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Exchange Rate Regime, Real Exchange Rate, Trade Flows and Foreign Direct Investments: The case of Morocco

Abstract

We study the behavior of the Real Effective Exchange Rate (REER) of the dirham against the European currencies (Europe of the 15), over the period 1960-2000 (annual data). We measure the volatility using standard deviation, and the misalignments as the difference between the actual REER and the equilibrium REER (NATREX model). We show that a rise of the volatility of the dirham reduces the trade flows (exports and imports). The misalignments affect also the trade flows: an overvaluation leads to a reduction in Morocco exports from, to a raise of Morocco imports, and globally to a deterioration of the trade balance with the European Union. On the other hand, neither the volatility nor the misalignments have an effect on the direct investments (FDI) in favor of Morocco.

1. Introduction

The Barcelona Conference in November 27-28, 1999, established a new Euro-Mediterranean partnership between the 15 Members States of the European Union and 12 countries of the eastern and western Mediterranean, including Morocco. This partnership is founded on three aspects: political and security aspects; a social and human aspect and an economic and financial aspect which is the more important here. The Council put forward an action plan for achieving a Euro-Mediterranean economic area based on free trade, in the horizon 2010. In this perspective, for Morocco, the choice of the exchange rate regime is very important. On this choice depends the behavior of the exchange rate of dirham, i.e. the volatility and the misalignments.

The exchange rate can be a policy tool, to attain real targets. In particular, the exchange rate should be devalued when Morocco's current account needs to improve. So, the exchange rate policy may be important in a stabilization program. Generally for the developing countries, and in particular for Morocco, the choice is between real anchor or nominal anchor.

*** Why a nominal anchor?**

Countries that suffer very high rates of inflation have the ability to peg their currency to a single currency (the dollar for example, after the breakdown of the Bretton Woods system) or to a basket of currencies. This permits to reduce both the volatility of the exchange rate (nominal and real) and the volatility of the inflation rate and also to minimize fluctuations in output, consumption, or some other macroeconomic variable. Furthermore, adopting a pegged exchange rate can help establish the credibility of a program to bring down inflation. But in return, the risk is that the peg becomes unsustainable, and that these countries know serious misalignments.

At last, a fixed exchange rate is preferable if the perturbations impinging on the economy are predominantly monetary.

Finally, when a country adopts an exchange rate anchor (nominal anchor), the choice between pegging to a single currency or making a basket of currencies depends on

both the degree of concentration of country's trade with trading partners and the currency in which the debt is denominated.

* Why a real anchor?

A flexible exchange rate provides greater room to maneuver (autonomy of the monetary policy... Friedman). It permits the stability of the real exchange rate (real anchor) and to avoid misalignments. But in return, the inflation can be higher and more variable, with as principal consequence a loss of credibility. In the same way, we will have greater volatility of the exchange rates. At least, a flexible exchange rate is preferable if the perturbations impinging on the economy are predominantly real, which affects the relative prices. As most of developing countries, Morocco is confronted with a difficult choice, considering its trade partners, its debt service and the increasing globalization of financial markets.

Now, the volatility as the misalignments may have important effects on the trade flows, on the direct investments, on the output ...

An increased volatility as an overvaluation of the exchange rate should lead at a deterioration of the economic situation. An overvalued currency brings about resources shifts in favor of the non-tradable sectors, which reduces the growth (see for example, De Grauwe, 1983, Marston, 1988, for a detailed analysis). Greater volatility, i.e. greater uncertainty, affects trade prices¹ and exports revenues. This should decrease the trade flows (see Hooper and Kohlagen, 1978, Cushman, 1983)¹, depending of hedging possibilities. Furthermore, greater exchange rate volatility may cause greater profitability volatility and curtail the domestic investments and the direct investments (Shapiro, 1974, Dumas, 1978).

The choice between different exchange rate regimes may be illustrated by a study of effects, both volatility and misalignments of the dirham, on the trade flows and the direct investments of Morocco.

This paper is organized as follows. Section 2 explains the macroeconomics of Morocco. In section 3, we measure the volatility and the misalignments of the REER of dirham. We estimate the effects of exchange rate variability on the trade flows (exports, imports, trade balance) and on the direct investments in the section 4. Section 5 contains concluding remarks.

2. Moroccan economy: some elements of analysis

Moroccan economy was always considered as being the most liberal and the most opened by all the countries of the Maghreb. Its productive, commercial and banking structures are the most directed by the private initiative and the most exposed to foreign markets. This double vocation, which is liberal and world-wide, is the result of the dominant place occupied by Morocco in the production and the export of the phosphate. It is also the result of fundamental political choice of Morocco to maintain narrow relationships with the rest of the world and particularly with the West and of the existence of a strong financial, industrial, commercial and land bourgeoisie.

¹ See Côté (1994) for a survey of the literature on exchange volatility and trade.

This opening on the foreign markets confronts Morocco to outside shocks, especially oil ones.

2.1. A cleaned up economy but with remaining structural weaknesses

Moroccan economy bases itself essentially on the agriculture and on the exploitation of its resources in raw materials and notably in phosphate. So, in 1992 for example, agriculture and fishing represented more than 50 % of employment and 13 % of the GNP. The mining sector also occupies an important place. Besides, farming sector always mobilizes an important part of the working population (40,7 % in 1995, see table 1) although the part of the agriculture in the GDP decreases regularly. Moroccan industry is weakly developed because of the importance of the primary sector and also because of that of the services and the public sector. Nevertheless, industry tends to represent a more and more important part of the GDP; this sector concerns the quarter of the working population. The transformation of the products of the soil and the sea, the textile industry and the manufacture of fertilizer - with base of phosphate - constitute the three pillars of the Moroccan industry. The service sector is indeed strongly developed because it represents about 52 % of the GDP. The service sector remains the second employer of the country, far behind the farming sector but tends to get closer to the latter.

In other respects, the average annual growth rates of the sixties and seventies are superior to 4 %. The eighties marked a slowing down of the GDP growth (3.8 % on average for the decade). This can be explained by the financial crisis that Morocco knew in 1983 and by the restrictive policies that accompanied the implementation of a Structural Adjustment Program (SAP) under the aegis of the IMF and of the World Bank. Besides, this period was characterized by the increase of interest rates, the increase of the US\$, by an unfavorable increase in international prices of petroleum products and finally by climatic conditions (severe drought) weakening an agricultural economy. The end of the eighties saw the return of a strong growth, followed again by difficulties at the beginning of the nineties.

Between 1980 and 1993 -the years of exit of the SAP with much mitigated results- Morocco knew an average growth of 4 %. There were years of double-digit growth (more than 10 % in 1988) and years with a negative growth (less than 4 % in 1993). The financial support of the IMF and the rescheduling of the debt enabled to face difficulties. If at the level of macroeconomic sizes one can speak about the success of the SAP (i.e. a moderated inflation, mastered deficits, ratios of the debt improved, the greater currency reserves, the more or less supported growth...) consequences in the social standing are rather negative (disengagement of the main employer of the country – the State- deterioration of social services: education, health...). In fact, a general degradation of the level of the human resources. In 1994, the exit of the SAP produces its first positive effect: a double-digit growth (11.6 %). But, it is obvious that the evolution of the economic activity is widely dependent on the ups and downs of the climate and, in a least way, on the international environment. This period is marked by the alternative of good and bad agricultural campaigns and a persevering recession and/or a very moderate growth of industrial nations, -notably those of the European Union-, who are the main economic partners of Morocco.

This result remains valid today. Growth evolves in a switchback way in function of climatic conditions.

2.2. An opening asserted on the outside

2.2.1. The dynamics of foreign exchanges

The trade balance has not known real fluctuations for years. The trade deficit remains confined. It has been on average equal to 2 billion \$ for the last 10 years, with a degradation during the last three years (in 1999, 2000, 2001). The plan is always the same; the years of drought oblige the State to import important quantities of cereal. The increase in international prices for petroleum products and the lack of dynamism of exports make the deficit worse.

In the last years (2000), consumer price inflation remained subdued at about 2% year-on-year. The fiscal deficit reached 4.3% of GDP in 2000 up from 2% in the previous fiscal year.

Agricultural exports vary according to the agricultural results of the season. They represent about 25 % of the receipts of exports. In spite of the fixing of quotas products bound to European Common Agricultural Policy, these products took advantage of an access privileged in the European market. In a longer term this sector risks to be weakened with the process of opening started in Morocco. However, agreement signed with the EU (Zone of free - trade in the horizon 2010) grants a special treatment to the agricultural sector. Customs duties are often raised on the wheat so as to allow the local production to be sold.

Table 1: Distribution of the foreign trade (in % of the total)

	1970	1980	1990	1995
Manufacture exports	10	23.2	57.8	66
Agricultural exports	53.5	32.4	28	24
Others	36.5	44.4	14.2	10
Manufacture imports	69.4	54.2	68.8	67
Agricultural imports	24.1	21.6	12.3	16
Others	6.5	24.2	18.9	17

Source: Data base CHELEM – CEPII 2000.

The second important sector concerning exports remains that of the mines. It is dominated with phosphate. The weight does not stop decreasing, but it represents 25 % of the total of exports. The processing industry (fertilizer, acid phosphate) linked to this sector knows a continuous development and manages to supplant the sales of primary products.

Two sectors (agricultural and mining) do not know spectacular upheavals. Indeed, the production of phosphate grows in a regular rhythm, whereas delays in the agricultural domain are not ready to be reduced. Agricultural production remains very

unpredictable and depends on climatic conditions, which directly affects the trade balance. In other words the improvement of exports does not come from these two sectors.

On the other hand, manufacturing presents real potentialities. Hopes are all based so on this sector. Moreover, its weight in total exports does not stop increasing (70% in 2000). Textile industries for a long time constituted one of the most dynamic sectors at the level of exports. Advantages granted by the EU within the framework of multifibers agreements have certainly « boosted » this sector, but they established a major handicap in the emergence of industries with strong added value. With the disappearance of this preferential system and the integration of the Central and Eastern European Countries (CEEC) in Europe, the Moroccan industry has to face a rougher and rougher rough competition. This is even more obvious if we take into account the fact that the globalization encourages the emergence of new sources of a cheap labor, especially in the Asiatic countries. The membership of China in the TWO does not certainly improve the situation. A total reorganization of this sector appears essential.

The other sectors such as electronics or manufactures have succeeded these last years. These sectors, in spite of being dynamic, have the problems as the others.

As regards outside exchanges with the EU, one will notice an ascent in power of the exports of textile and leather (lower than 4 % in the 60s, their share rose to 47 % of the total of the exports of Morocco towards the EU in 90s). However, the part of food and agricultural products has not stopped decreasing (going from 55 % in the 60s to 25 % in the 90s). The share of ores decreases also (from 35 %, it has decreased to in 6.5 % for the same period). Finally two sectors see their part strengthening: chemistry (passing from 1.2 to 8 %) and electric mechanics (reached 9.3% in 90s while it was 0.46% in 60s). So, we can notice the specialization of Morocco in processing industry to the detriment of basic products.

As for Moroccan imports from the EU, two sectors distinguish themselves: Textile and leather, whose share has gone from 7 % in the 60s to 23% in the 90s. It is the result of the privileged access in the European market. The mechanical and electric sectors always occupy the first place even though their part decrease slowly (their share have gone from 46 % to 40 % for the same period).

The dynamics of outside exchanges will depend on the dimension of the structural reforms that Morocco has to operate and also of its capacity to mobilize an important saving. Yet saving remains weak (13 % of the GDP in 1997), hence the importance of the streams of the FDI towards Morocco

2.2.2. The boom of the FDI

2001 is the year of all the records. Indeed, the FDI has reached the symbolic threshold of 3 billion \$. Certainly this increase is due in big part to the privatization of Maroc Telecom. The other privatization had preceded those, notably those of the refineries SAMIR and SCP as well as the sale of the second license GSM in 1999. Thank to these privatizations, but also to the operations of conversion of loan notes, the FDI have literally exploded these last years. Their share in the GDP is 2.05 % between 1990 and 1999 (9.8 % in 2001 while it was 1 % before 1990). The same evolution can be

noticed with regard to the part of the FDI in the GFFC (see table 2). So, the main upheavals occurred in the middle of the 90s after the exit of the SAP.

Table 2: Evolution of the FDI on 1960 - 2001 (in million DH)

	1960-1969*	1970-1979*	1980-1989*	1990-1999*	2000	2001
FDI	42,82	233,78	849,9	655,4	18716	32071
%GDP	0,34	0,64	0,67	2,05	5,96	9,8
%GFCF	0,28	0,28	0,29	0,93	2,15	3,7
%EU	-	-	34	68	70	80

Source: CD-ROM IMF 2001 for the GDP and the GFCF, IMF (2001), Office de Change and Banque du Maroc for data on the FDI. * Average of the decade..

It is necessary to say that the State set up a very attractive code of investment and capital account convertibility was established for non-residents. Besides, the implementation of the « guichet unique » in 2002 can strengthen this tendency.

Beyond that, the sector-based distribution of the FDI shows that until a recently (1996), manufacturing industries occupied the first rank (27 % between 1983 and 1996). Building came in second with 20%, followed by the financial sector with 12 %, while tourism was ranked 4th with 7 % for the same period. Between 1996 and 1998, the financial sector soared up, but manufacturing industries always occupied the first rank. The last three years seen a telecommunications boom with the privatization of the sector.

As regards the origin of FDI, Europe in general and France in particular, occupy first place. The EU's share rose from 34 % of the total of FDI in 80s to 68 % in 90s. This ascendancy of European FDI is a new phenomenon, contrary to what can be notice for foreign trade. However, the Arabic countries (Saudi Arabia and United Arab Emirates) have seen their share stagnate.

So we can see that so according to what has preceded:

1. The implementation of the SAP yielded interesting results with regard to the inflow of the FDI.
2. With the policy of economic openness and stabilization, the amount of FDI has increased tremendously and their nature has changed with the growing of the telecommunication and banking sectors.
3. The EU's increasingly dominant role with regard to FDI viewed the perspective of the creation of the free trade area.

However, an analysis of long term of the FDI leads us to interpret these results with caution. Indeed, we will notice that on a period of 40 years, there is no clear logic in the attractive policy and in the evolution of FDI. We cannot see the emergence of a precise sector. Obstacles remain (corruption, high price of glands, high interest rates...). Moreover, the recent inflow of the FDI is due in major part to big operations of privatization of Maroc Telecom and the sale of the second mobile telephone (GSM) license. The question that arises is obviously to know whether recent tendency will last or not.

2.2.3. Exchange rate

The lack of competitiveness of Moroccan exports and dynamism of the economy put the problem of the value of the dirham. The dirham is determined according to a basket of currencies of the main trade partners with secret weighting. If exchange rate settles freely on the market, Banque Al Maghrib intervenes to maintain it in a band fixed around the central parity.

By the end of 90s, there was a significant appreciation of the real exchange rate toward the countries of EU15 according to our calculations (figure 3), which decreased so much the competitiveness of the exposed sectors. The lack of competitiveness of the Moroccan products should have compelled authorities to devalue the currency several ago. Authorities preferred to concentrate their efforts on the consolidation of the financial system and the lowering of the burden of the debt. It was necessary to wait till April 2001 to see authorities devalue de facto the value of the DH by 5 %. They have in fact modified the weighting of the various currencies which compose the basket by giving a bigger importance to the Euro to the detriment of the US dollar, so as to reflect better the anchor of Morocco in the Euro area.

In this context, it is important to know whether the real exchange rate appreciation is consistent with the fundamentals of the economy or if it represents an overvaluation of the exchange rate (misalignment) indicated by monetary or fiscal policy.

3. Exchange rate variability

In our work, we retain an effective exchange rate of the dirham *vis-à-vis* the Europe of the 15. For a base period, noted 0, we can define this rate² as:

$$REER_{t/0}^{eff} = \prod_{j=1}^n \left[\frac{RER_t^j}{RER_0^j} \right]^{\theta_j} \quad (1)$$

Where RER^j represents the bilateral real exchange rate between Morocco and j (here European currencies), θ_j the weight of the currency j , let

$$RER^j = \frac{E^j \cdot P}{P^j} \quad (2)$$

E^j is the nominal exchange rate of the dirham against a European currency, P and P^j are the consumer prices indexes (CPI, proxy of general price level) in the

². If X_j (M_j) represents the exports (imports) to Morocco from j country, (to j from Morocco),

we define for a currency j , the weight θ_j as: $\theta_j = \frac{X_j + M_j}{\sum_{j=1}^n (X_j + M_j)}$.

Morocco and in the European country. A rise of $REER$ is a real appreciation of the dirham.

We admit that the variability of the real effective exchange rate may be took into account, both by the volatility and by the misalignment.

3.1 Exchange rate volatility

Our work concerns annual data. Also, we proceed in two steps:

* In the first step, we calculate a moving standard deviation of the growth rate of quarterly real effective exchange rate (noted $REER_Q^{eff}$), on 8 quarters:

$$h_{Q,t} = \left[(1/8) \sum_{i=1}^8 ((REER_{Q,t+i-1}^{eff} - REER_{Q,t+i-2}^{eff}) / (REER_{Q,t+i-2}^{eff}))^2 \right]^{1/2} \quad (3)$$

* In the second step, we calculate for each year the average of the quarterly standards deviations:

$$\sigma_{EReff} = (1/4)(h_{Q1} + h_{Q2} + h_{Q3} + h_{Q4}) \quad (4)$$

Figure A-2, in annex 2, plots the volatility.

3.2 Misalignments

The misalignment is defined as the deviation of the actual real exchange rate from its long run equilibrium value. Also, it is necessary to calculate the equilibrium real exchange rate.

Since the real exchange rate cannot be modeled as a stationary process, this suggests that the real exchange rate is affected by permanent real shocks, and its mean is not constant. Also, we adopt an equilibrium real exchange rate model which provides a measure of equilibrium exchange rate, i.e. a measure of misalignment. The literature proposes various models³. For this, we choose NATREX (NATurel Real EXchange) model developed by Stein (1994...)⁴, and adapted at a *small open economy* (Lim and Stein, 1995)⁵. The NATREX differs from the internal-external approach of Williamson (1983) (Fundamental Equilibrium Exchange Rate, FEER) which defines the FEER as a real exchange rate compatible with an external balance characterized as the sustainable desired net flow of resources. This normative element is the major difference with the NATREX⁶ (Allen, 1995).

³ See Stein and Allen, 1995, MacDonald, 2000, Montiel, 1999, Baffes and al., 1999.

⁴ See references in bibliography.

⁵ Stein and Lim summarize and discuss the work of Edwards (1988) applied to Latin America.

⁶ MacDonald (2000) notes also that the FEER is an explicitly medium-run concept.

3.2.1 The real effective exchange rate for a small open economy: Morocco

We retain a small country hypothesis for Morocco: the tradable good produced by Morocco is the export good, and its price is noted P_x ; the tradable good produced by Europe is imported by Morocco and its price is P_m . If the CPI are made of traded goods prices (P_e , with $P_e \equiv P_x$, $P_e^j \equiv P_m^j$ and $P_m = P_m^j / E^j$) and non-traded goods prices (P_{ne}), the equation (2) becomes:

$$REER^j = \frac{E^j P_x}{P_m^j} \cdot \frac{(P_{ne} / P_x)^{(1-\alpha)}}{(P_m^j / P_m^j)^{(1-\beta)}} \quad (5)$$

Where α and β are the shares of traded ($(1-\alpha)$, $(1-\beta)$, the shares of non-traded) goods in the economies. Substitution of (5) and (1) yields:

$$REER_{t/0}^{eff} = \frac{E_{t/0}^{eff} \cdot P_x}{P_{t/0}^{eff,j}} \cdot R_n^{1-\alpha} \cdot c' \sim \frac{E_{t/0}^{eff} \cdot P_x}{P_{t/0}^{eff,j}} \cdot R_n^{1-\alpha} \quad (6)$$

Now, the real effective exchange rate depends to three components:

- * The effective terms of trade (TOT_{eff}); $TOT_{eff} = \frac{E_{t/0}^{eff} P_x}{P_{t/0}^{eff,j}}$, which is an exogenous variable; $E_{t/0}^{eff}$ represents the nominal effective exchange rate.
- * The ratio of the price of Morocco non-tradable goods to the price of its export goods, noted R_n , with $R_n = P_{ne} / P_x$, which is endogenous.
- * The ratio of the price of European non-tradable goods to the price of its export goods, noted c' and exogenous.⁷

Also, the endogenous variations in the real effective exchange rate of the dirham correspond to endogenous variations in the price of non-tradable to export price.

3.2.2 Characteristics of NATREX model

The basic market equation that determines the real equilibrium exchange rate is:

$$I - S + CA = 0 \quad (7)$$

With I for investment, S for save and CA for current account.

Stein distinguishes medium-run NATREX and long-run NATREX. Here, we are interested by the long-run equilibrium. The *long run NATREX* is the equilibrium real exchange rate associated with internal and external balance. The *internal balance* is a situation where the rate of capacity utilization is at its long run stationary mean. The *external balance* is a situation where the ratio of the foreign debt/GDP stabilizes at a tolerable level (*Current Account* = 0). In long run, the equilibrium condition is $I=S$.

Since the market for tradable is always in equilibrium at the exogenous terms of trade, equilibrium in the market good is realized when the market for non-tradable is in equilibrium. It is R_n which equilibrates this market. Also, we use the NATREX model to explain the relative price of non-tradable (R_n) and the real exchange rate, seeing that $REER^{eff}$ is the terms of trade times a function of the relative non-tradable price. The determinants of R_n are:

* *The social time preference*, or the social consumption. It is the sum of private consumption ($C = C_p \cdot GDP$) and government consumption ($G = C_g \cdot GDP$). The variations of the fiscal ratio C_g are crucial and represent the political regime changes. NATREX model does not make any assumptions about Ricardian equivalence (the consumption of the private sector do not cancel the effects of government consumption). A rise in social consumption (or a decline of saving) depreciates R_n and $REER^{eff}$.

“A decline of saving raise I-S, increasing borrowing from foreigners and producing net log-term capital inflows. In the medium run, the NATREX appreciates a standard conclusion from Mundell-Fleming.... With the rising debt to foreigners, wealth and consumption gradually decline, saving begins to rise, and the situation is reversed: desired capital inflows decline and interest payments to foreigners rise, dominating any improvement in the desired trade balance. The NATREX gradually depreciates. In the log run, the NATREX depreciates bellow its initial level, producing the trade surplus necessary to offset higher interest payments to foreigners” (Allen, 1995, p23).

* *The productivity*. When the country produces both tradable and non-tradable goods, the sectoral location of the productivity increase is important. Increased productivity in the non-tradable sector raises output of non-tradable relative to the exportable. Shifts of resources from exportable to non-tradable create excess demand for exportable, a decline of the ratio of the price of non-tradable goods to the price of the export goods, and finally a real depreciation. Increased productivity in the tradable sector has the opposite effect on the NATREX.

In the end, we can write equation (6) as:

⁷ Following Lim and Stein, we normalize the mean of $(P_{ne}^j / P_m^j)^{1-\beta}$ at unity. For more details, see annex 1.

$$REER^{eff} = REER^{eff}(Z) \quad (8)$$

Where Z represents the fundamentals, i.e. the terms of trade, the social consumption and the productivity.

3.2.3 Estimation of the misalignment

We do not estimate directly a cointegrating equation for the real effective exchange rate. Firstly, we cannot measure R_n directly. Secondly, if we replace R_n by its determinants, we obtain a model where the variables have different degrees of integration. So, the real effective exchange rate, the government consumption (percentage of GDP), the private consumption (percentage of GDP) and the productivity behave as a random walk (I(1) variables). Conversely, the terms of trade are stationary (I(0) variable)⁸. Also, we estimate the model in two steps. In the first, we estimate the cointegrating equation for the relative prices of non-tradable. For that, we adopt this formulation:

$$RN = REER^{eff} / TOT^{eff} = R_n^{1-\alpha} \quad (9)$$

We use the Johansen's method which permits the determination of the cointegration rank (noted r) in a vector autoregressive model.

Table 3 : Estimation of the cointegration equation for RN
Johansen-Jesulius's method

Hypothesis	$r = 0$	$r \leq 1$	$r \leq 2$	
λ_{trace}	63.32**	40.31**	22.01**	
λ_{max}	23.01**	18.30**	13.32**	
Cointegration vector				
RN	Government consumption	Private consumption	Productivity	Constant
-464.485	-1.402	57.281	-1.439	-30.606
901.421	2.793	-0.479	5.774	-28.689
356.617	-65.438	-50.238	2.170	35.863

** statistically significant at 5%.

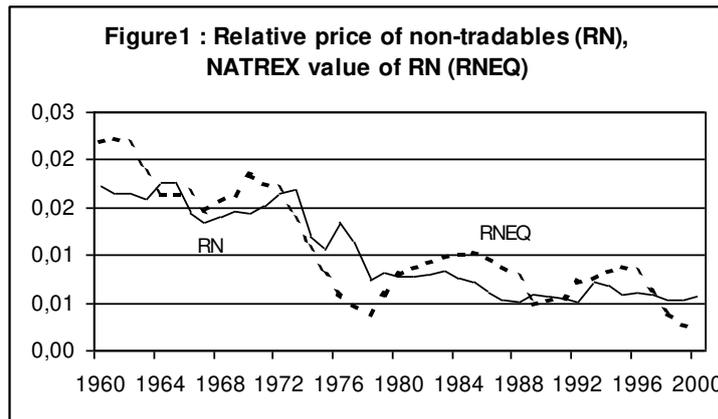
⁸ The results of unit root tests (ADF test with Akaike criterion) are not presented here. We have some problems with data for to calculate the terms of trade and the productivity. We do not dispose of data on export and import prices between Morocco and European Union. Also, we retain the ratio of the unit value of exports to the unit value of imports as measure of the terms of trade. We have two measures for the productivity. The first is the ratio of the real Gross Domestic Product to Population (Real GDP per capita; we cannot calculate the Real GDP per employed worker because the series on workers are not complete on the period). The second is the rate of return on investment, defined as the ratio of the variation of GDP to investment. This variable is stationary and excluded of the cointegrating equation

The statistics (λ_{trace} and λ_{max}) permit the acceptance of three relations of cointegration. We interpret the first as the long-run equation of RN. After normalization, we obtain for the NATREX value of RN:

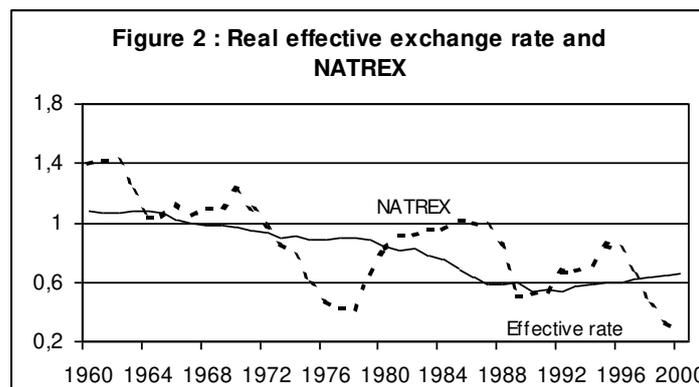
$$RN = -0.0030 \cdot C_g + 0.1233 \cdot C_p - 0.0031 \cdot PROD - 0.0659 \quad (10)$$

The government consumption depreciates RN; the private consumption appreciates RN and the productivity depreciates RN. The opposite sign for the private consumption is not a surprise, as far as this variable shows a negative trend, whereas we have a positive trend for the government consumption. Contrary to the NATREX hypothesis, it is possible that Ricardian equivalence makes sense for Morocco. The negative sign for the productivity suggests that productivity increases have occurred primarily in the non-tradable sector.

Figure1 plots the relative non-tradables price and its NATREX value. For to obtain the NATREX value, we replace in the equation (10) each exogenous variable by a moving average on three years. Note $REER_{eq}$ the NATREX value.



Knowing RN_{eq} , we can deduce the NATREX real exchange rate ($REER_{eq}$) and a measure of the misalignment ($MISeff$). $REER_{eq}$ is deduced of equation (10): $REER_{eq} = RN_{eq} \cdot TOT_{eq}$, where TOT_{eq} is a moving average on three years of the exogenous terms of trade. Figure 2 plots NATREX real effective exchange rate for 1960-2000. When the REER is above (below) the equilibrium rate, it indicates that the dirham is overvalued (undervalued).

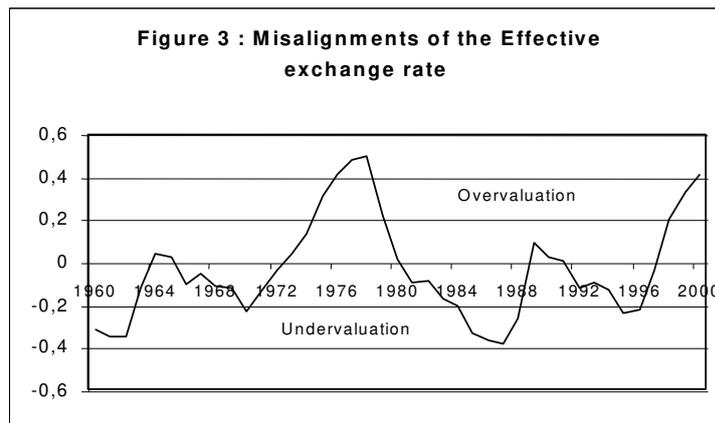


The misalignment variable is the difference between $REER_{eq}$ (NATREX) and $REER^{eff}$. In the same time, figure3 plots the misalignment indicator. A positive (negative) value means that the dirham is overvalued (undervalued).

In the first part of the period up to 1973, the REER is undervalued. In this period, the dirham was tied to French Franc until May 17, 1973.

Between 1973 and 1981, we observe an overvaluation. Since 1973, we had managed float regime with a target of stabilization of the effective exchange rate. Weights of the currencies in the basket were modified on September 23, 1980, “*in order to take account the changes in Morocco’s foreign trade pattern and the structure of currencies used in external settlements*” (Domaç et Shabsigh, 1999).

During the 1980’s, after the structural adjustment program in 1983, the exchange rate policy brought about a real depreciation of the DH (until 1989-1990).



In 1990, the dirham was devalued by 9.3%. In the 1990’s, the movement toward more liberalization was pursued. On January 1993, full current account convertibility was established. In June 1996, a foreign exchange interbank market was created. But this policy of nominal anchor to a basket of currencies produced a large movement of real appreciation of the DH. Also, “*the authorities modified the basket to better reflect the growing importance of the Euro area in Morocco’s trade accompanied by a 5% depreciation of the dirham on April 25, 2001*” (IMF, 2001).

In a general way, one can assert that in Morocco, volatility is not very stressed contrary to the other South Mediterranean countries (Turkey in particular). On the other hand adjustment does not make quickly so that the periods of under or overvaluation are rather long. In spite of this lack of "flexibility", one can assert that Moroccan authorities made watch of a rather good mastery of the exchange policy as far as real exchange rate does not go away many of its equilibrium rate

4. Trade flows, FDI and variability of the dirham

In this section, we analyze the trade flows and FDI effects of dirham volatility. The literature exploring effects of exchange rate variability on FDI and trade flows is relatively inconclusive. We return on some results which distinguish the effects of appreciation (depreciation) and volatility of exchange rate.

4.1. Theories

4.1.1. Exchange rate variability and FDI

When the domestic currency depreciates, we can have negative or positive effects on FDI. On one side, a real depreciation increases the foreign cost of capital that reduces the FDI outflows. Just as, a depreciation of the host currency reduces FDI into the host country, because a lower level of the exchange rate (measured in units of foreign currency per domestic currency) is associated with a lower expectations of future profitability (Campa, 1993). On the other side, a depreciation of the host currency increases the relative wealth of foreign entrepreneurs and therefore may increase the attractiveness of the host country for FDI (Froot and Stein, 1991).

Higher volatility may be found to be associated with higher direct investment outflows. Firstly, risk-averse investors can choose to invest overseas as a hedge against uncertainty of exchange rate. Secondly, by investing in more than one country, investors purchase a real option whose value increases with volatility (see Sung and Lapan, 2000 for example).

4.1.2 Exchange rate variability and trade flows

The real exports are favoured by a real depreciation of the domestic currency, while real imports are reduced. The final effect on trade depends on the elasticities (Marshall Lerner condition).

The effect of greater exchange rate volatility is ambiguous. The traditional models examine the behavior of firms under uncertainty. The profitability is directly related to the movements in exchange rates. Higher volatility leads to higher cost for risk-averse traders and to less foreign trade. Uncertainty about exchange rates translates into uncertainty on future export receipts in domestic currency. Also, “*by reducing sales, both expected profits and the variance of profits decline, but expected utility increases*” (Côté, 1994). The literature⁹ shows that these effects depend on the properties of the utility function, and the availability of forward cover.

But a more recent literature considers that the changes of exchange rates do not represent only a risk, but also constitute opportunities to make profits (De Grauwe, 1994). These works emphasize the “*entry/exit costs and evaluate “real options” to participate in exports markets*” (Franke, 1991, Baum and al., 2004). In this case, “*one view maintains that the capacity to export is tantamount to holding an option and when exchange rate*

volatility increases, the value of that option also increases, just as it would for any normal option" (McKenzie and Brooks, 1997). Firms benefit from an increase in exchange rate volatility since their expected profits grow at a higher rate than their entry/exit costs. These models which focus on the firm's flexibility tend to conclude that a higher exchange risk stimulates real exports.

4.2. Evidence

For to analyze the impact of exchange rate variability on trade flows and FDI, we choose a dynamic representation. We retain two separate models. In the first, the dependent variable is the trade variable, measured alternatively by ratio of trade balance to GDP, ratio of exports to GDP and ratio of Imports to GDP. In the second, we explain FDI. We note A , the variable which represents successively the trade flows and FDI. But this estimation poses some problems. First the A variable and the volatility are endogenous. Second, the MIS variable (misalignment) was generated from an auxiliary model (section3). Also, we choose estimating simultaneous-equation model by SUR (Seemingly Unrelated Regression) method, where the misalignment is treated as an instrumental variable.

So we estimate a bi-variate dynamics model. The model is written as:

$$\Delta \text{Log}A_t = \sum_1^n \alpha 1_i \cdot \Delta \text{Log}A_{t-i} + \sum_1^n \beta 1_i \cdot \Delta \sigma_{EReff,t-i} + \sum_1^n \gamma 1_i \text{MIS}_{eff,t-i} + C1 + \varepsilon 1_t \quad (11-a)$$

$$\Delta \sigma_{EReff,t} = \sum_1^n \alpha 2_i \cdot \Delta \text{Log}A_{t-i} + \sum_1^n \beta 2_i \cdot \Delta \sigma_{EReff,t-i} + \sum_1^n \gamma 2_i \text{MIS}_{eff,t-i} + C2 + \varepsilon 2_t \quad (11-b)$$

With σ_{EReff} for the real effective rate volatility and MIS_{eff} for the misalignment. The ε are white noises.

The estimation results are presented in table 4. The results concern the equation for interest (equation 11a). The ratio of trade balance is negatively affected by its previous values. The estimation coefficients are negative but only the third year is significantly different from zero. The estimation coefficients for volatility are negative (second and third year) and positive for the first year, but not statistically significant. *Misalignment is negatively and significantly associated with the ratio of trade balance*, even if in the second and third lagged, misalignment increases, not significantly, the ratio of trade balance.

Ratio of exports tends to decrease in the first three year. But the two first lagged values are not statistically significant. Furthermore, *volatility decreases the exports after its third year in a statistically significant fashion. This result indicates a negative link between an exchange rate uncertainly and ratio of exports*, while the effect of misalignment is not significant.

⁹See for example Ethier, 1973, Clark, 1973, Hooper and Kohlhagen, 1978, Cushman, 1983,1988, Chowdhury, 1993, Arize, 1995.

Ratio of imports is negatively affected by the two first previous values, but only the first lag is significant. *The coefficient of misalignment is significant at 5% and has the expected sign.*

The last equation concerns the ration of FDI on GDP. First of all, this ratio tends to decrease the first and third year (significantly at 5 and 10% respectively). The second lag affects positively the ratio of FDI on GDP in a statistically insignificant fashion. The coefficient of exchange rate uncertainly and misalignment are not significant. In terms of their contribution to the ratio of FDI on GDP, misalignment and volatility appear to substantially less important than movement in the liberalization ladder. On other hand, we observe the lack of role for misalignment and volatility in the expectation of FDI performance. These last ones are more bound to the costs of labor. This confirms our previous observations on the logic of the FDI influx towards Morocco.

The results show that the misalignment affects the trade balance and the imports whereas volatility affects exports. The impact of the set of these elements of variations of exchange on the aggregates of the trade and FDI, although corresponding in the theory, does not appear in a clear way. It is to identify the impact of each of these elements that one made estimations by separating the effects of the misalignment and those of the volatility. The results are supplied in tables from 4 to 6.

In table 4, one shows that misalignment and volatility affect negatively and in a significant way the ratio of exports on the GDP. Also an increase of exports affects positively and significantly the FDI, which confirms firsts advanced observations on the agreements of autolimitation. These agreements exclude quota imposed by the EU to the Moroccan re-exportations of products having a strong contents in European imports (on average for 100\$ of sold products contents in imports represent 35\$). It is about the textile industry in particular.

Table 4: Effects of volatility and misalignment 1962-2000

Equation	Ratio of Trade Balance		Ratio of Exports		Ratio of Imports		FDI	
	$\Delta(TB_{UE} / GDP)$		$\Delta \text{Log}(X_{UE} / GDP)$		$\Delta \text{Log}(M_{UE} / GDP)$		$\Delta \text{Log}(FDI / GDP)$	
	Coef.	T-Stat.	Coef.	T-Stat.	Coef.	T-Stat.	Coef.	T-Stat.
<i>Dependent variable</i>	-0.2197	-1.27	-0.2080	-1.36	-0.3417	-1.99**	-0.6242	-3.64**
<i>t-1</i>								
<i>t-2</i>	-0.1989	-1.12	-0.1854	-1.32	-0.0653	-0.36	0.0465	0.22
<i>t-3</i>	-0.4312	-2.52**	-0.3552	-2.46**	0.0006	0.01	-0.3687	-1.76*
$\Delta \sigma_{ER,t-1}$	165.05	0.41	1.0096	0.51	1.2617	0.47	-0.3110	-0.03
<i>t-2</i>	-127.35	-0.33	2.2745	1.18	2.2845	0.91	-3.7961	-0.36
<i>t-3</i>	-405.39	-0.97	-5.0014	-2.53**	-1.5693	-0.56	8.4735	0.77
<i>MIS_{eff,t-1}</i>	-76.52	-2.70**	0.0644	0.49	0.4676	2.51**	0.7839	1.11
<i>t-2</i>	33.67	0.85	-0.2443	-1.22	-0.4328	-1.60	-0.8128	-0.77
<i>t-3</i>	12.66	0.50	0.0068	0.05	-0.0642	-0.35	0.3886	0.57
<i>Constant</i>	-2.6081	-1.03	0.0089	0.77	0.0195	1.18	0.1275	1.75
<i>DW</i>	2.25		1.89		1.85		2.06	
\overline{R}^2	0.07		0.25		0.11		0.30	

* and ** indicate significance at 10% and 5%.

**Table 5: Effects of volatility and misalignment 1962-2000
on Exports (equation with FDI) $\Delta \text{Log} (X_{UE} / GDP)$**

	Model 1		Model 2	
	Coef.	T-Stat.	Coef.	T-Stat.
<i>Ratio of exports t-1</i>	-0.1418	-0.88	-0.1765	-1.10
<i>t-2</i>	-0.1357	-1.01	-0.0693	-0.39
<i>t-3</i>	-0.1556	-1.13	-0.1484	-0.82
$\Delta \sigma_{ER,t-1}$			0.3501	0.17
<i>t-2</i>			1.5038	0.72
<i>t-3</i>			-5.0371	-2.48**
<i>MIS_{eff,t-1}</i>	0.1769	1.45		
<i>t-2</i>	-0.3993	-2.10**		
<i>t-3</i>	0.0930	0.73		
$\Delta \text{Log}(\text{FDI}/\text{GDP})_{t-1}$	-0.0456	-1.43	-0.0335	-0.89
<i>t-2</i>	0.0007	0.02	-0.0074	-0.16
<i>t-3</i>	0.1024	3.05**	0.0445	1.00
<i>Constant</i>	0.0021	0.86	0.0109	0.74
<i>DW</i>	2.43		1.79	
\bar{R}^2	0.20		0.07	

* and ** indicates significance at 10% et 5%.

Also ratio imports on the GDP are affected negatively and significantly by the volatility. It is also affected positively and significantly by the misalignment. One finds also that the FDI decreases imports. So we observe a substitution between FDI and imports. This result is strong because it remains valid in two estimations (model 1 and model 2 in the table 6)¹⁰.

¹⁰ These results are confirmed by a regression (see annex 2, table 7) which contains the trade balance. We have a positive effect of the FDI and a negative effect of the misalignment (overvaluation) on the trade balance.

**Table 6: Effects of volatility and misalignment 1962-2000
on Imports (equation with FDI) $\Delta \text{Log} (M_{UE} / \text{GDP})$**

	Model 1		Model 2	
	Coef.	T-Stat.	Coef.	T-Stat.
<i>Ratio of imports t-1</i>	-0.1987	-1.25	-0.2115	-1.35
<i>t-2</i>	0.1014	0.68	0.1646	1.09
<i>t-3</i>	0.0747	0.51	0.0667	0.42
$\Delta \sigma_{ER,t-1}$			1.2634	0.49
<i>t-2</i>			-0.1679	-0.06
<i>t-3</i>			-5.0857	-1.97**
<i>MIS_{eff,t-1}</i>	0.3342	2.13**		
<i>t-2</i>	-0.2963	-1.24		
<i>t-3</i>	-0.0396	-0.24		
$\Delta \text{Log}(\text{FDI}/\text{GDP})_{t-1}$	-0.0295	-0.76	-0.0065	-0.15
<i>t-2</i>	-0.1046	-2.43**	-0.1352	-2.80**
<i>t-3</i>	0.0104	0.23	-0.0736	-1.41
<i>Constant</i>	0.0153	0.92	0.0331	1.87*
<i>DW</i>	2.07		1.75	
\overline{R}^2	0.12		0.10	

* and ** indicates significance at 10% et 5%.

5. Conclusion

In this paper, we set out to shed light on the developments in Morocco's external competitiveness in the last 40 years by constructing an appropriate measure of REER.

We study the behavior of the REER of the dirham against the European currencies (Europe of the 15), over the period 1960-2000 (annual data). We measure the volatility using standard deviation, and the misalignments as the difference between the actual REER and the equilibrium REER (NATREX model). We show that a rise of the volatility of the dirham reduces the trade flows (exports and imports). The misalignments affect also the trade flows: an overvaluation leads to a reduction in Morocco exports from, to a raise of Morocco imports, and globally to a deterioration of the trade balance with the European Union. On the other hand, neither the volatility nor the misalignments have an effect on the direct investments (FDI) in favor of Morocco.

It is important to interpret these results with caution. While the econometric results are statistically significant, the derivation of the equilibrium real exchange rate is ultimately dependant upon the assumptions underlying model.

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Annex 1: The Effective Real Exchange Rate

We calculate the effective rate between Morocco and European Union of 15. Index j represents each European country; the base period is noted 0. We have,

$$REER_{t/0}^{eff} = \prod_{j=1}^n \left[\frac{RER_t^j}{RER_0^j} \right]^{\theta_j} \quad (A.1)$$

where RER^j represents the bilateral real exchange rate between Dirham and j currencies, or

$$RER^j = \frac{E^j \cdot P}{P^j} \quad (A.2)$$

E^j is the nominal exchange rate between the dirham and the European currency, P and P^j are the consumer prices index (CPI, proxy of general price level) in the Morocco and in the European country. A rise of $REER$ is an real appreciation of the dirham. If we distinguish tradable and non-tradable sectors, we can decompose the CPI as

$$\begin{aligned} P &= (P_e)^\alpha \cdot (P_{ne})^{(1-\alpha)} \\ P^j &= (P_e^j)^\beta \cdot (P_{ne}^j)^{(1-\beta)} \end{aligned} \quad (A.3)$$

with P_e et P_{ne} for respectively the traded goods prices and the non-traded goods prices. α and β are the shares of traded ($(1-\alpha)$, $(1-\beta)$), the shares of non-traded goods) in the economies. The real exchange rate in equation (2) becomes:

$$RER^j = \frac{E^j P_e}{P_e^j} \cdot \frac{(P_{ne}/P_e)^{(1-\alpha)}}{(P_{ne}^j/P_e^j)^{(1-\beta)}} \quad (A.4)$$

Suppose that the tradable good produced by Morocco is the export good. Its price is noted P_x . The tradable good produced by Europe is imported by Morocco and its price is P_m^j . So, we have

$$RER^j = \frac{E^j P_x}{P_m^j} \cdot \frac{(P_{ne}/P_x)^{(1-\alpha)}}{(P_{ne}^j/P_m^j)^{(1-\beta)}} \quad (A.5)$$

Now, the real exchange rate depends to three components:

- The terms of trade (TOT); $TOT = \frac{E^j P_x}{P_m^j}$
- The ratio of the price of European non-tradable good to the price of its export good,
- The ratio of the price of Morocco non-tradable good to the price of its export good.

The first and the second term are exogenous, whereas the ratio of Morocco is endogenous. Normalize the mean of $c' = (P_{ne}^j / P_m^j)^{1-\beta}$ at unity and pose R_n , the relative price of Morocco non-tradables goods, we obtain :

$$RER^j = TOT \cdot R_n^{1-\alpha} \cdot c' \sim TOT \cdot R_n^{1-\alpha} \quad (A.6)$$

The equation (A1) becomes:

$$REER_{t/0}^{eff} = \prod_{j=1}^n \frac{TOT_t^j}{TOT_{t/0}^j} \cdot R_n^{1-\alpha} \cdot c' \quad (A.7)$$

or as well,
$$REER_{t/0}^{eff} = \frac{E_{t/0}^{eff} \cdot P_x}{P_{t/0}^{eff,j}} \cdot R_n^{1-\alpha} \cdot c' \sim \frac{E_{t/0}^{eff} \cdot P_x}{P_{t/0}^{eff,j}} \cdot R_n^{1-\alpha} \quad (A.8)$$

where $\frac{E_{t/0}^{eff} \cdot P_x}{P_{t/0}^{eff,j}}$ represents the effective terms of trade.

Annex 2:

**Table7: Effects of volatility and misalignment 1962-2000
on Trade Balance (equation with FDI) $\Delta(TB_{UE} / GDP)$**

	Model 1		Model 2	
	Coef.	T-Stat.	Coef.	T-Stat.
<i>Ratio of TB t-1</i>	-0.2598	-1.68*	0.0227	0.13
<i>t-2</i>	-0.0092	-0.06	0.2172	1.33
<i>t-3</i>	-0.2809	-2.01**	-0.1433	-0.90
$\Delta \sigma_{ER,t-1}$			-83.4975	-0.22
<i>t-2</i>			130.7485	0.35
<i>t-3</i>			44.4667	0.12
<i>MIS_{eff,t-1}</i>	-54.7340	-2.72**		
<i>t-2</i>	-4.2786	-0.1493		
<i>t-3</i>	34.5581	1.85*		
$\Delta \text{Log}(FDI/GDP)_{t-1}$	-2.6739	-0.50	-2.3109	-0.35
<i>t-2</i>	24.3531	3.82**	24.5930	3.14**
<i>t-3</i>	18.0409	2.57**	13.1055	1.52
<i>Constant</i>	-4.7455	-2.18**	-4.0710	-1.58
<i>DW</i>	2.21		1.93	
\overline{R}^2	0.42		0.16	

* and ** indicates significance at 10% et 5%.