that make policymakers abandon the peg.

In these models, a currency crisis can also erupt without any significant change in fundamentals but because of a speculative attack on the currency motivated by market participants' expectations of a collapse of the peg. In this framework, two outcomes are identified. One is that without the speculative attack, the peg can be maintained indefinitely. Another is that the currency of an economy with sound macroeconomic fundamentals can also be attacked. In this case, speculators anticipate that fundamentals will change after the attack due to their actions and to the response of policymakers, thereby validating ex post the incompatibility between the previous peg and the new fundamentals, and therefore their decision to attack the currency.

Obstfeld (1996) presents some mechanisms through which currency crises with self-fulfilling features, or self-fulfilling crises, erupt. One such mechanism is when expectations of a currency depreciation drive up domestic interest rates in a country with a high public debt. In this case, out of concern for the higher cost of servicing the public debt, the government will abandon

the peg. Another mechanism is when expectations of a depreciation, which lead to higher domestic interest rates, put the banking sector under pressure. In this case, rather than face a possible costly bailout of banks, the government will abandon the peg.

One important characteristic of these models is that they allow for the possibility of multiple equilibria and shifts across these equilibria; that is, the economy can move from an equilibrium with no devaluation expectations and a sustainable peg to an equilibrium with high devaluation expectations and a peg that becomes unsustainable, without a change in fundamentals. Thus, unlike in the Krugman model where a decrease of foreign reserves to a critical threshold will trigger a currency crisis, a major implication of the second generation models is that a crisis is very hard to predict.

Jeanne (1997) presents a model of currency crisis in which he attempts to reconcile the two main theories discussed above. The author argues that self-fulfilling speculation is a phenomenon that results from a bifurcation in the fundamentals; that is, when the fundamentals cross a certain level, speculation becomes self-fulfilling. The author also provides an empirical illustration of this approach, using the French franc crisis of 1992-93.

Finally, some authors have argued that currency crises are caused by contagious effects. Following the theoretical work by Gerlach and Smets (1995), Eichengreen, Rose and Wyplosz (1996) undertake a test of this hypothesis. They find that a speculative attack elsewhere in the world raises the probability of an attack on the domestic currency by 8%.

### 3. Indicators of currency crises: empirical evidence

In the present section, the focus will be on three of the most cited empirical models for predicting currency crises, which also differ in terms of the methodology adopted. These models are from: Frankel and Rose (1996), Sachs, Tornell and Velasco (1996) and Kaminsky, Lizondo and Reinhart (1998).

Frankel and Rose apply a model to estimate the probability of a currency crash, using a panel of annual data for 105 developing countries over the period 1971-1992. The authors first define a currency crash as “a nominal depreciation of the currency of at least 25% that is also at least a 10% increase in the rate of depreciation” (p. 352), thus excluding high inflation cases. To avoid counting the same crisis more than once, they also set a three-year window around a crash period. They use a large number of explanatory variables classified as follows: domestic macroeconomic indicators, external variables, debt composition and foreign variables. Following a graphical analysis of the variables they selected, the authors pool the data across countries and periods and estimate probit models using both contemporaneous and lagged regressors. After conducting robustness checks to their regression results, the authors conclude that the probability of a currency crash increases when the share of foreign direct investment to total debt decreases, domestic credit growth is high, GDP growth is low, and when foreign interest rates are high.

The second model considered is that of Sachs, Tornell and Velasco in which the authors analyze the severity of the Mexican crisis of 1994 and its impact on emerging markets, using a cross section of twenty countries in 1995. They define a crisis index as the weighted average of the percent depreciation of the nominal exchange rate and the percent decrease in reserves, from



November 1994 to April 1995. Their explanatory variables include real exchange rate appreciation and growth in credit to the private sector as a fraction of GDP (a proxy for banking system weakness) which represent fundamentals, and the ratio of reserves to M2 as a proxy for reserve adequacy. Their argument is that for a country to face a currency crisis, it has to have both weak fundamentals and inadequate reserves (exchange rate appreciation, lending boom and reserves/M2 in the lowest quartile of the sample). With  $R^2$  equal to 0.69, they conclude that their model describes well the cross-country pattern of currency crises in emerging markets in the period they covered.

Kaminsky, Lizondo and Reinhart propose the “signals” approach, an early warning system of currency crises which consists of monitoring the evolution of a set of economic indicators which tend to behave differently in the periods leading up to a crisis. The authors define a crisis as “a situation in which an attack on the currency leads to a sharp depreciation of the currency, a large decline in international reserves, or a combination of both” (p. 15). Empirically, they identify a crisis by the behavior of an index of exchange market pressure which is a weighted average of monthly percentage changes in the exchange rate and gross international reserves. Based on theoretical priors and on the availability of data on a monthly basis, the authors choose 15 economic indicators: international reserves, imports, exports, the terms of trade, deviations of the real exchange rate from trend, the differential between foreign and domestic real interest rates on deposits, excess real M1 balances, the money multiplier, the ratio of domestic credit to GDP, the real interest rate on deposits, the ratio of nominal lending to deposit interest rates, the stock of commercial banks deposits, the ratio of broad money to gross international reserves, an index of output and an index of equity prices. Except for the deviation of the real exchange rate from trend, excess real M1 balances and the variables based on interest rates, the indicator is defined as the percentage change in the level of the variable from its level of one year earlier.

The authors set the signaling horizon at 24 months and consider that an indicator issues a signal whenever it departs from its mean and crosses a given threshold level. For each indicator, they choose a country-specific threshold level so as to establish a balance between the risks of issuing false signals and not issuing signals about an upcoming crisis. In their examination of the effectiveness of individuals indicators, the authors extend the empirical analysis undertaken in Kaminsky and Reinhart (1996). In that paper, the authors analyze the links between banking and currency crises and include 76 currency crises in 20 countries (15 developing and 5 developed) over the period 1970-1995.

Kaminsky, Lizondo and Reinhart analyze the performance of each indicator in terms of the matrix presented below.

	Crisis within 24 months	No crisis within 24 months
Signal was issued	A	B
No signal was issued	C	D

Each of the 4 cells represents months. For example, cell A would show for a particular indicator the number of months in which the indicator would issue a signal of a crisis which would actually occur within the next 24 months. Based on the framework of the above matrix, the authors present in a summary table the performance of all indicators under the signals approach. The table provides data on the percentage of crises called, the percentage of good signals to possible good signals ( $A/(A + C)$ ), the percentage of bad signals to possible bad signals ( $B/(B + D)$ ), the ratio of false signals to good signals, or the noise-to signal ratio ( $[B/(B + D)]/[A/(A + C)]$ ) and the percentage of crises for which signals were issued to number of signals issued ( $A/(A + B)$ ).

The authors also calculate for each indicator both the average number of months in advance of the crisis when the first signal occurs (average lead time) and the persistence of the signals, the average number of signals per period, during the period preceding a crisis relative to tranquil times. Based on the empirical examination of the various indicators included in the study, the authors conclude that those that performed the best as leading indicators are: deviations of the real exchange rate from trend, exports, equity prices, the ratio of broad money to gross international reserves and output.

Furman and Stiglitz (1998) discuss a number of issues related to the East Asian crisis of 1997. In this context, they analyze the three empirical models reviewed above, developed and estimated before that crisis, and apply them to the East Asian countries in order to assess their forecasting accuracy. When applying the Frankel and Rose model, they find very low probabilities of crises in East Asian countries and thus conclude that it would not have predicted that crisis. They reach a similar conclusion when they apply the Sachs, Tornell and Velasco model. Regarding the Kamisky, Lizondo and Reinhart model, Furman and Stiglitz find that it would have performed better than the previous two models in predicting the East Asian crisis. However they argue that, because it adopts a common percentile threshold, this model has a tendency to overpredict crises in countries with a history of good fundamentals and underpredict them in countries with a history of bad fundamentals.

In line with the work undertaken by Furman and Stiglitz, Berg and Pattillo (1999) evaluate the same three models and assess their predictive power. This out-of-sample exercise leads to conclusions that are largely consistent with those of Furman and Stiglitz. In effect, both the Frankel and Rose, and the Sachs, Tornell and Velasco models do not provide any useful forecasts, even with the addition of other explanatory variables. As to the Kaminsky, Lizondo and Reinhart model, the authors find that it achieved some

success such as in terms of ranking countries by severity of crisis. But, when they add two variables, the level of the ratio of M2 to reserves and the ratio of the current account to GDP (which they believe are important potential determinants of currency crises), the augmented model performs better out-of-sample than the original model.

#### 4. Behavior of indicators for Arab countries

In the previous section, the focus was on three studies that have claimed success in predicting currency crises, based on in-sample prediction. The choice of variables used in these studies was based on the main theories of currency crises. However, when applied for out-of-sample prediction, those empirical models failed though to a lesser extent for the Kaminsky, Lizondo and Reinhart model. Therefore, the search for a model capable of forecasting currency crises with some degree of accuracy and consistency continues. This, in no way, is intended to imply that the large amount of work undertaken so far in this direction should be discarded. The literature, both theoretical and empirical, has identified a large set of variables that could at least be useful in the task of detecting vulnerability to currency crises. From this perspective, and given the lack of studies on Arab countries in this area, the present section will focus exclusively on Arab countries. The objective will be essentially to analyze the behavior of some of the main indicators identified in the literature, and thus attempt to uncover any potential vulnerability of Arab economies to currency crises.

The group of Arab countries covered includes only those that officially adopt a pegged exchange rate regime, that is: Bahrain, Jordan, Kuwait, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria and United Arab Emirates. Three countries peg their currency to the U.S. dollar, five to the SDR and two to a basket of currencies (table 1 at the end of the text). Due to a lack of data on

several variables identified in the literature as potential indicators of vulnerability to currency crises, the present exercise focuses only on annual observations on nine variables over the period 1995-1998. Two of these variables, depreciation of the nominal exchange rate against the U.S. dollar (table 2) and inflation (table 3), should be examined jointly; thus grossly measuring changes in the real exchange rate against the dollar (given that the inflation rate in the U.S. was less than 3% over the period in question). Data on real GDP growth rate are presented in table 4. Fiscal expansion is represented by the ratio of fiscal surplus to GDP (table 5). Monetary expansion is represented by the growth rate of domestic credit (table 6). Adequacy of reserves is represented in two ways: the ratio of M2 to reserves (table 7) and the ratio of reserves to imports (table 8). Finally, the external position of the countries under study is represented by both the ratio of the current account to GDP (table 9) and the ratio of the external debt to GDP (table 10).

It can be observed from table 2 that six of the ten Arab countries had the nominal exchange rate of their currencies against the dollar fixed over the period 1995-98, and in fact for much longer than that. Combined with the figures from table 3 on inflation, the real exchange rate of those currencies against the dollar actually declined over the period for most of them, except for Qatar where it slightly increased over the last year (inflation up from 2.8% to 3.1%). Jordan experienced no change in the nominal rate over the last two years, but an increase in the real rate in the last year though by a small percentage. For the other Arab countries, while Morocco experienced a depreciation of the real rate over the last three years, Libya's real rate consistently increased by more than 15% over the same period, even surpassing the 30% rate of increase in 1996.

Except for Morocco and Jordan, the other Arab countries in the sample are oil producers and the oil sector represents an important part of their GDP and a main source of their government revenues. Thus, it is expected that the

figures in tables 4 (real GDP growth rate) and 5 (fiscal surplus/GDP) reinforce each other for those countries. Furthermore, the sharp decrease in world oil prices from the end of 1997 to early 1999 should be reflected significantly in the figures for 1998. A look at the numbers in the two tables indicates that it is indeed the case. For Jordan, the ratio of the fiscal deficit to GDP increased sharply in 1998 although the economy contracted only slightly. As to Morocco, the growth of its GDP is heavily dependent on agricultural output which in turn is highly exposed to weather conditions.

Regarding the indicator of monetary expansion, domestic credit growth, the figures in table 6 show sharp changes in the rate of growth, both positive and negative, over the period for most countries. Over the last two years, the most noticeable numbers concern Bahrain, Jordan, Oman and Qatar for the sharp increases in the rate; Kuwait and Morocco for the slowdown in the expansion and Saudi Arabia for the contraction.

With respect to the adequacy of reserves represented by two ratios, broad money (M2) to foreign exchange reserves (table 7) and reserves to imports (table 8), figures on two countries stand out: the low level of reserves relative to M2 and imports for Saudi Arabia and the high level for Libya. The ratios for the other Arab countries are not far apart. However, for all countries and over the four years, no significant deterioration in the ratios was observed.

The external position of Arab countries is represented by the ratio of current account to GDP (table 9) and that of external debt to GDP (table 10). Between 1997 and 1998, all oil producing countries experienced a worsening of their current account position. Even Jordan and Morocco faced a similar situation. The highest deficits as a percent of GDP were recorded in Bahrain, Oman and Qatar at around 17%. Kuwait and the United Arab Emirates are the only countries that show a positive ratio of current account to GDP over the whole period. As to the ratio of external debt to GDP, it is highest in the cases

of Jordan and Qatar (114.9% and 100%, respectively in 1998). However, the ratios have been moving in opposite direction for these two countries, decreasing for Jordan and increasing for Qatar. For the other countries, Morocco's debt is the highest with respect to GDP (53.4% in 1998) but has been declining annually while those of Oman and the United Arab Emirates have sharply increased in the last year (by about 44% and 40%, respectively).

Regardless of the strength of economic fundamentals, for a speculative attack on a currency to succeed the capital account must be open; in other words, inward and outward capital flows must be unrestricted. Otherwise, the monetary authorities can maintain the pegged exchange rate for a much longer period of time (although at the cost of the emergence of a parallel foreign exchange market or increased imports, as discussed previously). In the case of the Arab countries covered in this study, the regulatory frameworks for current and (especially) capital transactions are presented in table 1. With respect to current transactions, Libya and Syria are the only countries that have yet to accept the obligations of Article VIII of the IMF Articles of Agreement. Regarding capital transactions, a few observations can be made. Except Bahrain, all Arab countries impose controls on foreign direct investment. Also, except Qatar, all have specific provisions regarding transactions conducted by commercial banks and other credit institutions. Only four Arab countries impose controls on financial credits (Bahrain, Libya, Morocco and Syria). Finally, only Jordan and Qatar do not maintain any controls on capital and money market instruments. Thus, the regulatory framework for capital transactions is by no means uniform across Arab countries. While no country maintains a fully open capital account, countries differ in terms of types of transactions they chose to liberalize. Overall, on a capital account openness scale, Libya, Morocco and Syria rank the lowest and Qatar the highest.

Based solely on an observation of the indicators, and without statistical tests of the type undertaken by Kaminsky, Lizondo and Reinhart for instance, it can be stated that these indicators behaved differently across Arab countries. The sharp decrease in world oil prices over the last two years of the period did have a significant impact on oil exporting countries. However, the indicators for some of these countries deteriorated much more than those for others. In effect, Bahrain, Libya, Oman and Qatar had most of their indicators move in the “wrong” direction in a significant way. For the non-oil producing countries, Jordan experienced a significant deterioration of its indicators, which implies increased vulnerability to currency crisis. In effect, while an upturn in world oil prices (as seen since early 1999) will quickly lead to improvements in the indicators of oil exporting countries, Jordan’s economic structure combined with the relative openness of its capital account imply that its currency has become more vulnerable.

## 5. Conclusion

This paper has addressed the issue of currency crises. A currency crisis is generally defined as a situation in which a speculative attack on the currency leads to a sharp decrease in its nominal value. Some authors also include in this definition a situation in which a speculative attack does not result in a devaluation of the currency but in a reduction of foreign exchange reserves and an increase in domestic interest rates. The costs of a currency crisis to an economy may be significant, which makes the interest in this issue shown by both researchers and policymakers all the more relevant. A currency crisis can occur jointly with a banking crisis, it can precede or follow a banking crisis, or it can occur without a banking crisis. The links between the two types of crises are well established in the literature. The focus in this paper has been only on currency crises.



After discussing the main types of theoretical models of currency crises, the first generation and second generation models, the paper has reviewed three of the most cited empirical models of currency crises. Those models have claimed success in predicting currency crises, based on in-sample prediction. But, when applied for out-of-sample prediction, they showed their limitations. However, it should be recognized that currency crises are hard to predict because they are different from each other mainly in terms of the conditions of the countries in which they erupt. Therefore, using a model or a set of indicators which may have performed well in one instance does not necessarily make them suitable in another situation. Furthermore, as pointed out in the IMF World Economic Outlook (1998), even if models or indicators which could predict a currency crisis with a high degree of accuracy were available, they would lose their usefulness since market participants would take them into account and thus speed up occurrence of the crisis and policymakers would act to prevent its occurrence.

Nevertheless, the literature on currency crises, both theoretical and empirical, has identified a large set of variables that could at least be useful in the task of detecting vulnerability to currency crises. From this perspective, the last part of the paper has discussed the results of an exercise that focused exclusively on Arab countries and which relied on an observation of developments in the indicators. Based on the behavior of some of the main indicators identified in the literature, the objective was to attempt to uncover any potential vulnerability of Arab economies to currency crises. As it turned out, discounting the impact of world oil prices on most Arab countries, a few of them do appear vulnerable to a currency crisis.

**Table 1. Exchange Arrangements and Regulatory Frameworks for Current and Capital Transactions in Arab Countries**

Country	Exchange rate arrangements pegged to:			Status under IMF Articles of Agreement		Controls on capital and money market instruments	Controls on financial credits	Controls on direct investment	Provisions specific to commercial banks and other credit institutions
	U.S. Dollar	SDR	A basket of currencies	Article VIII*	Article XIV**				
<b>Bahrain</b>		•		•		•	•		•
<b>Jordan</b>	•			•				•	•
<b>Kuwait</b>			•	•		•		•	•
<b>Libya</b>		•			•	•	•	•	-
<b>Morocco</b>			•	•		•	•	•	•
<b>Oman</b>	•			•		•		•	•
<b>Qatar</b>		•		•				•	
<b>Saudi Arabia</b>		•		•		•		•	•
<b>Syria</b>	•				•	•	•	•	•
<b>United Arab Emirates</b>		•		•		•		•	•

Notes: \* No restrictions on payments and transfers for current transactions.

\*\* Maintenance of restrictions on payments and transfers for current transactions.

- Not available.

Sources:

- International Monetary Fund, Exchange Arrangements And Exchange Restrictions Annual Report 1998.
- Unified Arab Economic Report, 1999.

**Table 2. Depreciation of Nominal Exchange Rate  
Against U.S. Dollar  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	0.00	0.00	0.00	0.00
<b>Jordan</b>	0.14	1.28	0.00	0.00
<b>Kuwait</b>	0.40	-0.32	-1.64	1.10
<b>Libya</b>	7.78	4.62	5.52	2.09
<b>Morocco</b>	-5.48	3.90	10.39	4.72
<b>Oman</b>	0.00	0.00	0.00	0.00
<b>Qatar</b>	0.00	0.00	0.00	0.00
<b>Saudi Arabia</b>	0.00	0.00	0.00	0.00
<b>Syria</b>	0.00	0.00	0.00	0.00
<b>United Arab Emirates</b>	0.00	0.00	0.05	0.00

Source: International Monetary Fund, International Financial Statistics, February 2000.

**Table 3. Inflation  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	2.8	-0.2	0.2	0.2
<b>Jordan</b>	2.3	6.5	3.0	4.5
<b>Kuwait</b>	2.7	3.6	0.6	0.2
<b>Libya</b>	26.7	38.9	25.0	24.2
<b>Morocco</b>	6.2	3.0	0.9	2.9
<b>Oman</b>	-1.1	0.3	-0.4	-0.5
<b>Qatar</b>	3.0	7.4	2.8	3.1
<b>Saudi Arabia</b>	4.9	1.2	0.0	-0.3
<b>Syria</b>	8.0	8.2	2.3	-1.2
<b>United Arab Emirates</b>	4.4	3.2	3.5	3.0

Source: The Economist Intelligence Unit, Country Report, Various Issues.

**Table 4. Real GDP Growth  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	4.0	4.1	3.1	0.4
<b>Jordan</b>	5.9	0.6	1.3	-1.0
<b>Kuwait</b>	1.0	3.3	2.8	-2.3
<b>Libya</b>	2.0	1.1	0.5	-2.0
<b>Morocco</b>	-6.6	12.1	-2.0	6.3
<b>Oman</b>	4.8	2.9	6.4	-2.5
<b>Qatar</b>	1.6	5.0	10.0	2.0
<b>Saudi Arabia</b>	0.5	1.4	1.9	1.6
<b>Syria</b>	5.8	4.5	1.3	-1.5
<b>United Arab Emirates</b>	8.1	10.1	2.1	-2.0

Source: The Economist Intelligence Unit, Country Report, Various Issues.

**Table 5. Fiscal Surplus  
GDP  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	-5.76	-2.40	-5.24	-5.01
<b>Jordan</b>	-1.69	-3.15	-3.13	-6.86
<b>Kuwait</b>	-13.78	-7.11	5.48	-4.82
<b>Libya</b>	-5.10	1.02	0.00	0.00
<b>Morocco</b>	-3.35	-3.32	-2.41	-1.83
<b>Oman</b>	-9.03	-4.49	-0.66	-6.89
<b>Qatar</b>	-4.20	-8.08	-8.60	-8.02
<b>Saudi Arabia</b>	-5.73	-3.65	-2.87	-10.03
<b>Syria</b>	-6.36	-4.38	-3.34	-4.31
<b>United Arab Emirates</b>	-12.47	-12.82	-4.53	-16.93

Source: Unified Arab Economic Report, 1999.

**Table 6. Domestic Credit Growth  
(in %)**

Country	1995	1996	1997	1998
<b>Bahrain</b>	17.93	-7.49	20.87	23.34
<b>Jordan</b>	9.83	0.61	1.71	14.23
<b>Kuwait</b>	10.53	-1.32	13.75	5.33
<b>Libya</b>	7.92	-4.48	-15.84	1.90
<b>Morocco</b>	14.61	5.98	49.25	8.51
<b>Oman</b>	7.81	13.96	30.64	26.96
<b>Qatar</b>	1.03	7.88	12.92	17.32
<b>Saudi Arabia</b>	5.58	-1.99	18.27	-3.69
<b>Syria</b>	10.24	-7.20	0.45	-
<b>United Arab Emirates</b>	7.10	11.94	15.90	12.82

Source: International Monetary Fund, International Financial Statistics, February 2000.

**Table 7. M2  
Foreign Exchange Reserves  
(in %)**

Country	1995	1996	1997	1998
<b>Bahrain</b>	3.10	3.09	3.41	5.02
<b>Jordan</b>	3.69	4.15	3.57	4.37
<b>Kuwait</b>	7.56	7.59	7.99	7.18
<b>Libya</b>	4.54	3.88	3.35	-
<b>Morocco</b>	6.24	6.03	5.60	6.02
<b>Oman</b>	3.65	3.20	3.21	5.52
<b>Qatar</b>	3.30	4.06	4.39	5.31
<b>Saudi Arabia</b>	9.02	13.03	12.21	12.53
<b>Syria</b>	-	-	-	-
<b>United Arab Emirates</b>	3.11	3.08	3.21	3.10

Source: International Monetary Fund, International Financial Statistics, February 2000.

**Table 8. Foreign Exchange Reserves  
Imports**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	0.38	0.34	0.35	0.34
<b>Jordan</b>	0.60	0.46	0.60	0.51
<b>Kuwait</b>	0.49	0.44	0.44	0.51
<b>Libya</b>	0.93	0.99	1.13	1.22
<b>Morocco</b>	0.36	0.39	0.42	0.43
<b>Oman</b>	0.28	0.32	0.33	0.20
<b>Qatar</b>	0.46	0.30	0.45	0.36
<b>Saudi Arabia</b>	0.06	0.05	+0.05	0.05
<b>Syria</b>	-	-	-	-
<b>United Arab Emirates</b>	0.30	0.29	0.28	0.37

Source: The Economist Intelligence Unit, Country Report, Various Issues.

**Table 9. Current Account  
GDP  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	3.3	2.8	-4.9	-17.9
<b>Jordan</b>	-3.9	-3.3	0.4	0.04
<b>Kuwait</b>	18.8	23.1	26.2	10.3
<b>Libya</b>	0.6	5.4	2.8	-8.1
<b>Morocco</b>	-3.6	0.09	-0.2	-1.5
<b>Oman</b>	-5.8	1.2	-0.3	-17.1
<b>Qatar</b>	-31.0	-29.3	-11.4	-17.0
<b>Saudi Arabia</b>	-4.2	0.5	0.2	-9.9
<b>Syria</b>	2.7	1.0	3.4	-1.5
<b>United Arab Emirates</b>	13.7	15.3	14.6	5.8

Source: The Economist Intelligence Unit, Country Report, Various Issues.

**Table 10. External Debt  
GDP  
(in %)**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>Bahrain</b>	52.7	41.3	39.3	45.9
<b>Jordan</b>	122.9	120.1	116.7	114.9
<b>Kuwait</b>	37.6	24.6	31.3	36.4
<b>Libya</b>	-	-	-	-
<b>Morocco</b>	68.8	59.1	57.6	53.4
<b>Oman</b>	23.1	22.4	23.1	33.3
<b>Qatar</b>	60.0	79.1	96.7	100.0
<b>Saudi Arabia</b>	-	-	-	-
<b>Syria</b>	0.15	0.13	0.13	0.12
<b>United Arab Emirates</b>	23.7	24.4	24.1	33.7

Source: The Economist Intelligence Unit, Country Report, Various Issues.

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# **On the Predictability of Currency Crises: The Use of Indicators in the Case of Arab Countries**

## **Abstract**

A currency crisis could have a significant impact on the economy, as events from the East Asian crisis of 1997 have shown. The increase in the number of currency crises over the last three decades has generated a large amount of research into their causes. Theoretical models developed over this period have been classified in the literature into two main types commonly called the “first generation” and the “second generation” models. The first generation models focus on the incompatibility between domestic conditions and the maintenance of a pegged exchange rate. The second generation models emphasize the trade-off between the benefits and the costs of maintaining a peg. Based on theoretical priors, empirical models have been developed and applied for the purpose of predicting currency crises. After discussing both theoretical and empirical models and underlining the limitations of the latter, the last part of the paper focuses on a group of Arab countries that adopt a pegged exchange rate regime. Using a set of indicators identified in the literature, the objective of the exercise is to attempt to detect any potential vulnerability of Arab economies to currency crises.