FEMISE RESEARCH PROGRAMME

The European Single Currency and MENA's Manufactured Export to Europe

ACHY Lahcen and SEKKAT Khalid
Dulbea and Ecares, Université Libre de Bruxelles

June 2000

This text has been drafted with financial assistance from the Commission of the European Communities. The views expressed herein are those of the authors and therefore in no way reflect the offical opinion of the Commission

The European Single Currency and MENA's Manufactured Export to Europe[1]

June 2000

ACHY Lahcen[2] and SEKKAT Khalid[3]

Abstract

The purpose of this paper is to investigate the optimal exchange rate policy for MENA countries in order to foster their manufactured exports towards Euroland. The exchange rate policy is captured through three di¤erent indicators: the e¤ect of real e¤ective exchange rate changes, the e¤ect of volatility and the e¤ect of misalignment. This investigation is conducted at sectoral level over the period 1970-1997. Export supply equations for eleven categories of manufactures are estimated using panel data method. Our sample includes the four North African countries (Algeria, Morocco, Tunisia, Egypt) and Turkey. Our empirical results show that exchange rate management plays a crucial role in providing incentives for manufactured exports toward Euroland. Finally, an assessment of the degree of sectoral sensitivity to exchange rate changes is conducted and the e¤ects of excess volatility and misalignment of exchange rate are estimated.

Key words: Real E¤ective Exchange rate, Misalignment, Volatility, Manufactured exports, Panel Data.

JEL Classi…cation: C23, F14, F31.

[1]We are grateful to Agnes Chevalier for useful discussions and for providing us with the trade data.We also bene…ted from heplful comments by Agnes Benassy, Michel Beine, Lionel Fontagne, Akiki Suwa-Eisenmann and from participants to the AFSE confrence (Paris,october 1999),the ENTER jamboree (London,january 2000) and the FEMISE confernce (Marseilles,febraury 2000). This study bene…ted from …nancial supports by the FEMISE network, The ARC 96/01-205 and the Research Fund at the ULB.

[2]Dulbea and Ecares ,Université Libre de Bruxelles and INSEA (Morocco).

[3]Corresponding author, Dulbea and Ecares, Univesite Libre de Bruxelles, CP 140, Avenue F.D. Roosevelt 50,Brussels 1050, Belgium. Tel: 00-32-2-6504139, Fax 00-32-2-6504123, Email ksekkat@ulb.ac.be

1. Introduction

Since January 1999 the Euro is the unique and o¢cial currency of the eleven European countries. The move through such a step of the process of economic integration in Europe has important implications both for member and non-member countries. While the impact on members has received large attention from the profession, the impact on non-members is still poorly explored. For the MENA countries the economic implications of the Euro are especially important. The MENA region is heavily dependent on the European Union (EU) as a market for its exports and a source for its imports. About 30% of total MENA exports are directed to the EU, and 44% of the total MENA imports. For some countries, such as North African countries, these ratios are generally above 60%.

The adoption of the Euro in 1999 and the dependency of MENA countries on trade with Europe pose the question of the choice of an optimal exchange rate management strategy for these countries. The Maasticht Treaty's Declaration on Monetary cooperation with non community countries states that EMU countries should seek to contribute to stable international monetary relations (Hadjimichael and Galy (1997)). In this context, the EMU countries are intended to cooperate with other non-European countries, with which they have close economic ties, in order to create a monetary and …nancial environment favorable to trade and growth. It follows that policy makers in MENA countries and in the EU should investigate the terms of such a cooperation. To guide their choice, an assessment of the consequences of cooperation for their economies will be very helpful. The aim of this study is to conduct such an assessment for MENA countries. It focuses on the relationship between exchange rate management and manufactured exports.

The focus on manufactured exports follows from its role as a major factor of economic growth in developing countries.[4]. This is due to at least three factors: First, income elasticity of demand is higher for manufactured goods than for primary products. It follows that growth prospects for a country's exports along with growth in foreign income can be expected to improve by specializing in manufacturing. Second, both price elasticity of demand and price elasticity of supply are presumed to be higher for manufactured goods than for primary commodities. This induces a stabilizing e¤ect on the terms of trade and, therefore,

[4] In addition, expanding manufactured exports made a valuable contribution in the 1980s in providing foreign exchange to service external debt. This was all the most welcome in a period of depressed world markets for many primary commodities on which most of those countries exports mainly rely.

a more stable growth of export earnings over time. Third, the development of the manufacturing sector involves substantial prospects for dynamic productivity gains through economies of scale, learning e¤ects, and externalities among …rms and industries.

Based on the above considerations, many developing countries in Asia and Latin America have increased the share of manufactures in total exports. In North-Africa, Morocco and Tunisia also showed a signi…cant rising trend in the share of manufactured exports: from 20% in 1980 to 56% in 1990 and from 34% to 70% respectively. Egypt experiences a moderate increase (from 7% to 20%) while for Algeria the share remains very low.

Exchange rate policy plays a crucial role in providing increased incentives for exporting. All countries which have been successful in promoting manufactured exports experienced real exchange rate (RER) depreciation, leading to a signi…cant increase in the domestic relative price of tradables to non tradables.

Mismanagement of macroeconomic and trade policies lead to real exchange rate misalignment- that is to a substantially overvalued RER with respect to its market clearing level. Real exchange rate misalignment is damaging to economic performance- and especially to manufactured exports, as it decreases the pro…tability of production of tradables. Moreover, inconsistent policies increase the volatility of real exchange rate. High volatility sends con‡icting signals to economic agents and increases uncertainty with regard to investments as well as the pro…tability of producing tradable goods.

The damaging in‡uence of RER misalignment has been shown by Edwards (1989), as well as by Cottani et all (1990) for various groups of developing countries. The negative in‡uence of RER variability on economic performance has been established by Grobar (1993) on a panel of ten developing countries excluding North Africa. This region was studied by Sekkat and Varoudakis (1998) who also found signi…cant adverse e¤ect of volatility and misalignment on trade.

The purpose of this paper is to investigate the optimal exchange rate policy for MENA countries in order to foster their manufactured exports towards Euroland.To this end it analyzes the impact of exchange rate policy in providing incentives for manufactured exports towards Europe. The exchange rate policy is captured through three di¤erent indicators: the e¤ect of real e¤ective exchange rate changes, the e¤ect of volatility and the e¤ect of misalignment. The e¤ects of the three indicators on trade are analyzed simultaneously. In addition to the black market premium, as a crude measure of misalignment, we construct an accurate measure derived from a structural model of "equilibrium" exchange rate

determination.

Economic analysis suggests that, the impact of exchange rate management is not the same across sectors (Froot and Klemperer,1989). Hence, the investigation is conducted at sectoral level over the period 1970-1997. Export supply equations for eleven categories of exports are estimated using a panel data approach. Our sample includes the four North African countries (Algeria, Morocco, Tunisia, Egypt) and Turkey .

The empirical results provide support to the fact that exchange rate management plays a key role in providing incentives for manufactured exports from MENA to Europe. Exchange rate depreciations increase manufactured exports while exchange rate misalignment or volatility decrease it. The results further showed that policy makers should be more concerned with misalignment than with volatility.

The rest of the paper is organized as follows. The second section provides a survey of the literature on exchange rate management and trade. The third section presents a brief overview of trade and exchange rate policy in MENA countries. The fourth section is devoted to the Real E¤ective Exchange Rate computation and to the measurement of volatility and misalignment. Section …ve, deals with the sensitivity of sectoral exports to exchange rate management and presents empirical estimates. Section six provides an assessment of the potential impact of exchange rate management vis a vis the Euro on MENA trade. Finally, section seven concludes.

2. Literature review on exchange rate management and trade

There has been a vast body of the literature on the implications of exchange rate management on trade since the early seventies. While there was a consensus on the impact of exchange rate changes on trade, the impact of exchange rate variability was much more controversial. Two types of variability have been addressed. First volatility, which can be de…ned as more frequent and less persistent ‡uctuations of real exchange rate. Second, misalignment, which describes less frequent and more persistent swings of real exchange rate.

The theoretical literature on the e¤ect of volatility on trade does not allow to draw any clear-cut and …rm conclusion. Several assumptions are critical in obtaining the result that an increase in exchange rate volatility reduces the level of trade. Theoretical models indicate that the e¤ect of exchange rate volatility depends on the degree of competition, the durability of the product, the diversi-

…cation of sales, the use of imported goods as inputs, the ability to hedge against exchange rate volatility. Hence a sectoral investigation of the e¤ects of exchange rate management on trade seems more suitable than an aggregate approach.

Clark (1973) shows, under some speci…c assumptions[5], that uncertainty about future exchange rates leads the exporting …rm to reduce the volume of production and trade. Hooper and Kohlhagen (1978) examine the e¤ects of exchange rate volatility in bilateral framework where the key parameters are the currency denomination of the contracts, the proportion of hedging and the relative degrees of exporters' and importers' risk aversion. They show that exchange rate variability a¤ects only the portion of pro…ts that is not hedged. An increase in exchange rate volatility increases the variance of pro…ts and shifts the demand curve downwards, leading to a decline in quantity and prices. The size of the e¤ect depends on the price elasticity of the demand, the degree of risk aversion and degree of exposure to risk.

De Grauwe (1988) and Giovannini (1988) show that the assumption of risk aversion is not su¢cient to conclude that exchange rate volatility reduces the level of trade. An increase in volatility has both a substitution and an income e¤ects, which work in opposite directions. More volatility reduces the attractiveness of the risky activity, leading agents to reduce that activity (substitution e¤ect). However, it also reduces the expected utility of this activity, and to compensate for that drop, additional resources might be devoted to this activity. De Grauwe explains that the results obtained by Hooper and Kohlhagen are due to the restriction imposed on the utility function: a constant absolute risk aversion (CARA) utility function was assumed, which leads to ignoring the income e¤ect.

Ethier (1973) and Baron (1976) claim that with perfect forward markets and no other sources of uncertainty, the volume of trade is una¤ected by exchange rate volatility. The level of output depends on the forward rate, while exchange rate a¤ects the hedging decision. Viaene and de Vries (1992) show that even in the presence of a forward markets, spot exchange rate volatility can a¤ect indirectly trade through its e¤ects on forward rate. Exchange rate volatility has opposite e¤ect on exporters and importers because they are on opposite sides of forward market.

Cushman (1983) derives a model similar to that of Hooper and Kohlhagen but

[5] In Clark's model, the exporting …rm produces under perfect competition a homogeneous commodity sold entirely abroad. The …rm uses no imported inputs and the price of exported good in foreign currency is an exogenous variable. The …rm is paid in foreign currency and hedging is limited.

expressed in real terms. Nominal exchange rate volatility may have little e¤ect on the …rm's pro…ts if changes in prices are fully or partly o¤set by changes in exchange rates. Reducing nominal exchange rate volatility could increase risk on pro…ts, if it created a deviation from purchasing power parity. Cushman shows that an increase in real exchange rate uncertainty reduces trade quantity, however, price e¤ects are ambiguous and depend essentially on the invoicing currency.

An important shortcoming of the previous models is their focus on two-country model. Cushman (1986) shows that in a multi-country world, relative variability between more than two currencies can play a role in a¤ecting the pattern of bilateral trade ‡ows. Omission of third-country exchange risk could therefore lead to perverse results in estimating bilateral trade ‡ow equations[6].

Regarding empirical research, several papers have attempted to quantify the e¤ects of exchange rate volatility on trade. The majority of the studies were not able to establish a systematically signi…cant relationship between measured exchange rate volatility and the level of trade. Bélanger and Gutiérrez (1990) survey the empirical work published over the 1978 and 1988 period. Overall, the evidence was inconclusive. The aggregate studies produce contradictory results, while the sectoral ones, far less numerous, provide some support to the assumption that exchange rate volatility reduces the volume of trade. There are, however large di¤erences across sectors.

According to Frenkel and Golstein (1989) the di¢culty in identifying a signi…cant association between volatility and trade might re‡ect the availability of hedging instruments against exchange rate risk, or the adaptability of multinationals. Hence, during the eighties, researchers have focused more on misalignment. The hypothesis was that misalignment generates uncertainty against which there is little possibility of insurance. Empirical work supports this hypothesis (De Grauwe, 1987). Other authors focussed on the associated overvaluation of a currency which depresses exports (Grobar (1993),Sekkat and Varoudakis (2000)). This negative impact is con…rmed in general.

In recent years there has been a shift in the focus from the impact of variability on the level of trade variables, to its impact on the response of trade variables (volume and prices) to exchange rate changes. This is based on the costs of reversing changes in foreign market shares due to either the existence of sunk

[6] Consider a country i trading with countries j and k. Assume that exchange rate variability for country i increases against both j and k. If the increase is larger against k, the relative variability of trading with j decreases. Therefore, trade for country i could be reallocated from country k to country j.

costs or to consumers loyalty (Baldwin and Krugman (1989), Dixit (1989), Froot and Klemperer (1989), Sapir and Sekkat (1995)). Assuming that exchange rates can not depart permanently from equilibrium levels, it is shown that during a period with substantial misalignment, for instance an overvaluation of the national currency, economic agents expect exchange rate to revert to its equilibrium level. They consider further depreciation of exchange rate as temporary and would not expand sales as much as if actual exchange level was perceived as being at its equilibrium level.

Almost all published studies on the impact of exchange rate variability on manufactured trade focused on developed countries. Only few papers investigated the issue for developing countries (Gupta (1980), Medhora (1990), Coes (1981), Paredes (1989) Grobar (1993) and Sekkat and Varoudakis (2000)).

Early analyses focused only on the impact of volatility on trade. The evidence is mixed. For India, Israel, Mexico, Korea and Taiwan, Gupta (1980) found no sign1i…cant link between export supply and exchange rate uncertainty. An analysis of sectoral exports in Brazil, conducted by Coes (1981), showed a negative impact of uncertainty. Parades (1989) reached a similar conclusion concerning the impact of exchange rate uncertainty on the growth of manufactured export of Chile and Peru. The case of the West African Monetary Union (Benin, Burkina Faso, Côte d'Ivoire, Senegal and Togo) was examined by Medhora (1990). The focus was on imports instead of exports. The empirical analysis failed to reveal any negative e¤ect of exchange rate volatility on trade.

Grobar (1993) examined the e¤ect of exchange rate volatility and misalignment on manufactured exports of ten middle-income countries (Argentina, Brazil, Colombia, Greece, Malaysia, Mexico, Philippines, South Africa, Thailand and Yugoslavia). She distinguished four categories of exports and used the black market premium as a proxy of misalignment. The results lent support to the hypothesis that exchange rate volatility negatively a¤ects exports. Misalignment seemed, however, not to have played a central role in determining exports of the ten countries. In a recent paper, Sekkat and Varoudakis (2000) assess the impact of volatility and misalignment on manufactured export for a panel of Sub-Saharan African countries over the period 1970-1992. They used a model based measure of misalignment.. Export supply equations are estimated for three manufacturing sectors (textiles, chemicals, and metals) and two exchange regimes: a …xed rate regime represented by CFA countries and a more ‡exible represented by non-CFA countries. Their results suggest that exchange rate management matters for export performance.

3. Trade and exchange rate policies in MENA countries

3.1. Trade pro…le

For geographical as well as for historical reasons almost all MENA countries' major trading partners are from Euroland. On average over the last six years, 77% of Tunisia's exports have been oriented to Euroland market, 70% of Algeria's, 62% of Morocco's, 52% of Egypt's and 51% of Turkey's. These …gures re‡ect the fact that these countries are heavily dependent on Euroland countries as a market for their exports. The same dependency exists for their imports since Euroland is also the main source of MENA imports. At the same time, the importance of MENA countries in Euroland external trade is much smaller; it does not exceed 5%. Table (1) gives the relative importance of Euroland countries in MENA exports.

Table 1. Major Euroland Trading partners (1990-97)[7]

	Algeria	Morocco	Tunisia	Egypt	Turkey
Euroland	70	62	77	52	51
Non Euroland	30	38	23	48	49
France	28	49	31	13	16
Germany	19	15	17	10	55
Italy	25	10	34	57	12
Spain	10	12	6	8	01
Others	18	14	12	12	16
Total	100	100	100	100	100

When examining the structure of exports, one can observe the strong contribution of manufactured exports: Tunisia 89.5%, Turkey 88.6%; Egypt 76.2% and Morocco 64%. On the other hand, Algeria exhibits more dependence on exports of un…nished goods, the share of manufactured export does not exceed 19% and hydrocarbons continue to dominate its exports. Moreover, Algerian manufactured value added experienced a negative real growth rate during the period 1990-97.

[7] This table reports the average exports (over the period 1990-1997) oriented to Euroland and non-Euroland partners. It also gives the relative weight of the main Euroland partners.

Table 2. Manufactures in GDP and in Total Exports (1990-97)[8]

Key indicators	Algeria	Morocco	Tunisia	Egypt	Turkey
Share of MVA in GDP	7.4	17.6	18.5	23.5	24.2
Share of manufactures in exports	19	64.1	89.5	76.2	88.6
RAAG of MVA (80-90)	3.3	4.1	3.7	3.8	4.8
RAAG of MVA (90-97)	-10.2	2.5	5.5	2.8	3.6

Textile exports remain the most dynamic element in most of the …ve countries, mainly because it does not require a high-skilled labor. This aspect can be considered as a major weakening of manufacturing sector in these countries. However, some more modern industrial sectors are emerging. Table (12) in section 6 reports the dynamic pro…le of exports oriented to Euro area over sub-periods from 1970 to 1997. It shows, for example, that Electronic exports in Morocco represent 4% over the period 1990 to 1997, while it did not exceed 0.23% between 1970 and 1979. Electrical exports in Tunisia represent 6% over the period 1990-97 against only 0.45% during the period 1970-79.

3.2. Exchange rate policies

As a part of comprehensive economic reform programs, the …ve countries substantially reformed their foreign exchange systems in the late of 1980s and early 1990s by, progressively, unifying and liberalizing foreign exchange markets.

All countries have established current account convertibility by accepting the obligations under Article VIII of the IMF' Articles of Agreement. Egypt and Turkey have also achieved substantial capital account convertibility, while Algeria, Morocco, and Tunisia still have signi…cant restrictions, less restrictions are imposed, in general, on in‡ows than on out‡ows. All the countries permit non residents to hold accounts in foreign and domestic currencies, but residents' accounts are subject to more regulation than non residents' accounts and are fully convertible into foreign exchange only in Egypt. Tables (3) below summarize the main exchange rate arrangements and restrictions in countries considered in this paper, as given by the annual report of International Monetary Fund (1997).[9]

[8]Source: UNIDO Country Industrial Statistics.
MVA: Manufacturing Value Added, RAAG: Real Average Annual Growth (in percentage).

[9]Source: IMF, Annual report on Exchange Rate Arrangements and Exchange Restrictions, (1997).

A major exchange rate re-alignment in Egypt occurred in 1979 when the government uni…ed the exchange rates of the central bank pool and the commercial bank pool, resulting in a signi…cant depreciation of the RER of the pound. The exchange policy pursued from 1979 to 1988 has resulted in a steady appreciation of the RER of the Egyptian Pound. Since 1991, Egyptian pound has been freely traded in a single exchange market. In 1994, the foreign exchange market was further liberalized by easing capital account restrictions.

In Morocco, the weights in the currency basket, were changed in 1980 in order to take into account the changes in Morocco's foreign trade partners and the structure of currencies used in external settlements. The authorities started a gradual depreciation of the Dirham. In 1993, full current account convertibility was established, and capital account convertibility was established for non-residents only. A major step toward liberalizing the foreign exchange market was taken with the establishment of the inter-bank market in 1996.

The Tunisian Dinar was linked to a basket comprising French Franc, Deutch Mark and US Dollar. The basket was expanded in 1981 to include Italian Lira and Belgian Franc, and later the Dutch Florin, and Spanish peseta. The authorities started a gradual depreciation of the Dinar from 1986 until 1989. In 1992, the exchange rate for current account purposes were liberalized. In 1994, the inter-bank spot exchange market were established. Since 1997, banks have been allowed to transact in the forward foreign exchange market[10].

The current exchange rate regimes in the …ve countries are summarized in table 3.a. below.

Table 3.a.
Exchange Rate Regimes in MENA countries (1997)[11]

Country	Exchange Rate Regime	Basket
Algeria	Managed ‡oat	US Dollar
Egypt	Managed ‡oat	US Dollar
Morocco	Fixed peg	Basket of partners' currencies
Tunisia	Managed ‡oat	Basket of partners' currencies
Turkey	Managed ‡oat	Real exchange rate rule

[10] Ilker Domaç and Ghiath Shabsigh (1999).
[11] World Economic Outlook, October 1998, IMF; p 151.

Table 3.b. Restrictions on Capital Transactions (1997)

Category[12]	Algeria	Morocco	Tunisia	Egypt	Turkey
Controls on capital transactions					
Foreign direct investment					
Outward	Yes	Yes	Yes	No	Yes
Inward	Yes	No	No	No	Yes
Liquidation and repartition	No	No	No	Yes	No
Capital market securities					
Purchase locally by nonresidents	n.a.	No	n.a.	No	–
Purshase abroad by residents	Yes	Yes	Yes	No	No
Security insurance locally by non residents	n.a.	Yes	Yes	No	No
Security insurance abroad by residents	n.a.	Yes	Yes	–	–
Money market instruments					
Purchase locally by nonresidents	n.a.	No	Yes	–	–
Purshase abroad by residents	Yes	Yes	Yes	–	–
Insurance locally by non residents	n.a.	Yes	Yes	No	Yes
Insurance abroad by residents	n.a.	Yes	Yes	–	–
Derivatives					
Purchase locally by nonresidents	n.a.	Yes	Yes	n.a.	No
Purshase abroad by residents	Yes	Yes	Yes	n.a.	No
Pro…t repartition and liquidation of capital	No	No	No	Yes	No
Credit operations					
Commercial credit					
In‡ow	n.a.	n.a.	Yes	No	No
Out‡ow	Yes	No	Yes	n.a.	n.a.
Financial credit					
In‡ow	n.a.	No	Yes	n.a.	No
Out‡ow	Yes	Yes	Yes	n.a.	n.a.
Deposit accounts					
Non residents in foreign exchange	No	No	No	No	No
Non residents in local currency	No	No	No	No	No
Residents abroad	Yes	Yes	Yes	Yes	No
Residents in foreign currency	No	Yes	No	No	No
Residents account convertibility	Yes	Yes	Yes	No	Yes
Non-residents account convertibility	Yes	No	No	No	Yes

[12] n.a.unavailability of information; Yes controls are practiced; No transactions are not restricted; and '–' no reference has been made to that transaction in the exchange arrangements

4. Real effective exchange rate

4.1. Real exchange rate level

Theoretically, real exchange rate is de…ned as the relative price of tradable to non-tradable goods. Empirically, there is no unique measure of exchange rate. There are issues related to whether it should be bilateral or e¤ective, real or nominal. However, given the aim of this paper, we adopted a measure of real e¤ective exchange rate (REER), that takes into account the degree of competitiveness of MENA exports in Euroland markets.

Real e¤ective exchange rate computation takes into account the ratio of foreign prices to home prices and the structure of trade. According to our de…nition an increase in REER indicates a depreciation while a decrease re‡ects an appreciation. For a given country, REER is computed as:

$$\log REER = \sum_{j=1}^{p} w_j \log \frac{e_j WPI_j}{CPI} \qquad (1)$$

where e_j is the bilateral nominal exchange rate vis-à-vis country j, WPI_j is the wholesale price index of country j and proxies for the foreign price of tradable goods, CPI is the consumer price index of the home country and proxies for the domestic price of non-tradable goods, w_j is the share of partner j in home country's exports[13]. Trade shares are the averages over the whole period.

Bilateral exchange rate data, wholesale price and consumer price indexes are drawn from IMF's International Financial Statistics. The weights are computed from CHELEM database (Harmonized Accounts on Trade and the World Economy database)[14].

of the country.

[13] Here we consider the eleven countries of Euroland. As trade data for Belgium and Luxembourg are aggregated we end up with ten partners.

[14] CHELEM database, CEPII, Paris.

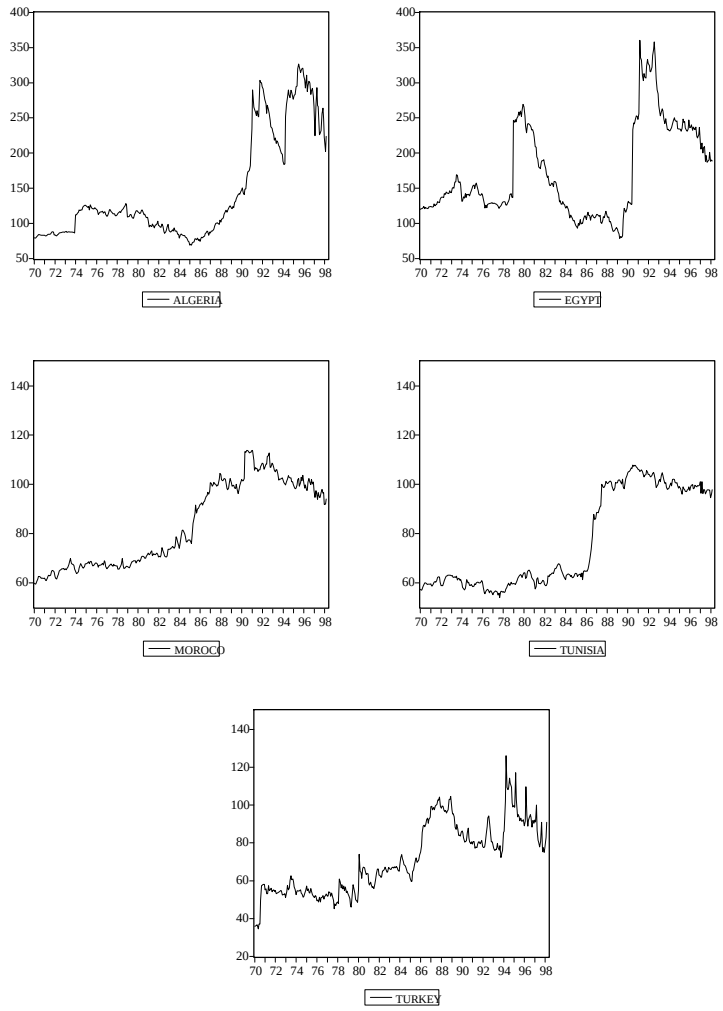
Table 4.a. Summary statistics on Real E¤ective Exchange Rate over the period 1970-97 (1987=100)

	Algeria	Morocco	Tunisia	Egypt	Turkey
Mean	134.2	82.2	75.2	168.7	70.0
Std. dev	67.7	17.4	19.5	66.3	18.1
Minimum	74.3	61.3	55.9	97.4	44.6
Maximum	306.0	109.4	106.5	322.1	105.1

Figure (1) presents the behavior of the real e¤ective exchange rate on a monthly basis for the …ve countries in the sample.

In every country the REER has experienced signi…cant movements during the past 26 years. However, the extent of variations has di¤ered quite signi…cantly across countries. According to the table above, the real e¤ective exchange rate indexes have ‡uctuated more in Algeria and Egypt than in the remaining countries. In Tunisia and Morocco, there is a slight but steady trend of real e¤ective exchange rate depreciation initiated in the middle of eighties. This tendency can be explained as the outcome of exchange rate reforms undertaken in these countries.

Figure 1. Real Effective Exchange Rate in MENA countries
(1970-1997)



– Note that for Algeria and Egypt the scale of real e¤ective exchange rate ranges between 50 and 400, while for Morocco, Tunisia and Turkey the scale varies between 50 and 150.

4.2. Real exchange rate variability

4.2.1. Real exchange rate volatility

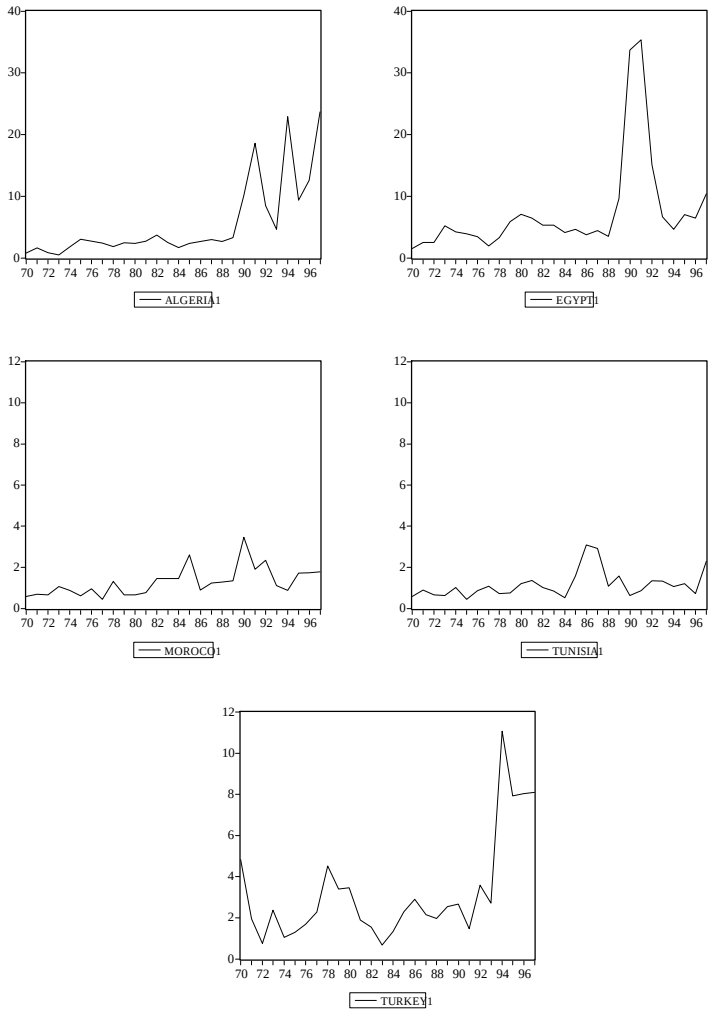
There is no consensus about how to measure volatility of exchange rates. Following Kenen and Rodrik (1986) and Grobar (1993) we use the standard deviation of 12 month to month changes in RER as shown below:

$$V_1 = [(\tfrac{1}{12}) \sum_{i=1}^{12} (\Delta RER_{t-i})^2]^{\frac{1}{2}}$$

Figure (2), presents the behavior of volatility according to this measure. During the period 1970-1988, the extent of volatility was relatively limited in the five countries. Since 1988 there has been more volatility in Egypt specifically from 1989 to 1992 due to multiple nominal exchange rate devaluation that have taken place. In 1988, Bilateral nominal exchange rate against the dollar was increased from 0.7 Egyptian pound to 1.1 for one US dollar. The Central Bank pool rate was changed again to 2.0 to the U.S. dollar in 1990. At the end of 1990 it had reached 3.0 to the U.S. dollar. Algeria has experienced large swings in real exchange rate volatility since the beginning of the 1990s as a consequence of economic austerity and political instability. In Turkey, we observe an increase in real exchange rate volatility in 1993. This volatility is still limited when compared to nominal volatility of the Turkish Lira. Finally, in Morocco and Tunisia the size of real exchange rate volatility has been overall relatively small over the whole period. This is mainly due to the exchange rate regime adopted in both countries in which the external value of their currencies is determined on the basis of a basket of their partners' currencies.

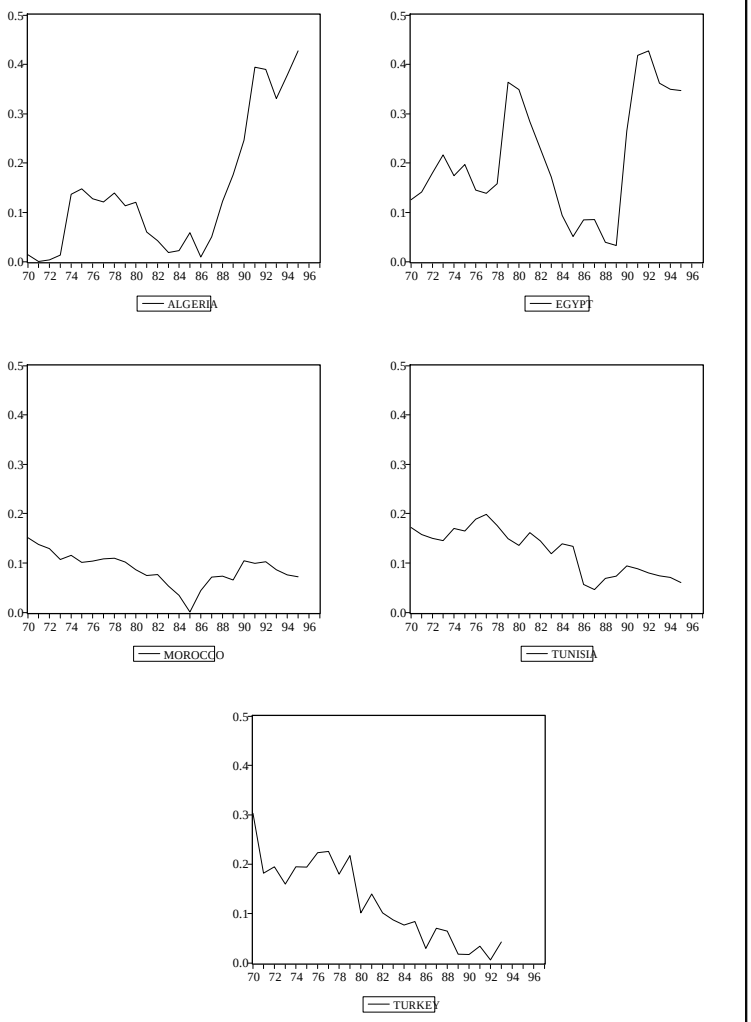
However, such a measure of real exchange rate volatility has been criticized because from theoretical point of view, volatility is the unpredictable component of future exchange rate. In this case, volatility is taken as the absolute difference between the previous period forward exchange rate and the current spot. According to this measure, fluctuations in exchange rates don't necessarily represent a risk as long as they can be anticipated by the market participants and reflected in the forward rate.

Figure 2. Exchange Rate Volatility as Standard Deviations of Monthly changes of RER



– Note that for Algeria and Egypt the scale of real e¤ective exchange volatility ranges between 0 and 40, while for Morocco, Tunisia and Turkey the scale varies between 0 and 12.

Figure 3. Exchange Rate Volatility Based on an ARCH Model of RER



Unfortunately, this de…nition of volatility cannot be used in our context given the inexistence of forward markets in MENA countries over the period considered.

To overcome this weakness, a second measure of volatility using ARCH model of exchange rate behavior is suggested. This speci…cation implies that information about volatility observed in the previous period is used to forecast the volatility of the current period. An ARCH model is de…ned as follows:

$$\log RER_t = Á_0 + Á_1 \log RER_{t\,i\,1} + ²_t$$

where $¾^2_t = ! + ®"^2_{t\,i\,1}$

The measure of volatility derived from this model attempts to capture "volatility clustering", very often, observed in real exchange rate behavior. The idea is that large swings in the past tend to generate higher expected volatility in the following periods.

The conditional variance $¾^2_t$ (based on past information) is a function of the mean ! and news about volatility from the previous period $"^2_{t\,i\,1}$(the arch term). Table (4:b) reports the estimation results for the …ve countries and …gure (3) depicts the behavior of RER volatility from an ARCH model.

Table 4.b. Estimation results of ARCH model[15]

Parameters	Algeria	Morocco	Tunisia	Egypt	Turkey
$Á_0$	0.04*	0.03**	0.01	0.08*	0.12
	(1.6)	(1.9)	(0.1)	(1.7)	(1.5)
$Á_1$	0.99**	0.99**	0.99**	0.98**	0.97**
	(178)	(266)	(361)	(116)	(52)
!	0.001**	0.002**	0.0002**	0.03**	0.002**
	(3.3)	(4.9)	(3.8)	(2.4)	(4.3)
®	0.18	0.21**	0.38*	-0.01	0.31*
	(1.2)	(3.0)	(2.4)	(-1.2)	(1.9)
$\overline{R}^2$	0.98	0.99	0.99	0.97	0.95
N±obs	335	335	335	335	335

– Note: the estimated equation is: $\log RER_t = Á_0 + Á_1 \log RER_{t\,i\,1} + {}^2_t$, for each country where ^2_t is assumed to have an ARCH structure de…ned by the equation $¾^2_t = ! + ®"^2_{t\,i\,1}$. The estimated coe¢cients are presented in the table. (*), (**) mean that the corresponding coe¢cient is signi…cant, respectively, at 10% and 5%. The …gures within brackets refer to z-statistic.

The estimation results show that, overall, ARCH model represents a good …t for real exchange rate volatility. The autoregressive coe¢cient is highly signi…cant in all cases and very close to one. The ARCH parameter, which gives an idea about volatility clustering in the behavior of real exchange rate, is also statistically signi…cant in all countries except in Egypt and Algeria.

Figure (3) displays the ARCH measure of volatility. As noticed before, the extent of real exchange rate volatility is higher in Egypt and Algeria. According the ARCH model, real exchange rate volatility is steadily decreasing in Turkey over the period. One explanation of this tendency is the adoption of real exchange rate rule, where domestic consumer price index is adjusted to maintain roughly the purchasing power of the domestic currency. Finally real exchange rate volatility in Morocco and Tunisia is of a small magnitude over the whole period.

[15] It is assumed that residuals from AR(1) speci…cation of RER follow an ARCH(1). The ARCH model is appropriate when there is a tendency for large residuals to cluster together.

4.2.2. Real exchange rate misalignment

Real exchange rate misalignment can be de…ned as a sustained departure of actual real exchange rate from its equilibrium value. Therefore the information about the extent of misalignment requires knowledge of the level of the equilibrium real exchange rate, which is unobservable and depends on both structural and macroeconomic factors.

In developing countries misalignment takes, in general, the form of domestic currency overvaluation, which hurts tradable activities and a¤ects economic growth. In many less-developed countries o¢cial exchange rates are maintained arti…cially at overvalued levels with regard their equilibrium by imposing strict exchange controls[16].

The issue of estimating the extent of real exchange rate misalignment has attracted a great deal of attention recently and has been addressed using di¤erent approaches. One simple and direct approach is to use the magnitude of the premium on parallel market of exchange rate as an indicator of RER misalignment. The intuition behind is that the more overvalued the RER is, the tighter will be the control on foreign exchange and, as an outcome, the higher will be the premia observed in the black market. This is why in many developing countries, exchange rate reform is designed to tighten the gap between both rates by depreciating the o¢cial rate and targeting the premium at a reduced level[17].

However,'…from an analytical standpoint, the case for treating the size of the parallel market premium as an indicator of the magnitude of real exchange rate misalignment is far from obvious[18]'. Moreover, the PMP is an asset price, which can be expected to exhibit much greater volatility than the RER. Empirically, PMP captures also the in‡uence of other distortions in the foreign exchange market.

[16] Edwards (1989)

[17] Underinvoincing exports is another negative e¤ect of PMP observed in many developing countries with high exchange restrictions. A sizeable PMP provides greater incentives to falsify exports invoices and to divert export revenues to the parallel market.

[18] Montief P. and Ostry J., The parallel Market Premium, IMF Sta¤ Paper, Vol. 41, N. 1 (March 1994) IMF.

Table 5. Parallel Market Premium in % of O¢cial Exchange Rate

	Algeria	Morocco	Tunisia	Egypt	Turkey
1970-74	51	5	15	83	120
1974-79	96	7	5	61	732
1980-84	242	5	8	39	477
1985-89	379	3	4	160	44
1990-97	194	4	4	9	6

In section 5, we use PMP as a crude measure to assess the robustness of export supply speci…cation to di¤erent measures of misalignment. Table (5) reports the extent of parallel market premium expressed as a percentage of nominal o¢cial exchange rate against the US dollar. Except for Morocco and Tunisia where over the whole period the size of PMP was low, the three other countries experienced very high levels of PMP. This is speci…cally the case of Turkey where parallel market rate of Turkish Lira was more than seven times lower than its o¢cial rate during the period 1974-1979. This is also the case of Algeria where the black market of the Dinar was almost four times lower than its o¢cial rate during the period 1985-89 and two times lower during the period 1990-97. Thanks to exchange rate reforms undertaken in Turkey and Egypt, aiming at easing restrictions on foreign exchange holding by residents, the level of PMP in both countries has signi…cantly decreased during the last period.

In the rest of this section, we estimate an empirical model similar to the one suggested by Cottani et all (1990), by Ghura and Grennes (1993), and adopted also by Sekkat and Varoudakis (2000). Within this framework, it's assumed that for each country i, the RER is determined according to the following equation:

$$\log REER_{it} = \bar{}_i + \acute{}_1 \log(\frac{P_x}{P_m})_{it} + \acute{}_2 \log(\frac{Y}{X+M})_{it} + \acute{}_3(\frac{C}{Y})_{it} + \acute{}_4 EXC_{it} + \acute{}_5 EXDEV_{it} + \grave{A}_{it} \quad (2)$$

where $REER$ is the real e¤ective exchange rate as measured by equation (1); $(\frac{P_x}{P_m})$ is the external terms of trade with respect Euroland; $\frac{Y}{X+M}$ is an inward orientation indicator computed as the ratio of GDP to the sum of exports (X) and imports (M); $\frac{C}{Y}$ is the net capital in‡ow (computed as the di¤erence between net change in reserves and trade balance) scaled by GDP; EXC represents the excess domestic credit expansion measured as the di¤erence between growth in domestic credit and real GDP growth; $EXDEV$ is the changes in the o¢cial exchange rate in %, t is the time index and …nally $\grave{A}_{it}$ is a random term.

Equation (2) was estimated using panel data methods. The estimation took account of both heteroskedasticity and autocorrelation in the random component of the model (Feasible Generalized Least Squares; FGLS). The sample consists of a balanced panel over the period 1970-97. The Hausman and the F tests suggest that the …xed e¤ects speci…cation …ts better the data.

The …nal estimation results are given by the equation (3):

$$\log \widehat{REER}_{it} = \underset{}{\beta_i} \underset{(-10:14)}{-0:52} \log(\tfrac{P_x}{P_m})_{it} \underset{(-15:42)}{-0:77} \log(\tfrac{Y}{X+M})_{it} \underset{(-7:29)}{-2:06} (\tfrac{C}{Y})_{it} + \underset{(0:90)}{0:10} EXC_{it} + \underset{(2:31)}{0:17} EXDEV_{it} \quad (3)$$

$$\overline{R}^2 = 0:80 \quad F - Test = 125:9 \quad Hausman - Test = 21:67 \quad N^{\pm} Obs = 125$$

According to the estimation, the empirical model relating the behavior of real exchange rate to "fundamentals" and macroeconomic policies accounts for a large proportion of the observed variation in real exchange rate. As expected, term of trade improvements, restrictive trade policies as re‡ected by the inward-orientation ratio and higher capital in‡ows lead to an appreciation of real exchange rate. Moreover, they are statistically signi…cant. The excess domestic credit, although with the expected sign, fails to be signi…cant. Nominal devaluations in‡uence real exchange rate signi…cantly and in the expected direction. According to the magnitude of the estimated coe¢cient, whenever a nominal devaluation of 10% is undertaken by the authorities, only 1.7% of its e¤ect is transmitted into REER during the same period.

The estimated model cannot be directly used to measure misalignment of real exchange rate since the policy variables (inward indicator, net capital ‡ows and excess domestic credit creation) are not necessary at their sustainable values. Real e¤ective exchange rate can departe from its equilibrium value as a result of excess domestic credit creation, excessive foreign borrowing or excessive trade protection. Therefore, the equilibrium real exchange rate (ERER) can be obtained as follows:

$$\log \widehat{ERER}_{it} = \beta_i + \beta_1 \log(\tfrac{P_x}{P_m})_{it} + \beta_2 \log(\overline{\tfrac{Y}{X+M}})_{it} + \beta_3 (\overline{\tfrac{C}{Y}})_{it} + \beta_4 \overline{EXC}_{it} + \beta_5 EXDEV_{it}$$

Where the upper bar indicates the sustainable value of the underlying variable[19]. The regression-based index of misalignment account for the difference between sustainable and actual values of the policy variables used as regressors. This index is then computed as follows:

$$RERMIS_{it} = \exp(Mis_{it}) - 1$$

where:

$$Mis_{it} = \log ER\overline{ER}_{it} - \log RE\overline{ER}_{it}$$

Table (6), reports the implied rate of misalignment of MENA currencies with respect Euro area currencies. Real exchange rate is overvalued (Mis>0) whenever it is below its "equilibrium value" and vice versa. According to our calculations, during the period 1990-1997, all currencies were overvalued except the Moroccan dirham. The overvaluation is more pronounced for the Algerian Dinar, which experienced an overvaluation of 6.77%, The Tunisian Dinar and the Egyptian Pound have experienced, roughly, 3% overvaluation. The Turkish Lira is closer to its equilibrium value.

Table 6. Misalignment rate with respect Euro currencies

	Algeria	Morocco	Tunisia	Egypt	Turkey
1970-74	-9.14	2.54	-5.40	0.12	2.57
1974-79	-1.10	0.73	0.56	-2.98	-0.40
1980-84	-3.76	0.29	-2.47	-2.71	-5.60
1985-89	2.12	-3.47	1.66	1.36	1.64
1990-97	6.77	-0.16	3.33	3.00	1.68

[19] The sustainable values of $\frac{Y}{(X+M)}$; $\frac{C}{Y}$ and EXC are computed in the same way as in Cottani et al. (1990) and Sekkat & Varoudakis (2000). Terms of trade is an exogenous non-policy variable. Nominal devaluation is used to eliminate induced misalignment.

5. Export performance and exchange rate policy

This section of the paper focuses on the impact of exchange rate policy on exports of a sample of …ve MENA countries. The exchange rate policy is captured through three di¤erent measures: the e¤ect of real e¤ective exchange rate changes, the e¤ect of volatility and the e¤ect of misalignment.

The assessment of the sectoral sensitivity to exchange rate ‡uctuations is based on the econometric analysis, by Sekkat and Varoudakis (2000). They examine, at an aggregate level, the sensitivity of Sub-Saharan Africa exports to exchange rate variability. The aim here is to conduct a similar analysis for bilateral ‡ows with Euroland countries to identify the sectoral sensitivity to exchange rate ‡uctuations. The analysis involves estimation of equations where sectoral exports are explained in terms of exchange rate indicators, as derived from the previous sections, and other relevant economic variables.

Export supply equations are estimated using panel data approach over the period 1970-1997. The export supply equation takes the following general form:

$$\log(X_{it}^{j}) = \ '_{j} + \circledR_1 \log(V A_{m_t}^{j}) + \circledR_2 \log RER_t^{j} + \circledR_3 \log V_t^{j} + \circledR_4 M is_t^{j} + "_{it}^{j} \quad (4)$$

where X_i is the ratio of export of sector i over GDP, RER is the real e¤ective exchange rate, V is the measure of volatility of the real e¤ective exchange rate, M is is the measure of misalignment and $V A_m$ is the ratio of manufactured value added over GDP, t is the time index, (j =1,2...5), refers to the …ve countries in our sample and (i =1,2...11), refers to the eleven export sectors investigated.

In equation (4), exports are set as a ratio to GDP to allow for di¤erences in country size. The $V A_m$ is intended to control for non-exchange rate determinants of export.

The coe¢cient $\circledR_1$ may be positive or negative depending on the nature and export-orientation of di¤erent sectors. The expected sign of $\circledR_2$ is positive which implies that a depreciation of the real exchange rate should, in principle, encourage exports. On the other hand, given that volatility and misalignment of currencies are potentially harmful to export $\circledR_3$ and $\circledR_4$ are expected to be negative.

The series of GDP, total exports and manufactured value added are drawn from IMF database and UNIDO Country Industrial Statistics database. Data on sectoral exports oriented to Euroland are drawn from CHELEM database[20].

[20] CHELEM database (July 1997), CEPII, Paris.

The parallel market premium data is drawn from Wood (1988) and the World Currency Yearbook.

The estimation results are presented in Tables (7) to (10). A separate equation is estimated for each sector. On the basis of Hausman and F tests, …xed e¤ects terms ($'_j$) are included to capture country speci…c e¤ects. The Feasible Generalized Least Squares (FGLS) estimation is used to correct for both heteroskedasticity and autocorrelation of the random component of the model.

Table (7) presents estimation results when volatility is measured by standard deviation of monthly changes of real exchange rate and misalignment is based on the black market premium. In all sectors, estimates of the coe¢cients on (the logarithm of) REER have the expected positive sign, moreover the estimated coe¢cients are signi…cant at 95 percent level of con…dence in 8 sectors out of 11. The estimated coe¢cients on volatility are negative as expected in 7 sectors, among which only 2 are signi…cant at 95 percent level of con…dence. However, whenever those coe¢cients have positive sign they are not statistically signi…cant. The estimated coe¢cients on PMP as a measure of misalignment have the expected negative sign in 8 sectors out of 11, among which 6 are signi…cant. The positive coe¢cients are not signi…cant.

Table (7) shows also that for textiles the coe¢cient of REER is positive, which reveals that any real depreciation of exchange rate has a positive e¤ect on textile exports. The coe¢cient of volatility is negative and signi…cant which indicates a negative link between exchange rate uncertainty and textiles export. The point estimate indicates that a reduction in misalignment by one percent would increase the share of textile exports in GDP by 0,47%. The e¤ect of misalignment is significant at 5% while the e¤ect of volatility is not signi…cant. A possible explanation comes from the "pricing to market" concept, developed by Dornbush (1987) and Krugman (1989). They showed that …rms keep their prices …xed even if they face large short-run exchange rate ‡uctuations. This means that exports show little reaction to real e¤ective exchange rate volatility, but pro…ts react strongly. Finally, given that manufactured value added is dominated by textiles, both move in the same direction as expected.

For food and agriculture exports oriented to Euroland, REER does not play any signi…cant role, while volatility and misalignment show a negative and highly signi…cant coe¢cients.

For Mechanical, Electrical and Electronic exports our estimation exhibits a strong link with the level of real e¤ective exchange rate. The coe¢cients of REER for those sectors have the expected positive sign and are signi…cant. One could

argue that, ceteris paribus, an exchange rate strategy that depreciate the real e¤ective exchange rate stimulates sensitively these exports. On the other hand, manufactured value added seems to play a signi…cant role re‡ecting the new orientation in the industrialization policy especially in Morocco, Tunisia and Turkey.

Table 7. Estimation results with a measure of Misalignment based on black market premium and Volatility based on standard deviation of monthly RER changes*

	log RER	log v	Mis	log VA	$\overline{R}^2$	F-test
Energy	0.40	0.00	-0.61	-0.48	0.79	29.74
	(1.97)	(-0.01)	(-4.42)	(-2.70)		
Food and Agriculture	0.08	-0.18	-0.84	-0.08	0.85	32.11
	(0.39)	(-2.63)	(-5.11)	(-0.45)		
Textiles	1.41	-0.02	-0.47	0.71	0.86	64.81
	(6.03)	(-0.18)	(-2.98)	(2.53)		
Wood and paper	0.49	-0.17	-0.34	0.20	0.93	132.7
	(3.75)	(-3.10)	(-3.08)	(1.32)		
Chemicals	0.43	0.01	-0.08	0.48	0.96	224
	(3.88)	(0.30)	(-1.18)	(4.84)		
Iron and Steel	0.18	-0.14	-0.44	0.09	0.32	7.5
	(0.67)	(-1.21)	(-3.10)	(0.28)		
Non ferrous	0.11	-0.04	-0.25	-0.32	0.70	30.75
	(0.53)	(-0.65)	(-2.31)	(-1.46)		
Mechanical	0.98	-0.01	0.17	1.87	0.72	19.8
	(4.59)	(-0.09)	(1.16)	(7.99)		
Vehicles	1.70	0.19	0.52	1.30	0.61	24.2
	(4.17)	(0.94)	(1.58)	(3.30)		
Electrical	1.01	0.10	-0.19	1.23	0.67	30.39
	(3.13)	(0.83)	(-0.95)	(3.70)		
Electronic	0.61	0.28	0.29	0.74	0.75	49.8
	(2.01)	(2.14)	(1.43)	(2.65)		

*All estimates are obtained on the basis of the …xed e¤ect method pooling over countries and using FGLS to account for both cross-section heteroskedasticity and contemporaneous correlation. The …gures within the brackets refer to t-statistics. The critical value of F-test for common intercept for all countries is (4.8014). Number of observations is 125.

Table 8. Estimation results with a measure of Misalignment based on black market premium and Volatility based on an ARCH model of RER *

	log RER	log v	Mis	log VA	$\overline{R}^2$	F-test
Energy	0.63	-0.12	-0.68	-0.77	0.79	27.41
	(2.73)	(-1.83)	(-4.28)	(-3.63)		
Food and Agriculture	-0.01	-0.03	-0.80	-0.02	0.83	22.62
	(-0.06)	(-1.18)	(-5.16)	(-0.15)		
Textiles	1.63	-0.21	-0.37	0.62	0.87	63.85
	(6.61)	(-3.16)	(-2.33)	(2.08)		
Wood and paper	0.19	-0.02	-0.38	0.21	0.92	147
	(1.59)	(-0.72)	(-3.38)	(1.25)		
Chemicals	0.24	0.08	-0.07	0.61	0.96	266
	(2.26)	(2.49)	(-1.10)	(5.49)		
Iron and Steel	-0.26	0.10	-0.52	0.43	0.32	8.75
	(-1.18)	(1.86)	(-3.67)	(1.31)		
Non ferrous	0.17	-0.07	-0.26	-0.42	0.70	30.56
	(0.94)	(-2.06)	(-2.45)	(-1.90)		
Mechanical	1.16	-0.10	0.19	1.70	0.73	20.49
	(5.78)	(-2.02)	(1.32)	(7.07)		
Vehicles	3.37	-0.56	0.78	0.40	0.66	33.21
	(10.7)	(-5.95)	(2.54)	(0.94)		
Electrical	1.72	-0.32	-0.26	0.90	0.71	38.68
	(4.91)	(-3.76)	(-1.36)	(2.43)		
Electronic	1.61	-0.33	0.30	0.22	0.77	59.28
	(4.93)	(-3.87)	(1.42)	(0.76)		

– *All estimates are obtained on the basis of the …xed e¤ect method pooling over countries and using FGLS to account for both cross-section heteroskedasticity and contemporaneous correlation. The …gures within the brackets refer to t-statistics. The critical value of F-test for common intercept for all countries is (4.8014). Number of observations is 125.

Table (8) reports estimation results when volatility of real exchange rate is based on an ARCH model of REER and misalignment is based on black market premium as in table (7). The results are qualitatively comparable when observing the estimated coe¢cients of REER. However, volatility seems to have a more explanatory power than in table (7). The expected negative sign is reported in 9 sectors out of 11 (among of 7 are signi…cant). The other explanatory variables (misalignment and manufactured value added) react qualitatively in a similar way as in table (7).

Table (9) shows estimation results when volatility is measured by standard deviation of monthly changes of real exchange rate and misalignment is based on the equilibrium exchange rate model. The estimates presented in this table provide strong support for the stimulating e¤ects of exchange rate policy on exports. The estimates of the coe¢cients on misalignment exhibit the expected negative sign in all sectors, among of 8 are statistically signi…cant.

Finally, table (10) reports estimation results when volatility is based on an ARCH model and misalignment on the equilibrium exchange rate model. This last speci…cation seems to perform better in capturing the expected e¤ects for the three exchange rate indicators. Whatever the sector, exchange rate variables (REER, volatility and misalignment) have the expected sign. The real exchange rate is statistically signi…cant in all sectors but food and agriculture. Volatility has the negative expected e¤ect, signi…cant in all sectors except for food and agriculture, chemicals, and non ferrous. Finally, except for wood and paper, and electrical exports, misalignment of REER exerts a signi…cant negative impact on export performance.

These …ndings suggest that exchange rate management plays a crucial role in providing incentives for exports from MENA to Europe. These e¤ects are better captured through the last speci…cation, where volatility is measured by an ARCH model and misalignment by the di¤erence between equilibrium Real exchange rate based on fundamentals and observed REER. Another important …nding that emerges from these results is that the degree of responsiveness is di¤erent across sectors. Textiles is one of most sensitive sectors to exchange rate changes and meanwhile one of the important export sectors in MENA region.

Table 9. Estimation results with a measure of Misalignment based on the equilibrium exchange rate model and Volatility based on standard deviation of monthly RER changes*

	log RER	log v	Mis	log VA	$\overline{R}^2$	F-test
Energy	1.69	-0.21	-5.77	-0.46	0.75	23.62
	(6.98)	(-2.48)	(-4.05)	(-2.38)		
Food and Agriculture	0.93	-0.23	-3.40	-0.29	0.83	55.92
	(4.26)	(-3.38)	(-3.27)	(-1.45)		
Textiles	2.16	-0.15	-6.00	0.66	0.89	110.25
	(7.84)	(-1.86)	(-4.46)	(2.32)		
Wood and paper	1.09	-0.20	-1.70	0.38	0.85	191.6
	(5.96)	(-3.22)	(-1.75)	(2.23)		
Chemicals	0.91	0.02	-3.51	0.48	0.94	230
	(7.70)	(0.35)	(-4.87)	(4.40)		
Iron and Steel	1.03	-0.23	-1.40	0.77	0.25	6.63
	(3.09)	(-1.75)	(-0.72)	(2.16)		
Non ferrous	1.03	-0.11	-4.39	-0.40	0.73	58.37
	(5.59)	(-1.86)	(-5.01)	(-1.86)		
Mechanical	1.38	-0.02	-2.67	1.76	0.63	16.62
	(5.05)	(-0.17)	(-1.74)	(7.51)		
Vehicles	2.06	0.12	-0.26	1.48	0.52	17.95
	(4.13)	(0.68)	(-0.11)	(3.59)		
Electrical	2.06	-0.02	-5.58	1.25	0.65	31.43
	(4.74)	(-0.19)	(-2.86)	(3.60)		
Electronic	1.48	0.18	-5.37	0.99	0.59	28.12
	(3.53)	(1.53)	(-2.79)	(3.33)		

*All estimates are obtained on the basis of the …xed e¤ect method pooling over countries and using FGLS to account for both cross-section heteroskedasticity and contemporaneous correlation. The …gures within the brackets refer to t-statistics. The critical value of F-test for common intercept for all countries is (4.7067). Number of observations is 120.

Table 10. Estimation results with a measure of Misalignment based on the equilibrium exchange rate model and Volatility based on an ARCH model of RER*

	log RER	log v	Mis	log VA	$\overline{R}^2$	F-test
Energy	1.60	-0.19	-5.13	-0.79	0.76	25.78
	(6.90)	(-3.19)	(-3.13)	(-3.27)		
Food and Agriculture	0.58	0.01	-2.36	-0.02	0.79	54.97
	(3.61)	(0.54)	(-3.06)	(-0.14)		
Textiles	2.32	-0.22	-5.19	0.29	0.90	123.82
	(9.14)	(-4.48)	(-3.80)	(1.02)		
Wood and paper	1.38	-0.22	-2.46	-0.14	0.86	270
	(9.04)	(-6.96)	(-2.60)	(-0.73)		
Chemicals	0.93	-0.02	-3.37	0.45	0.94	332.15
	(8.85)	(-0.73)	(-4.56)	(4.01)		
Iron and Steel	1.16	-0.16	-1.53	0.44	0.25	6.88
	(4.72)	(-2.74)	(-0.77)	(1.07)		
Non ferrous	0.99	-0.10	-3.57	-0.53	0.73	70.26
	(5.61)	(-3.13)	(-3.67)	(-2.45)		
Mechanical	1.77	-0.21	-2.73	1.37	0.67	24.58
	(7.62)	(-4.42)	(-1.91)	(5.73)		
Vehicles	3.66	-0.71	0.84	-0.05	0.64	36.23
	(8.27)	(-7.85)	(0.33)	(-0.12)		
Electrical	3.05	-0.56	-3.96	0.36	0.72	56.18
	(8.04)	(-6.52)	(-1.63)	(0.91)		
Electronic	2.29	-0.51	-3.12	0.09	0.69	55.44
	(5.95)	(-5.68)	(-1.29)	(0.28)		

*All estimates are obtained on the basis of the …xed e¤ect method pooling over countries and using FGLS to account for both cross-section heteroskedasticity and contemporaneous correlation. The …gures within the brackets refer to t-statistics. The critical value of F-test for common intercept for all countries is (4.7067). Number of observations is 120.

6. Impact of exchange rate changes against the Euro on MENA trade

One goal of this paper is to shed light on the potential impact of MENA countries' exchange rate management vis a vis the Euro on trade ‡ows from these countries to Europe. This should lead to recommendations concerning the policy of MENA countries' exchange rate with respect to the Euro. To this end we combine the estimation results in table (10) with data on sectoral exports to identify the key sectors for MENA economies and the extent of their sensitivity to the Euro ‡uctuations. We then address the costs of volatility and misalignment for these key sectors.

Table (11) presents the share of each sector in exports to Europe in 1997 and estimation results using the ARCH volatility and the model-based misalignment measures. Unsurprisingly, the Energy sector accounts for almost all Algerian exports toward Europe. It also represent a large share of the Egyptian exports. Given its speci…city we shall abstract from this sector for the subsequent analysis. Looking at the remaining sectors, some similarities emerge across the four countries. The textile sector is the most important in terms of exports to Europe in each country. The food sector emerges as the second most important. The chemical sector also represents an important share of exports to Europe in each country. Depending on the country, it stands as the third or the fourth most important sector. The remaining sectors are of di¤erent importance depending on the country. Note however, that Turkey's sectoral exports appear to be more diversi…ed than other countries' exports.

The …gures in table (11) give the picture for 1997 only. Relying on these …gures does not permit to capture the dynamics of specialization of each country. Table (12) presents the dynamic pro…le of exports to Europe over the period 1970-1997. The textile sector is not only the most important in each country (abstracting from energy) but, in addition, its share in total exports to Europe is steadily increasing. The importance of food is, in contrast, steadily decreasing in each country. The importance of chemicals decreased in Morocco and Tunisia while it slightly increased in Egypt and Turkey. Finally in the four countries the importance of four sectors (Electronic, Electrical, Mechanical and Vehicles) is steadily increasing although their shares are sometimes still low. The shares are especially low for Electrical and Electronic products in Egypt and for Vehicles in the three North African countries. The results clearly suggest a changing pattern of specialization of the four countries. This was also shown by Fontagné and

Péridy (1996) who found an increasing specialization of Morocco and Tunisia in Electrical goods. Hence the analysis of the impact of exchange rate management should also consider those sectors that, although of moderate importance, may become important in the future.

The sensitivity to exchange rate changes and hence the responsiveness of supply to incentives is reflected by the coefficients of RER. The results in table (11) show that the food sector is weakly responsive. The elasticity is by far lower than those of other sectors. This result is not surprising since exports of food and agricultural products to Europe are highly influenced by the restrictions of the European Common Agricultural Policy. Market mechanisms are not allowed to operate freely in this case. The textile sector is highly responsive to market incentives with an elasticity of 2.32. This sector is very important in the four countries who are highly competing with South-European countries in this market. Hence exchange rate management vis-à-vis the Euro may be an important determinant for MENA countries' competitiveness in this sector. Finally, the four growing sectors (Electronic, Electrical, Mechanical and Vehicles) are highly sensitive to exchange rate changes. The elasticities range from 1.77 to 3.66. Exports supply in these sectors can increase highly following an exchange rate depreciation. This suggests the possibility of further growth of these sectors and that exchange rate management may play an important role in this respect.

To draw further recommendations about exchange rate management vis-à-vis the Euro one should also consider the impacts of volatility and misalignment. It can be expected that countries experiencing substantial real exchange rate misalignment will also exhibit higher degree of measured volatility- as periods of increasingly overvalued real exchange rate would be followed by large devaluations, increasing RER volatility. However, it is also possible that big swings in fundamentals cause high RER volatility without necessarily resulting in RER misalignment. This could especially be the case for countries where RER volatility primarily reflects big swings in the terms of trade. In that case, in order to reduce RER volatility, it might be necessary to increase the RER misalignment.

The estimated elasticities of RER misalignment and volatility on manufactured exports suggest that RER misalignment is probably more harmful that RER volatility. Managing exchange rate policy with a view of avoiding RER misalignment rather than volatility should therefore be of more concern to policy-makers aiming at promoting manufactured export performance.

Relying on the estimated elasticities is not sufficient, however. The impact on export depends also on the extent of volatility and of misalignment. Table (13)

presents an assessment of the impact of volatility and misalignment combining the elasticities and the level of these variables. Instead of assuming a given level of these variables which will be necessary arbitrary, we use the observed levels during the period 1990-1997. This is the most recent period and a period in which the countries have already engaged in a process of policy reforms (including exchange market). Hence the levels of volatility and misalignment may be considered as a reasonable scenario for the future.

During the period 1990-1997, the Moroccan dirham experienced very low levels of volatility and misalignment. Hence no additional insight may be drawn from table (13). For the other countries, the …gures clearly show that misalignment is much more harmful than volatility. For textiles, the losses in the share to GDP of its exports to Europe are respectively 15.57%, 17.28% and 8.72% for Egypt, Tunisia and Turkey due to misalignment and 1.15%, 0.18% and 1.15% due to volatility. Similarily, the losses for the electrical sector are 11.88%, 13.19% and 6.65% due to misalignment and 2.92%, 0.47% and 2.92% due to volatility. These …gures con…rm the recommendation based on elasticities that policy maker should be more concerned with misalignment that with volatility.

Table 11. Sectoral sensitivity to exchange rate management and sectoral contribution to total exports to Europe

	Estimated coefficients				Contribution in exports to Europe				
	logRER	logV	Mis	logVA	Algeria	Morocco	Egypt	Tunisia	Turkey
Energy	1.60**	-0.19*	-5.13*	-0.79*	96.81	0.33	55.15	8.04	0.93
Food & Agric.	0.58*	0.01*	-2.36*	-0.02	0.40	21.61	8.59	8.80	17.09
Textiles	2.32**	-0.22*	-5.19*	0.29	0.10	48.68	21.26	62.31	51.30
Wood & paper	1.38**	-0.22*	-2.46*	-0.14	0.04	1.27	0.83	1.10	1.28
Chemicals	0.93**	-0.02	-3.37**	0.45**	1.12	13.17	4.07	6.54	7.65
Iron & Steel	1.16*	-0.16*	-1.53	0.44	0.91	0.30	1.51	0.55	3.94
Non ferrous	0.99**	-0.10*	-3.57*	-0.53*	0.35	2.97	4.49	0.33	1.29
Mechanical	1.77**	-0.21**	-2.73*	1.37**	0.21	1.11	2.70	1.82	5.86
Vehicles	3.66**	-0.71**	0.84	-0.05	0.01	0.37	0.06	0.47	2.48
Electrical	3.05**	-0.56**	-3.96#	0.36	0.01	3.08	0.48	8.24	4.79
Electronic	2.29**	-0.51**	-3.12#	0.09	0.04	7.10	0.84	1.79	3.39

Column 2 to 5 report estimated coefficient obtained from the model where volatility of real exchange rate is based on an ARCH model and misalignment is computed from the equilibrium exchange rate model. Data on sectoral exports refer to 1997 and drawn from CHELEM data base. (**), (*) and (#) indicate respectively that the coefficient is significant at 1%, 5% and 10%. When there is no star, the coefficient is not significant at 10%.

Table 12. Dynamic profile of exports oriented to Euro Area over subperiods from 1970 to 1995*

	Algerie			Morocco			Tunisia			Egypt			Turkey		
	1970-79	1980-89	1990-97	1970-79	1980-89	1990-97	1970-79	1980-89	1990-97	1970-79	1980-89	1990-97	1970-79	1980-89	1990-97
Food and agriculture	4.84	0.32	0.39	44.36	29.39	26.84	26.53	11.99	11.78	35.30	7.55	6.98	69.19	32.61	19.43
Wood and Paper	0.13	0.09	0.13	1.87	2.32	1.42	1.49	0.92	1.09	0.40	0.21	0.31	0.22	0.84	1.25
Chemicals	0.66	0.79	0.91	36.00	32.20	13.69	15.12	12.82	6.97	1.05	0.59	2.50	5.42	7.87	8.74
Electronic	0.03	0.04	0.04	0.23	1.56	3.95	0.24	0.97	1.60	0.24	0.39	0.49	0.07	0.46	2.44
Electrical	0.01	0.01	0.02	0.12	0.68	2.02	0.45	2.76	5.90	0.05	0.09	0.16	0.05	0.67	3.09
Energy	91.88	97.52	97.10	0.51	1.99	1.49	35.80	31.69	10.52	54.20	79.83	62.62	2.50	8.45	2.11
Mechanical	0.21	0.31	0.29	0.60	0.97	0.85	0.40	1.12	2.33	0.85	1.14	6.16	0.65	3.59	3.89
Non ferrous	0.33	0.16	0.36	6.34	5.47	3.00	2.38	0.78	0.50	1.17	4.03	4.75	2.69	1.32	1.45
Iron and Steel	1.40	0.70	0.61	1.02	0.44	0.28	2.02	0.14	0.33	0.32	0.46	1.86	0.40	1.27	2.33
Textiles	0.50	0.03	0.13	8.86	24.48	45.95	15.48	36.45	58.31	6.41	5.68	14.11	18.78	42.38	53.85
Vehicles	0.03	0.04	0.03	0.09	0.49	0.52	0.08	0.36	0.67	0.02	0.02	0.06	0.03	0.54	1.41
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

*Authors computations, original data source: Chelem Database (CEPII).

Table 13. Sectoral export (as a share of GDP) losses in % due to misalignment and excess volatility of MENA currencies with respect their European partners during the period (1990-97)

	Losses due to Misalignment						Losses due to excess volatility					
Sectors	**Mis**	**Algeria**	**Egypt**	**Morocco**	**Tunisia**	**Turkey**	**log Vol**	**Algeria**	**Egypt**	**Morocco**	**Tunisia**	**Turkey**
Energy	-5.13	-34.73	-15.39	0.82	-17.08	-8.62	-0.19	-0.68	-0.99	-0.17	-0.16	-0.99
Food & agriculture	-2.36	-15.98	-7.08	0.38	-7.86	-3.96	0.01	0.04	0.05	0.01	0.01	0.05
Textiles	-5.19	-35.14	-15.57	0.83	-17.28	-8.72	-0.22	-0.78	-1.15	-0.20	-0.18	-1.15
Wood & paper	-2.46	-16.65	-7.38	0.39	-8.19	-4.13	-0.22	-0.78	-1.15	-0.20	-0.18	-1.15
Chemicals	-3.37	-22.81	-10.11	0.54	-11.22	-5.66	-0.02	-0.07	-0.10	-0.02	-0.02	-0.10
Iron & steel	-1.53	-10.36	-4.59	0.24	-5.09	-2.57	-0.16	-0.57	-0.84	-0.15	-0.13	-0.84
Non ferrous	-3.57	-24.17	-10.71	0.57	-11.89	-6.00	-0.10	-0.36	-0.52	-0.09	-0.08	-0.52
Mechanical	-2.73	-18.48	-8.19	0.44	-9.09	-4.59	-0.21	-0.75	-1.10	-0.19	-0.17	-1.10
Vehicles	0.84	5.72	2.53	-0.14	2.81	1.42	-0.71	-2.53	-3.71	-0.65	-0.59	-3.71
Electrical	-3.96	-26.81	-11.88	0.63	-13.19	-6.65	-0.56	-1.99	-2.92	-0.52	-0.47	-2.92
Electronic	-3.12	-21.12	-9.36	0.50	-10.39	-5.24	-0.51	-1.81	-2.66	-0.47	-0.42	-2.66

Column 2 and 8 report estimated coefficient of misalignment and volatility obtained from the model where volatility of real exchange rate is based on an ARCH model and misalignment computed from the equilibrium exchange rate model. The sectoral export losses are computed on the basis of observed misalignment and volatility over the period 1990-1997.

7. Conclusions

In this paper, the e¤ects of exchange rate management on manufactured exports from North African countries and Turkey to Europe has been analyzed by constructing an appropriate measure of real e¤ective exchange rate and by using di¤erent measures of volatility and misalignment to assess the robustness of our econometric results. This study is conducted at sectoral level and covers the period 1970-1997. The results allow us to identify a strong negative e¤ect of real e¤ective exchange rate variability on manufactured exports.

Sectoral sensitivity with respect the changes in real exchange rate, with respect volatility and with respect misalignment are investigated. Our …ndings suggest that exchange rate management plays a crucial role in providing incentives for exports. These e¤ects are better captured through a speci…cation, where volatility is measured by an ARCH model and misalignment by the di¤erence between "equilibrium RER" and observed RER. As expected the degree of responsiveness is di¤erent across sectors. Textiles is one of the most sensitive sectors to exchange rate changes and meanwhile the most important export sectors in the region. Volatility has the negative expected e¤ect, signi…cant in all sectors except for food and agriculture, chemicals, and non ferrous. Finally, except for wood and paper, and electrical exports, misalignment of REER exerts a signi…cant negative impact on export performance.

The assessment of the sectoral sensitivity to exchange rate shows that the food sector is weakly responsive to real exchange rate changes. This result is not surprising due to the restrictions of the European Common Agricultural Policy. The textile sector is, in contrast, highly responsive to market incentives, which means that exchange rate management vis-à-vis the Euro may be an important determinant for MENA countries' competitiveness in this sector. Four growing sectors (Electronic, Electrical, Mechanical and Vehicles) are also highly sensitive to exchange rate changes. Exports supply in these sectors can increase highly following an exchange rate depreciation. This suggests the possibility of further growth of these sectors and that exchange rate management may play an important role in this respect.

To draw further recommendations about exchange rate management vis-à-vis the Euro we consider also the impacts of volatility and misalignment. The estimated elasticities of RER misalignment and volatility on manufactured exports suggest that RER misalignment is probably more harmful that RER volatility. Further Calculations con…rm the recommendation based on elasticities that policy makers should be more concerned with misalignment than with volatility.

References

1. Bacchetta,Eric P. and Van Wincoop (1998) "Does Exchange Rate Stability Increase Trade and Capital Flows?" NBER Working Paper No. 6704.

2. Baldwin R. and P. Krugman (1989) "Persistent trade e¤ect of large exchange rate shocks" Quarterly Journal of Economics, Vol. CIV, Issue 4, pp. 635-54.

3. Baron, P. (1976) "Fluctuating Exchange Rates and the Pricing of Exports" Econmic Inquiry 14, pp. 425-38.

4. Clark, P. (1973) "Uncertainty, Exchange Risk, and the Level of International Trade" Western Economic Journal 11, pp. 302-13.

5. Coes D. (1981), "The crawling Peg and Exchange Rate Uncertainty", Mimeo.

6. Cottani, J.A., D.F. Cavallo and M.S. Khan (1990), "Real exchange rate behavior and Economic Performance in LDCs", Economic Development and Cultural Change, (39), 61-76.

7. Cushman D. (1983) "The E¤ects of Real Exchange Risk on International Trade" Journal of International Economics 15, pp. 45-63.

8. De Grauwe, P. (1987) "International trade and Economic Growth in the European Monetary System", European Economic Review 31, pp. 389-98.

9. De Grauwe, P. (1988) "Exchange Rate Variability and the Slowdown in Growth of International Trade", International Monetary Fund Sta¤ Papers 35, pp. 63-84.

10. Dixit (1989) "Hysteresis, import penetration, and exchange rate pass-through", Quarterly Journal of Economics 104, pp. 205-28.

11. Dornbusch R. (1987) "Exchange Rate and Prices" American Economic Review, pp. 93-106.

12. Edwards S. (1989) Real Exchange Rates, Devaluation, and Adjustment, MIT Press.

13. Edwards S. (1994) "Real and Monetary Determinants of Real Exchange Rate Behavior: Theory and Evidence From Developing countries", in J. Williamson (ed), "Estimating Equilibrium Exchange rates", Institute for International Economics.

14. Ethier W. (1973) "International Trade and the Forward Exchange Market" American Economic Review 63, pp. 494-503.

15. Fontagné, L. and N. Péridy (1996), "Le renouveau de l'insertion des pays du Maghreb dans les échanges internationaux", Annales Marocaines d'Economie; pp. 87-116.

16. Froot, K.A. and Klemperer P.D. (1989) "Exchange rate Pass-Through when market share matters" American Economic Review 79, pp. 637-54.

17. Giovannini A. (1988) "Exchange Rates and Traded Goods Prices", Journal of International Economics 24, pp. 45-68.

18. Grobar L.M. (1993), "The e¤ect of real exchange rate uncertainty on LDC manufactured exports", Journal of Developement Economics 41, pp. 367-376.

19. Hadjimichael, M. and M. Galy (1997), "The CFA Zone and the EMU", IMF working Paper 97/156.

20. Helpman and Razin (1987) "Exchange rate management : Intertemporal trade-o¤s" American Economic Review, pp. 107-23.

21. Hooper P. and Kohlagen S. (1978) "The E¤ects of Exchange Uncertainty on the Prices and Volume of International Trade" Journal of International Economics 8, pp. 483-511.

22. Ilker D. and Shabsigh G. (2000) "Real Exchange Rate and Economic Growth: Evidence from Egypt, Jordan, Morocco, and Tunisia" IMF WP 99/40.

23. IMF (1998) World Economic Outlook, Washington, DC.

24. Ito T. , P. Isard and S. Symansky (1997) "Economic Growth and Real Exchange Rate: An Overview" NBER Working Paper No. 5979.

25. Kenen, P.B. and Rodrik, D. (1986), "Measuring and analyzing the e¤ects of short-term volatility in real exchange rates", Review of Economics and Statistics 68, pp. 311-15.

26. Medhora R. (1990), "The E¤ects of Exchange Rate Variability on Trade: The case of the West African Monetary Union's Imports", World Development 18, n±2;pp. 313-24.

27. Montief P. and Ostry J., "The parallel Market Premium", IMF Sta¤ Paper, Vol. 41, N. 1 (March 1994) IMF.

28. Paredes C. (1989), "Exchange Rate Regimes, the Real Exchange Rate and Export Performance in Latin America", Brookings Discussion Papers in International Economics, 77.

29. Ramey G. and V. Ramey (1995) "Cross-country Evidence on the Link Between Volatility and Growth" American Economic Review, pp. 1138-51.

30. Sapir A. & K. Sekkat "Exchange rate regimes and trade prices: Does the EMS matter" Journal of International Economics 38 (1995).

31. Sekkat, K and A. Varoudakis (1998) "Incentive Policies, Exchange Rate and Manufactured Exports in North Africa", ERF Fifth Annual Conference, Tunis.

32. Sekkat, K and A. Varoudakis (2000) "Exchange rate management and manufactured exports in Sub-Saharan Africa", Journal of Development Economics, Vol. 61, pp. 237-253.

33. Viaene, JM and Vries C. (1992), "International Trade and Exchange Rate Volatility" European Economic Review 36, pp. 1311-21.