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Exchange Rate Management within the Middle East and North Africa Region: The Cost to Manufacturing Competitiveness[1]

Mustapha Nabli

Jennifer Keller

Marie-Ange Veganzones[2]

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2 Mustapha Nabli is chief economist for the Middle East and North Africa Region and director of the Middle East and North Africa Region Social and Economic Development Group of the World Bank. Jennifer Keller is an economist at the World Bank. Marie-Ange Veganzones is an economist at the World Bank and the Centre National de la Recherche Scientifique (CNRS) in France. The authors are grateful to Pedro Alba, Dipak Dasgupta, Tarik Yousef, and Paolo Zacchia for their comments and suggestions, and to Paul Dyer and Adama Coulibaly for their analytical support. Views expressed here do not necessarily reflect those of the World Bank, its executive directors, or the countries they represent.

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Introduction

Perhaps the greatest challenge currently facing the Middle East North Africa (MENA) region is the challenge of creating jobs. A recent World Bank report[1] estimates that some 100 million new jobs will need to be created in the next two decades to absorb both the current unemployed as well as the rapidly expanding labor force—more than doubling the current number of jobs today. If the region is to ensure that this labor force has both sufficient employment opportunities and the prospects for real wage growth, GDP growth in the region will need to more than double from its average of 3% per year over the late 1990s to 6 to 7% a year for a sustained period.

Making this growth will possibly require a fundamental transformation in the region, from public sector-dominated economies to private sector-led economies, open to international trade, with competitive private-sector industries outside of oil becoming the engine for growth and the creation of employment. Supporting a competitive private manufacturing sector in

1 *Unlocking the Employment Potential in the Middle East and North Africa: Toward a New Social Contract.* World Bank, 2003.

MENA will require action on numerous fronts, including governance, trade, and monetary and fiscal policy action.

A requisite component of supporting private sector development in MENA will be appropriate exchange rate management. Evaluations of the economic policies in developing countries have demonstrated the importance of proper management of the real exchange rate (RER) in a country's performance. Empirical evidence consistently indicates that best economic performers are those countries that have maintained an "appropriate" RER.[2] Countries that have properly managed their RER (avoiding substantial RER appreciation) have been more successful in promoting manufacturing exports.[3] They have been more successful in attracting foreign direct investment,[4] and more generally, they have experienced higher growth.[5]

The Middle East and North Africa region has not followed the general trend worldwide in their choice of exchange rate regimes. Although over the past decades, countries have progressively adopted more flexible exchange rate regimes, the majority of the economies in the Middle East and North Africa continue to maintain *de facto* fixed exchange rate regimes. While about 65% of economies were operating under *de facto* fixed exchange rate regimes in 1974 (within MENA, the proportion was somewhat higher at 77%), by the end of the 1990s, only 42% of economies outside of MENA had fixed exchange rate systems. Within MENA, however, that proportion was 60%.

2 That is, its equilibrium real exchange rate value (ERER). See Williamson, 1985; Harberger, 1986; and Collins, 1997.

3 See Balassa, 1990, for empirical evidence among Sub-Saharan African economies.

4 Goldberg, 1993; Goldberg and Kolstad, 1994; and Cushman, 1985; 1988.

5 Edwards, 1988; Cottani, Cavallo and Khan, 1990; Ghura and Grennes, 1993.

What impact, if any, have fixed exchange rate regimes had on RER misalignment and, ultimately, the economic performances in the MENA region? In this paper, we calculate the level of exchange rate misalignment across a panel of countries over the 1970–1999 period, and show that the MENA region has suffered from substantial exchange rate overvaluation which, though highest over the 1970–1985 period, has persisted into the 1990s. It is estimated that over the 1985–1999 period, the degree of exchange rate overvaluation in MENA averaged some 22%, higher than for any other region but CFA Africa. We then calculate the effect that overvaluation of the exchange rate has had on the competitiveness of non-oil exports. It is estimated that the overvaluation of exchange rates has reduced the region's manufacturing exports—as a percentage of GDP per year—by about 18% over the 1970–1999 period.

Armed with this information, we discuss the empirical relationship between the extent of exchange rate misalignment and the choice of exchange rate regime. From our own calculations, the probability for fixed exchange rates to become overvalued is substantially higher than for floating regimes, and the probability for exchange rates under fixed regimes to become seriously overvalued (in excess of 25%) is almost twice as high as for flexible arrangements. We then discuss the reasons behind MENA's continued reliance on fixed exchange rate regimes. While the exchange rate choices in the region are poorly explained by most traditional models of exchange rate choice, they in part reflect the interests of the public sector as both producer of oil and holder of debt, both of which make the government likely to favor fixed exchange rates over floating ones.

Exchange Rate Management, Overvaluation, and the Costs to Competitiveness

MENA's exchange rate management has relied predominantly upon rigid exchange rates, though not necessarily "officially" fixed exchange rates.[6] In part, the reliance on fixed regimes was in response to the rapid inflation many economies experienced over the late 1980s and early 1990s. Most economies in MENA opted for a fixed exchange rate regime as the most effective strategy for combating high inflation.

This adoption of fixed exchange rates was successful in contributing to macroeconomic stability. However, once the immediate threats of high inflation had been averted, only a handful of countries shifted to more flexible exchange rate arrangements.

One of the arguments for countries not contending with high levels of inflation (and thus not necessarily requiring a monetary anchor) to adopt flexible exchange rate arrangements is that the real exchange rate is less likely to become overvalued. Overvaluation can negatively affect a country's economic performance through a variety of channels. Overvaluation reduces the profitability of tradables and, in turn, decreases exports. It leads to a reduction in economic efficiency and a misallocation of resources. By increasing uncertainty and raising the risk of macroeconomic collapse, misalignment can hinder economic growth through a deterioration of domestic and foreign confidence and investment, and can act as a catalyst for capital flight.[7]

Our own estimates suggest that fixed exchange rate regimes are substantially more likely to become overvalued than flexible regimes. We estimated the level of exchange rate misalignment for a panel of countries, measured as the percent difference between the real exchange rate (RER) and its equilibrium value (ERER).[8] The RER was modelled following the approach used by Edwards (1989) and extended by Elbadawi (1994) and Baffes, Elbadawi and O'Connell (1997).[9]

From these misalignment estimates, we find that over the 1974–99 period, the proportion of observations under fixed regimes which were even marginally overvalued was 88%, versus 76% of flexible exchange rate regimes. Moreover, the proportion of observations under fixed regimes which were seriously overvalued (in excess of 25%) was 50%, almost twice as high as for flexible regimes (28%).

This tendency for fixed exchange rates to become overvalued has impacted the MENA region significantly, with substantial overvaluation of the real exchange rate experienced over the past three decades—around 29% per year in the '70s to the mid-80s and 22% per year from the mid-80s to 1999 (see Table 1 below). In addition, this tendency has

6 In many cases of exchange rate systems officially classified as flexible, for example, there has been considerable "management" of the exchange rate. *De facto* exchange rate regimes according to Levy-Yeyati/Sturzenegger (2000), determined by looking at the actual behavior of three variables closely related to exchange rate behavior: exchange rate volatility, volatility of exchange rate changes, and volatility of reserves. External liabilities and government deposits were netted out from the reserves data, in order to consider only changes with a counterpart in monetary, an especially important correction for both oil producing countries and countries with large privatization programs. The LYS dataset of exchange rate regimes has subsequently been amended. This paper's analysis reflects use of the earlier *de facto* classification system.

7 In addition to misalignment, variability of the RER has been found to have negative consequences on growth (Ghura and Grennes, 1993; Grobar, 1993; Cushman, 1993; and Gagnon, 1993).

8 This estimate represents a new contribution to the study of exchange rate policy in MENA countries, since previous studies are sparse (Domac and Shabsigh, 1999; Mongardini, 1998; Sundararajan, Lazare, and Williams, 1999).

9 This model estimates the RER as a function of both "fundamental" factors in the medium to long-term (terms of trade, investment, capital flows, and trade openness) and less persistent factors in the short-term (macroeconomic policies, nominal devaluations and others). Following the estimation of the RER, the ERER could be computed. Using the estimated RER, the ERER was computed by eliminating the effects of transitory variables and using estimates of "sustainable" values of the fundamentals.

not significantly decreased—contrary to the Latin American, African, or Asian economies of our sample, which have in general chosen a more flexible exchange rate regime—with regular devaluation of their currency—as well as more consequent macroeconomic reforms.

Table 1: Average Misalignment and Volatility[10]

1970/80– 84 (in % per year)*	Misalignment	Volatility
MENA	29	7.9
Latin America	20	11.2
Africa (CFA)	61	12.7
Africa (non CFA)	29	11.3
South Asia	43	13
East Asia	10	5.4
1985–99 (in % per year)*	**Misalignment**	**Volatility**
MENA	22	12.4
Latin America	10	12.9
Africa (CFA)	28	14.5
Africa (non CFA)	13	16
South Asia	15	8.3
East Asia	5	8.6

*Depending on the countries.

10 Volatility is calculated as the coefficient of variation of the RER over a five-year period.

Overvaluation and Manufactured Exports

What has been the cost of this greater degree of overvaluation in MENA to total exports and manufactured exports? To determine this cost, the following model tests the effects of RER misalignment and volatility on the logarithm of total and manufactured exports to GDP ($\log(X_t)$):

$$\ln(X_t) = c + b_1.\ GDPgrTP_{i,t} + b_2.\ \ln(TOTn_{i,t}) + b_3.\ \ln(Inv_{i,t}) + b_4.\ \ln(Roads_{i,t}) + b_5.\ \ln(H1_{i,t}) + b_6.\ RerVol_{i,t} + b_7.\ \ln(RerMis_{i,t}) + \varepsilon_t.$$

where:

(i) $GDPgrTP_{i,t}$ = the rate of growth of GDP of country's trading partners (which can have a "pulling" effect on export growth)

(ii) $\ln(TOTn_{i,t})$ = logarithm of terms of trade (in which improvements can increase the profitability of production for export)

(iii) $\ln(Inv_{i,t})$ = logarithm of investment/GDP (which increases the overall production capacity, and thereby, export capacity)

(iv) $\ln(Roads_{i,t})$ = logarithm of length of roads (in km per km^2)

(v) $\ln(H1_{i,t})$ = logarithm of the average number of years of primary schooling of adult population

{Both (iv) and (v) capturing the availability of core physical and human infrastructures}

(vi) $RERVols$ = volatility of the RER, as a measure of volatility of relative prices[11] (with RER[12] volatility increasing the uncertainty of export

11 Calculated as the coefficient of variation of the RER over an eight-year period. To compute this indicator, some economists use more or less sophisticated regressions techniques, such as the variance of the residual if the regression of the RER on a time trend, or an ARCH modelization RER behavior. However, from an empirical point of view, all these various measures are highly correlated and the standard deviation or the coefficient of variation measures perform as well as more sophisticated ones (see Kenen and Rodrik, 1986 or Grobar, 1993).

12 In addition to misalignment, variability of the RER has been found to have negative consequences on growth (Ghura and Grennes, 1993; Grobar, 1993; Cushman, 1993; and Gagnon, 1993).

profitability)

(vii) *RERMis* = RER misalignment, as a measure of the distortion of relative prices (the overvaluation of which hampers competitiveness and diverts investment out of more productive tradable goods sectors)[13]

The equation was estimated on our panel of 53 countries over 1970/80 to 1999. The results from our estimation are shown in Table 2.

Our estimations confirm a significant negative impact of ER mismanagement (in the form of overvaluation) on total and manufacturing export performance. According to our estimations, a 10% increase in the level of misalignment lowers the ratio of manufactured exports to GDP by 7.2%, and the ratio of total exports to GDP by 1%. Overall, for the MENA region, this RER overvaluation during the 1970–99 period reduced—on average per year—manufacturing exports to GDP by 18%.

In terms of individual countries in MENA, losses were important in Jordan and Morocco in the '70s and '80s, because of the more diversified export base of these economies. This is also the case of Tunisia in the '90s, despite a low level of overvaluation. In the major oil-exporting countries (Algeria and Iran), losses appear small because of the low level of manufactured exports (Table 3). The large overvaluation, however, has certainly contributed to the low diversification of these economies.

13 RER misalignment can also disrupt exports by increasing RER uncertainty. Our measure of RER misalignment comes from our estimation of the ERER (see previous section).

Table 2: Estimation Results of the Exports Equations
Dependent Variables: ln(*Xmanufi*) and ln(*Xtoti*)

Variable	Manufactured Exports	Total Exports
GDPgrTP $_{i,t}$	2.83	1.48
	(1.9)	*(2.52)*
ln*(TOTn* $_{i,t}$*)*	-1.4	0.1
	(0.81)	*(2.49)*
ln*(Inv* $_{i,t}$*)*	0.87	0.30
	(5.8)	*(8.69)*
ln*(Roads* $_{i,t}$*)*	0.08	0.10
	(1.4)	*(3.48)*
ln*(H1* $_{i,t}$*)*	1.92	0.26
	(11.13)	*(5.66)*
RerVol	-0.27	-0.1
	(0.80)	*(1.21)*
Ln(RerMis)	-0.72	-0.10
	(5.75)	*(2.75)*
Year 1974	0.25	
	(1.65)	
Year 1975	0.34	
	(1.7)	
Intercept		-1.14
		(9.05)
Adjusted R^2	0.81	0.13
Fischer Test	31.7	78.3
Haussmann Test	12.4	0.20

NOTE: Student *t* statistics are within brackets. The number of observations are 816 and 964. Cointegration of the variables was tested using Im, Pesaran, and Shin (2003) critical values of ADF tests in the case of heterogeneous panel data. (see Table A2 in *Annex* 2). The equations were estimated by using the fixed effect method in the case of manufactured exports and the random effect method in that of total exports.

Table 3: Cost of Overvaluation on Manufactured Exports
(Selected MENA Countries)

	Algeria			Egypt			Iran		
	ExpM*			ExpM			ExpM		
	Mis (%)	(%)*	Cost**	Mis (%)	(%)*	Cost**	Mis (%)	(%)*	Cost**
1970–79	79	3	-1.7	15	27	-2.9	42	3	-0.9
1980–89	59	1.5	-0.6	22	19	-3	24	4	-0.7
1990–99	8	3.3	-0.2	19	37	-2.4	84	7	-4
1970–99	49	2.6	-0.8	15	27.6	-2.7	49	4.5	-1.8

	Jordan			Morocco			Tunisia		
	ExpM			ExpM			ExpM		
	Mis (%)	(%)*	Cost**	Mis (%)	(%)*	Cost**	Mis (%)	(%)*	Cost**
1970–79	57	26	-10.5	49	16	-5.7		25	
1980–89	31	43	-9.4	8	39	-2.4	3	49	-1
1990–99	9	49	-3.1	1	53	-3.7	16	75	-8.7
1970–99	25	39.1	-7.7	21	36.1	-3.9	9	49.6	-4.8

* ExpM: manufactured exports as percent of total exports
** Cost of overvaluation as percent of total exports

Overall, overvaluation represents a large cost to the region. Developing a competitive private sector depends upon ensuring appropriate prices. Profitability of production hinges on prices: prices of inputs that go into the production process and the price that can be obtained in the market for output. Overvaluation damages competitiveness because it artificially alters the price ratio between tradables and non-tradables, and the region's producers of tradable goods find they are less able to compete with either imported goods or with other countries' exports.

Economies, which have in reality cost advantages in labor and domestically produced inputs, begin altering their production processes and substituting for capital equipment and imported inputs. And the greater the overvaluation that takes place, the more difficult it becomes for otherwise competitive firms to maintain their competitive edge, and the more it discourages new firms from entering the market. At a time when encouraging an export-oriented, non-oil private sector in MENA is critical, there is little room for excessive exchange rate overvaluation.

Exchange Rate Regime Choice

While fixed exchange rates significantly increase the incidence of overvaluation and subsequently the cost to manufacturing exports, the question emerges, why does the region continue to rely upon rigid exchange rate arrangements? Is misalignment a justified cost that the MENA region must pay to maintain stability in other macroeconomic fundamentals? In other words, have MENA countries been choosing the appropriate exchange rate arrangements?

The question is complex. A great deal of research has been devoted to

improving our understanding of how exchange rate regime choices are made; two major branches of research emerge. The first branch has produced models of exchange rate choice based solely upon economic factors.[14] In this framework, the optimal regime could be determined as the one that minimizes fluctuations in output, the price level, or some other macroeconomic variable. The other branch of research has focused on the political economy. While there have been several arguments within this general framework, they have generally focused on the relationship between domestic political institutions and exchange rate decisions.[15]

But while both economic and political economic models have substantially improved our understanding of exchange rate choice across countries, traditional models have been less successful in explaining the *de facto*[16] exchange rate regime decisions within MENA. Standard models of exchange rate choice that incorporate both structural and political characteristics, when applied to MENA economies, result in incorrectly predicted exchange rate regimes twice as often as for non-MENA economies. In Table 4, several conventional models of exchange rate regime choice are outlined, models which incorporate a broad range of structural and political

14 The earliest literature focused strictly on the structural characteristics of the economy, such as economic openness, country size, and labor mobility. From these characteristics, the optimal exchange rate arrangement is determined (Dreyer, 1978; Heller, 1978; Holden et al., 1979; Wickman, 1985; Savvides, 1990). Later research in this branch of the literature has focused on country-specific shocks emanating from both the international and domestic community (Fischer, 1977; Savvides, 1990).

15 Within that concentration, arguments have centered around policy discipline and credibility (Kydland and Prescott, 1977), capability and constraints on future governments (Rogowski, 1987; Edwards, 1996).

16 As opposed to the *de jure* classification of exchange rate regimes, we have examined the *de facto* classification of exchange rate regimes (Levy-Yeyati and Sturzenegger, 2001), which looks at the actual behavior of three relevant variables to exchange rate behavior: exchange rate volatility, volatility of reserves, and volatility of exchange rate changes. This new classification of exchange rate regimes refines the analysis substantially.

Table 4: Correct Predictions of Exchange Rate Regime under Alternate Model Specifications[17]

		Non–MENA		MENA	
Model	Independent Variables[18]	No. Obs.	% correct Predictions[19]	No. Obs.	% correct Predictions
A	SIZE, OPENNESS, CVEX, CVGDP	895	37%	106	16%
B	SIZE, OPENNESS, CVEX, CVGDP, CAPCONT, RESERVES, INFLAT	895	43%	106	19%
C	POLSTABLE, HISTGROW, SIZE, OPENNESS, CVEX CVGDP, CAPCONT, RESERVES, INFLAT	674	41%	91	15%
D	HISTGROW, SIZE, OPENNESS, CVEX, CVGDP, CAPCONT, RESERVES, INFLAT	779	42%	97	17%

17 Dependent variable exchange rate regime arrangement (1=fixed; 0=floating). Probit estimation for the 1985–2000 period.

18 SIZE = lagged ratio of GDP in constant US$ to US. OPENNESS = average ratio of (imports + exports)/GDP for five years prior to observation year. CVEX = Coefficient of variation of exports for period (t-5) to (t-1). CVGDP = Coefficient of variation of GDP for period (t-5) to (t-1). CAPCONT = dummy variable for whether country had controls on movement of capital. RESERVES = lagged ratio of international reserves to imports. INFLAT = average inflation rate over five-year period prior to observation year. POLSTABLE= lagged index of political stability (ICRG). HISTGROW = average lagged log growth, period (t-5) to (t-1). All estimations performed over the 1985–2000 period.

19 Exchange rate choice was modeled through probit estimation, with fixed exchange rates having a value of 1, and flexible regimes a value of 0. Probit estimations will produce a probability of adopting a fixed regime, ranging from 0 to 1. A fixed exchange rate regime was said to be correctly predicted if the estimated probability of adopting a fixed exchange rate regime was greater than 0.6. A flexible exchange rate regime was said to be correctly predicted if the estimated probability of adopting a fixed regime was less than 0.4. Estimated probabilities between 0.4 and 0.6 were categorized as not definitively predicted by the model.

economy variables. In none of these standard models are the exchange rate regimes adopted in MENA as well predicted as for other countries. In most cases, the difference in the proportion of observations correctly predicted between non-MENA economies and MENA economies is substantial.

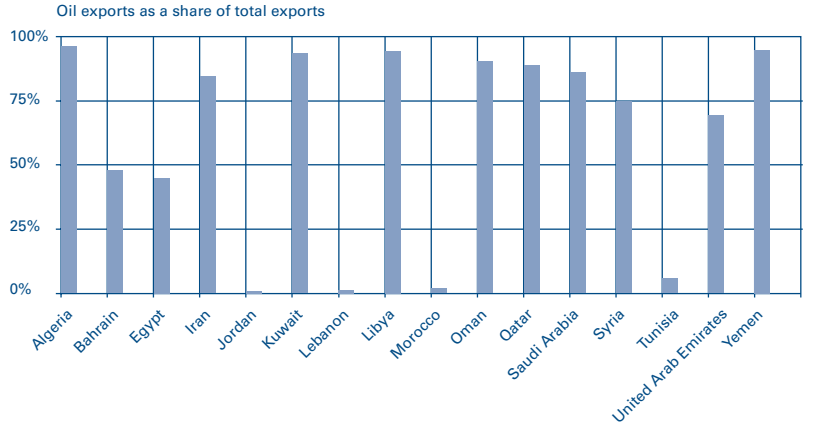
Where do the standard models fail in predicting the exchange rate regimes within MENA? The majority occurs for fixed exchange rate observations. Model A, for example, correctly predicts 31% of the MENA observations of floating regimes. On the other hand, it does not correctly predict any fixed regime observations (that compares with Non-MENA economies, where there were 55% correct predictions for floating regime observations and 10% correct predictions for fixed regime observations). Model B correctly predicts 31% of MENA's floating regime observations, but only 6% of its fixed regime observations (compared with 57% and 21% for Non-MENA observations of floating and fixed regimes, respectively). Overall and especially for the cases where fixed regimes have been adopted, according to traditional models for exchange rate choice, the MENA region isn't getting it right.

Why the MENA countries which would be predicted along structural variable lines to adopt flexible regimes have chosen to maintain fixed exchange rate arrangements may have something to do with the public sector's personal interests.

Recent research advances on the proposition that countries with high unhedged foreign currency denominated debt and a correspondingly high exchange rate risk exposure (such as economies in the MENA region) have an incentive to peg (see Calvo and Reinhart, 2002; Hausman, Panizza, and Stein, 2001). For governments with high publicly guaranteed external debt, fixed regimes may be preferred as a means to better control the direction of

temporary currency appreciation (or depreciation), since by allowing overvaluation of the currency, the fixed regime permits an at least temporary reduction in foreign denominated debt payments (albeit while sacrificing the competitiveness of some national industries in the process). Continued build-up of further debt, at the same time, allows an overvalued fixed exchange rate to be maintained, since it permits the government to continue to borrow foreign currency to sustain the current account deficit and meet the excess demand.

Share of oil in total exports, 1999



Source: United Nations COMTRADE data, as reported in WITS trade data warehouse.

In addition, the public sector in many MENA economies (and most oil-based economies) has interest in its own business, namely the export of natural resources. Oil still represents the major source of income and a dominant source of foreign exchange for the oil-producing economies of MENA. Shares of oil in current total exports ranged from a high of more than 95% in Yemen, to a low of less than 1% in Jordan and Morocco at the

end of the 1990s. In 10 of the 16 countries of MENA listed below, oil revenues account for more than 70% of total export revenues, and in 12 of the 16, it accounts for more than 45% of export revenue.

What is striking about oil economies, in general, is the reliance they have maintained on fixed exchange rate regimes. For economies in which over 50% of export revenue emanated from natural resource extraction in 1997, some 83% had fixed exchange rate arrangements in place. That compares with fixed exchange rate regimes being adopted in only 38% of economies in which oil represented less than 25% of exports. Conventional economic models approach the desire for fixed or flexible regimes by agglomerating the interests of the tradable goods sector together. The problem with this approach is that the various industries within the exporting sector are assumed to have concurrent interests. There is reason to believe this may not always be the case.

The manufacturing sector, with relatively elastic worldwide demand, is likely to be more dependent upon competitiveness (and thus, more likely to lobby for floating exchange rates) than is the natural resources sectors. Floating exchange rate mechanisms may entail greater short-term volatility, but better prevent long-term appreciation of the exchange rate. As a result, it allows exporters to better achieve external competitiveness through efficiency, by leaving to the market forces of supply and demand the exchange rate determination.

On the other hand, the natural resource extraction sector is assumed to face more inelastic demand and depend less upon imported raw materials. As a result, currency appreciation has weaker impact on profits (and depending upon the elasticity of demand, may result in even higher profits). Thus, the natural resource-exporting sector is likely to prioritize stability in

exchange rates and the potential gains from currency overvaluation (under control of policy-makers under a fixed regime, at least for the short-term) rather than the potential for competitiveness.

In an attempt to understand better the exchange rate regime decisions in MENA, we estimate exchange rate choice according to traditional models of exchange rate choice for a large sample of economies, but include public external debt and the divergent interests of the oil versus manufacturing sectors.

The Empirical Results

Several standard exchange rate regime choice models are augmented with proxies for the importance of oil revenues to the public sector, the importance of external debt payments to the public sector, and the ability of the manufacturing sector to lobby the government for flexible regimes. Debt payments are measured by the ratio of public external debt to GDP, lagged one period. The importance of the oil sector is captured as the value of oil exports to total exports, lagged one period. The lobby power of the manufacturing sector is measured as an interactive between the size of the manufacturing export sector in GDP and the concentration of manufacturing exports within the sector, with the expectation that larger or more concentrated manufacturing sectors (in terms of the industries represented) are more able to have an effective voice in influencing the government's exchange rate regime choice. The manufacturing lobby variable was also lagged a period.

Other variables include political stability, size, degree of openness, measures of external and domestic variability, inflation, reserves, and

capital controls. Annex 3 provides a more detailed explanation of the variables included in the estimations and the expectations about their influence on exchange rate regime choice.

To investigate whether the incorporation of additional explanatory variables significantly improves the predictive power of traditional models on the exchange rate regime choices within MENA, standard probit models of exchange rate choice are compared with augmented models (Table 5), incorporating variables for external debt and for the interests of the oil sector versus the lobby power of the manufacturing sector. To avoid simultaneity problems, the oil sector and manufacturing sector variables are included in separate estimations.

By then comparing the predicted exchange rates from the models to the actual exchange rate choices in MENA and outside of MENA, versus models incorporating the public sector and manufacturing sector's interests, it is possible to measure the improvement of fit.

Table 5: Standard and Augmented Models of Exchange Rate Choice
Dependent Variable: Exchange Rate Regime (1=fixed; 0=floating)

	Model 1			Model 2			Model 3		
Independent Variables	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
SIZE	-4.97	-2.91	-4.32	-5.58	-3.13	-4.75	-4.76	-2.48	-4.17
	(-4.75)	(-2.75)	(-4.05)	(-4.80)	(-2.74)	(-4.12)	(-3.76)	(-2.23)	(-3.48)
OPEN	0.01	0.02	0.14	0.01	0.01	0.01	0.04	-0.00	-0.01
	(5.08)	(5.40)	(5.23)	(3.17)	(3.05)	(3.01)	(0.92)	(-0.15)	(-0.31)
CVEX	-0.12	0.25	-0.29	0.09	0.43	-0.09	0.12	0.99	0.39
	(-0.21)	(0.44)	(-0.50)	(0.16)	(0.72)	(-0.14)	(0.14)	(1.08)	(0.43)
CVGDP	0.37	0.30	0.40	0.81	0.62	0.80	0.71	0.56	0.89
	(0.79)	(0.63)	(0.84)	(1.65)	(1.24)	(1.61)	(1.04)	(0.80)	(1.30)
CAPCONT				0.23	0.23	0.20	0.44	0.13	0.02
				(2.35)	(2.37)	(2.04)	(0.38)	(1.09)	(0.17)
RESERVES				-0.15	0.53	0.10	0.34	0.84	0.56
				(-0.22)	(0.78)	(0.15)	(0.44)	(1.05)	(0.71)
INFLAT				-0.71	-0.80	-0.80	-0.81	-1.01	-0.96
				(-5.33)	(-5.73)	(-5.79)	(-5.02)	(-6.00)	(-5.71)
POLSTABLE							-0.00	0.01	0.01
							(-0.40)	(2.13)	(1.63)
HISTGROW							-0.04	-0.01	-0.03
							(-2.12)	(-0.30)	(-1.63)
OILX			0.50			0.57			0.83
			(2.90)			(3.22)			(4.07)
MANLOBBY		-1.53			-1.60			-2.16	
		(-6.97)			(-7.15)			(-7.06)	
PUBEXDEBT		0.00	0.08		0.06	0.14		0.27	0.39
		(0.05)	(1.08)		(0.89)	(1.98)		(2.28)	(3.16)

	Model 1			Model 2			Model 3		
Independent Variables	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
No.Obs	1001	1001	1001	1001	1001	1001	765	765	765
MENA									
Proportion Right	16	35	16	19	37	32	15	44	26
Proportion Wrong	16	19	12	10	14	11	9	13	9
No Prediction	67	45	73	71	49	57	76	43	65
NON-MENA									
Proportion Right	36	49	41	43	57	46	41	61	52
Proportion Wrong	13	15	16	11	17	14	13	14	15
No Prediction	50	36	43	46	27	41	46	25	34

The incorporation of debt, combined with a measure of the interests of the oil sector or the lobby power of the manufacturing sector, significantly increases the predictive power of the exchange rate models under all three model classifications, not only for MENA economies, but for economies overall. The improvement in predictive power of these augmented models in explaining MENA's exchange rate arrangements is substantial, especially so for models incorporating the lobby power of the manufacturing sector.

Conclusions

Against the overall trend throughout the world, the majority of the MENA region has continued to maintain *de facto* fixed exchange rate arrangements. Empirical analysis suggests that fixed exchange rates are associated with greater levels of exchange rate misalignment, in the form of overvaluation, which, in turn, reduces competitiveness for non-oil exporters. In MENA, manufacturing exports—as a percentage of GDP per year—have been reduced by some 18% over the 1970–1999 period as a result of the region's substantial overvaluation of its currency. At a time when developing a strong, export-oriented private sector outside of oil is critical in MENA, there is no room for excessive currency overvaluation.

We find that MENA's choice of exchange rate regimes—predominantly leaning towards rigid exchange rate arrangements—is less a reflection of structural characteristics of the economies than it is a reflection of the political economy. With a large public sector, which has individual interests as producer of oil and holder of external debt, the interests of the economy are often at odds with the interests of the political economy. If the manufacturing sector has enough power, however, it may lobby effectively for flexible exchange rate regimes.

Annex 1: Calculating RER Misalignment

Modeling the Long-Run Equilibrium of the RER

The long-run equation explaining the RER behaviour is based on Edwards (1994), who has developed a dynamic model of RER determination for a small, open economy with a single nominal exchange rate system. The model allows for both real and nominal factors to play a role in the short run. In the long run, only real factors— "fundamental"—influence the ERER. In our case, the long run relation is specified as follows:[i]

(1)

$$\ln(e_t) = c + a_1 . \ln(Inv_t) + a_2 . \ln(Open_t) + a_3 . \ln(TOT_t) + a_4 . Capinf_t + \varepsilon_t .$$

with:

(i) e_t = RER. This indicator is used as a proxy of the ratio of the price of non-tradable goods (P_{Dt}) to the price of tradable goods (P_{wt},E_t0, E_t, being the nominal ER in local currency/US$ and P_{wt} the world prices)

(ii) Inv_t = Investment ratio to GDP

(iii) $Open_t$ = Indicator of trade openness, measured as the sum of import and export divided by GDP

(iv) TOT_t = External terms of trade, measured as the ratio of export to import prices (in dollars)

(v) $Capinf_t$ = capital inflows calculated as the net change in reserves minus the trade balance scaled by GDP[ii]

c = intercept, a_1 to a_4 =parameters, t = time index and ε_t = error term

Following Edwards (1989), we assume that in the long-term an increase in the investment rate results in an augmentation in the demand and in the relative price of non-tradables, thus appreciating the real exchange rate. This assumption implies, however, that investment is predominantly constituted of non-tradable products (such as for example services and construction) and non of tradable goods (such as equipment). It can also be due to the multiplier effect of the investment which increases the aggregated demand of non-tradable products principally. Conversely, the RER is positively affected by trade restrictions, of which the ratio of imports plus exports to GDP is a proxy. The impact of the terms of trade on the RER is more ambiguous, since there are two opposite effects: an increase in the relative price of export goods to import goods leads to an appreciation of the RER if the income effect, which results in higher demand for non-tradables, dominates the substitution effect, associated with a decline in the relative cost of imported intermediate goods used in the production process of non-tradables. Finally, an increase in capital inflows, either officially or not, involves stronger demand for both tradable and non tradable goods. They, therefore, lead to a higher relative price of non tradables, and conversely appreciate the RER—as needed for domestic resources to be diverted toward production in the non tradable sector to meet increased demand.

A complementary equation has been estimated in order to take more into consideration the characteristics of some MENA countries. The idea is that in a certain number of countries, among which is Egypt, the debt relief should have led to an appreciation of the ERER. For this purpose we have added to equation (1) the ratio of the debt service to total external trade (imports + exports, *DebtServ*).

(2)

$$\ln(e_t) = c + a_1 . \ln(Inv_t) + a_2 . \ln(Open_t) + a_3 . \ln(TOT_t) + a_4 . Capinf_t + a_5 . \ln(DebtServ_t) + \varepsilon_t .$$

The existence of these long-term relationships implies that variables of equations (1) and (2) are cointegrated. It is therefore required to determine the order of integration of the series. Table A2 in Annex 2 provides the results of the Augmented Dickey-Fuller (ADF) tests of the data for our sample of 53 countries over 1970–80 (depending on the countries) to 1997. We used the Im, Pesaran, and Shin (2003) methodology, which provides critical values of ADF tests in the case of heterogeneous panel data. The results indicate that the series are stationary at either the 1% or 5% levels, which allowed us to run equations (1) and (2). We then used the Engel and Granger (1991) method to test for cointegration between the variables of equations (1) and (2). Cointegration tests have been based on the residuals of the two equations. ADF tests conclude, still using Im, Pesaran, and Shin (2003) critical values, that residuals are stationary.

Hence, equations (1) and (2) describe the long-run relationship between RER and a number of fundamental variables. The equations were estimated on an unbalanced panel of 53 countries, among which 19 are African countries (8 CFA and 11 non CFA), 13 Latin America countries, 10 Asian countries, 10 MENA countries, plus one country (see Annex 2 for the list of countries).[iii] The results of the regressions–using the White estimator to correct for the heteroscedasticity bias–are presented in Table A1. The equations were estimated by using the fixed effect methodology.[iv] The estimated regressions explain a fairly large amount of the observed variation of the RER.

Table A1: Estimation Results of the Cointegrating Equations (1) and (2)
Dependent Variable: $\ln(e_t)$

Variable	Eq (1)	Eq (2)
$\ln(Inv_t)$	0.16	0.10
	(3.6)	*(2.6)*
$\ln(Open_t)$	-0.64	-0.72
	(12.5)	*(13.7)*
$\ln(TOT_t)$	0.14	0.21
	(3.1)	*(4.41)*
$Capinf_t$	0.34	0.44
	(3.6)	*(4.3)*
$\ln(DebtServ_t)$		-0.18
		(9.9)
Adjusted R^2	0.61	0.65
Fischer Test	28.3	25.7
Haussmann Test	28	15.5

NOTE: Student *t* statistics are within brackets. The number of observations used in eq (1) and (2) are respectively 1183 and 1062.
Data have been compiled from WDI, GDF, GDN and LDB World Bank databases.
Source: Authors'estimations

Estimated relationships between RER and its fundamentals are consistent with theory: an increase in investment and in capital income, or an improvement of the terms of trade result in a RER appreciation, which indicates, in the latter case, that the income effect dominates the substitution effect. Conversely, the opening of the economy and the increase in the debt service lead to an RER depreciation.

Calculating RER Misalignment

RER misalignment is measured as the ratio of the RER and its equilibrium value (ERER):

MIS = (RER/ERER)

Thus, when the RER is higher than its equilibrium value (when the currency is overvalued) misalignment takes a value greater than one. But when the RER is lower than its equilibrium value (undervalued), misalignment takes a value less than one.

The estimations of the long-term relationship between the RER and its fundamental determinants have been used to compute the ERER.[v] To this purpose, the "sustainable" or "equilibrium" values of the fundamental variables had to be assessed. The idea is that the deviation of the fundamental variables from their "equilibrium"—in addition to the variations of the short-term economic policy variables—leads to a misalignment of the RER. The "permanent" values of the four fundamental variables, i.e., Inv_t, $Open_t$, TOT_t, $Capinf_t$, were computed using moving averages of the series over a three-year period. This simple method was possible because our series was stationary.[vi]

Following this methodology, excessive trade protection, unexpected appreciation of the terms of trade or increase in investment and capital flows, in comparison to the "normal" or long-term trend in the economy, lead to an overvaluation of the RER. It can also be shown from the estimation of the error correction model that in the short run nominal devaluations (*Dev*), black market premium (*BMP*) and inflation (*Infl*) explain the deviations of the RER from the ERER.

i The short run dynamic of the RER has also been estimated through an error correction model.

ii An increase in net capital inflows may result from a) an autonomous augmentation in foreign aid, foreign voluntary lending or FDI, b) an increase in borrowing due to the removal of domestic capital controls, c) a fall in the world interest rates, or d) an increase in public borrowing to finance the fiscal deficit.

iii The countries have been selected on the criteria of their level of income per capita. To preserve a kind of coherence of the sample, we have chosen, most of the time, intermediate income countries in order to be comparable to the ones of the MENA region.

iv This is supported by the data as shown by the Fischer test of equality of intercepts across countries and preferable to the random effect methodology, as revealed by the value of the Haussmann test.

v In the rest of the document, it is equation (2) that has be used to calculate the misalignment.

vi Other trials consisting in an "economic" determination of these "sustainable" levels, inspired by Edwards (1989), which consists, for example, of taking as sustainable value for OPENNESS the average of the three higher values of the variable, or in the case of capital inflows, zero if the rate of growth of the economy is inferior to the international interest rate, which means in this case that that borrowing is not sustainable and did not give better results as far as misalignment is concerned. They are not presented here.

Our calculations of misalignment appear, however, in some cases, to underestimate the level of misalignment as generally perceived in the different countries. We thereby have adjusted our estimates by scaling them up, according to the difference between our calculations of ERER and its level in periods in which the actual RER was considered to be at the equilibrium. The RER was considered to be close to its equilibrium in periods following devaluations and structural adjustment where balance of payment was also close to the equilibrium. For example, it has been considered that RER equilibrium took place in 1989 in the case of Morocco. This period has been 1991 and 1994–95 for Algeria; 1993–94 for Egypt; 1995 for Iran; 1992 for Jordan; 1980, 1994 and 1997 for Tunisia.

Some more sophisticated calculations consist, when a variable has a unit root, in using time series techniques introduced by Beveridge and Nelson (1981) where variables are decomposed into a random walk with a drift and a stationary component. This technique allows, unlike the trend stationary model based decomposition, the steady state growth path of the series to shift over time. Fluctuations around the shifting permanent path reflect cyclical effects.

Annex 2: List of Countries in Estimations of Exports/GDP

Table A2: List of Countries in Estimations of Exports/GDP

MENA	AFRICA		ASIA	LATIN AMERICA
	CFA	NonCFA		
United Arab Emirates (ARE)	Burkina Faso (BFA)	Botswana (BWA)	Bangladesh (BGD)	Argentina (ARG)
Bahrain (BHR)	Côte d'Ivoire (CIV)	Ghana (GHA)	China (CHN)	Bolivia (BOL)
Algeria (DZA)	Gabon (GAB)	Kenya (KEN)	Indonesia (IDN)	Brazil (BRA)
Egypt, Arab Rep. (EGY)	Cameroon (CMR)	Madagascar (MDG)	India (IND)	Chile (CHL)
Iran, Islamic Rep. (IRN)	Gambia (GMB)	Mozambique (MOZ)	Korea, Rep. (KOR)	Colombia (COL)
Jordan (JOR)	The Niger (NER)	Mauritius (MUS)	Sri Lanka (LKA)	Costa Rica (CRI)
Kuwait (KWT)	Senegal (SEN)	Malawi (MWI)	Malaysia (MYS)	Ecuador (ECU)
Morocco (MAR)	Togo (TGO)	Nigeria (NGA)	Pakistan (PAK)	Guatemala (GTM)
Syrian Arab Republic (SYR)		Tanzania (TZA)	Philippines (PHL)	Mexico (MEX)
Tunisia (TUN)		South Africa (ZAF)	Thailand (THA)	Peru (PER)
		Zambia (ZMB)		Paraguay (PRY)
				Uruguay (URY)
				Venezuela, RB (VEN)

Annex 3: Modeling Exchange Rate Choice

In this paper, we empirically tested the hypothesis that for each economy, the public sector's determination of exchange rate regime is a decision-making process which weighs three factors: the overall structural characteristics of the economy, its personal interests in minimizing its current external debt payments and maximizing natural resources revenue (both better achieved under fixed exchange rates), and the degree to which lobby pressures by the manufacturing sector can sway the public sector. The greater the lobby power of the manufacturing sector, the more likely the public sector will be to adopt a floating exchange rate regime.

A central problem throughout the literature in the testing of models of exchange rate regime choice has been the utilization of *de jure* (legal) exchange rate regimes. Most empirical analysis has used the published exchange rate regimes from the IMF's *Exchange Arrangements and Exchange Restrictions: Annual Report*. The report classifies economies according to their exchange rate arrangement into three broad groups: (a) those whose currency is pegged to a single currency or currency composite; (b) those whose exchange rate system has limited flexibility, in terms of a single currency or group of currencies; and, (c) those with more flexible exchange rate systems. Unfortunately, in many countries, exchange rates that are officially flexible have been subject to considerable official "management." Indeed, as Calvo and Reinhart (2002) and others have emphasized, many countries that claim to have floating exchange rates do not in practice allow the rate to float freely, but use interest rate and intervention policies to affect its behavior.

Within the approaches pioneered by Holden, Holden, and Suss (1979) to characterize the *de facto* exchange rate regimes economies employ, a major contribution was provided by Levy-Yeyati and Sturzenegger (2001), hereafter LYS, who developed a database of exchange rate classifications by looking at the actual behavior of the main relevant variables, as opposed to the traditional classification compiled by the IMF. The LYS classification is based on three variables closely related to exchange rate behavior to determine the *de facto* exchange rate regime: exchange rate volatility, volatility of exchange rate changes, and volatility of reserves.[vi] The empirical results from this paper were based on the original re-classification of exchange rates by LYS for their 2000 paper. That dataset has recently been amended, and the results from this paper will have to be revised.

Structural variables in the analysis include many of the variables suggested by the optimal currency areas (OCA) literature. Two of these are the country size and the degree of openness of the economy, with the expectation that smaller countries that are more open tend to favor fixed exchange rate regimes. In our estimations, size (SIZE) is measured by the log of GDP, relative to the United States, lagged one period, and openness (OPEN) is defined as the average share of exports to GDP for the five-year period prior to the observation year. In addition, the OCA literature would suggest that vulnerability of an economy's output to shocks affects its choice of exchange rate regime. Thus, we have included two indices for the extent of external and domestic shock variability. The first, CVEX, is the coefficient of variation of real exports for the five-year period prior to the observation year. Likewise, CVGDP was constructed as the coefficient of variation of real GDP for the five-year period prior to the observation year. Each of these indicators was assembled from World Bank data.

Several control variables suggested by the literature were also included in our analysis. One, capital controls (CAPCONT) is suggested in the literature on capital liberalization and financial openness, with countries with capital controls more likely to have fixed exchange rates. If a government controls the movement of international capital, it can insulate itself from the international price movements and will be more able to maintain a pegged regime.[vi] A dummy variable was included if the country in question had controls on the international movement of capital, and the data was assembled from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*.

An additional control variable suggested by the political economy literature (Edwards, 1996) is the historical rate of inflation. Theory would predict that countries with a history of rapid inflation would have a lower probability of maintaining a pegged regime, and would thus tend to favor the adoption of a more flexible system. In most other studies, the history of inflation is measured as the average rate of inflation for some period prior to the observation year. We constructed a slightly different index, INFLAT. This was constructed by taking the average rate of inflation over the five-year period prior to the observation year, and determining the proportion of years in which inflation exceeded 30%. This was meant to better capture the variable which decision-makers might consider important in determining their exchange rate regime.[vi] One might question whether a policy-maker makes a serious distinction between whether his economy experienced average inflation rates of 140% a year versus 100% a year. Even taking logs of past inflation rates would retain these ordinal differences in inflation rate, which from the point of view of a policy-maker may lose their significance at some level of inflation. On the other hand, the past

probability of the economy facing episodes of high or runaway inflation (above 20% a year, in our estimations) may play a serious role in considerations for exchange rate policy in the future.

In addition to these variables, we have incorporated variables that proxy the public sector's weight put on personal interests (in minimizing external debt payments and maximizing natural resource export revenue) versus its ability to be lobbied by the manufacturing sector. For the reasons given above, countries which have higher levels of external debt will have a greater tendency to opt for a fixed exchange rate regime over a floating one, since there is an economic pay-off to allowing the currency to become overvalued, in terms of lower foreign-currency debt payments. In our estimations, we included PUBXDEBT, which is the lagged value of public and publicly guaranteed external debt to GDP.

To measure the public sector's interest in petroleum revenues, we include the size of the petroleum sector (measured by its share of total exports), OILX, to measure the public sector's personal exporting interests, again lagged one period, and assembled using World Bank data. Lobby power in the manufacturing sector, MANLOBBY, is measured as an interactive between the share of manufacturing exports in GDP and the concentration of manufacturing exports among the top three products, constructed using data from the United Nation's COMTRADE (which allows for analysis of trade-by-commodity). Like the size of the petroleum sector in exports, the manufacturing lobby variable was lagged one period. Because of significant reporting errors on the part of some economies (particularly the GCC)[vi] in terms of exports, exports of oil, exports of manufacturing goods, and total exports (to determine shares in total exports) by each economy were re-computed by aggregating world imports from each economy in the various

sectors as a share of total world imports from the economy in question.

Our estimations were performed over the 1985–1999 time period.

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