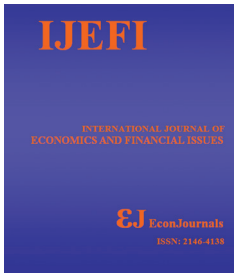

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Real Exchange Rate of Moroccan Currency: Appreciated or Depreciated?

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ABSTRACT

In this paper, we measure and evaluate the real parity of the Moroccan dirham during the period 1980-2020. The objective is to highlight the evolution of the real exchange rate of the dirham, and in particular to show if whether it has been overvalued against currencies of the main trading partners and competitors of Morocco. Contrary to many studies which used a simple method to calculate the real parity which consisted of assigning each country of the main trading partners a relative weight equivalent to its share in Morocco's external trade, we calculate the weights by combining both bilateral import weights and a double weighting for export to reflect both importance of each country in Morocco's import and export as well as the degree of competition of exporters in usual third markets. Calculation of real parity of the dirham reveals three main periods: a strong depreciation during 1980-1990; an appreciation during the period 1991-2000; and a resumption of a weaker depreciation for the last period 2001-2020. These trends are related to both changes in nominal effective exchange rate and in relative prices. Results obtained in the present paper are generally close to those calculated by the International Monetary Fund for Morocco and are strongly correlated with them and the trends in both remain the same.

Keywords: Real Exchange Rate, Appreciation, Moroccan Dirham
JEL Classifications: F31, F33

1. INTRODUCTION

Generally defined as the value of one currency in terms of another, the exchange rate has always been the subject of debate among many economic experts, academics and monetary policymakers. Interest in this topic was at the center of abundant literature that tried to explain the determination of the exchange rate as well as its influence on the whole economy, particularly the foreign trade competitiveness. One of the primary reasons for the significance of the exchange rate is its importance as a macroeconomic policy variable. Exchange rate management, as an economic policy tool, aims to boost a country's competitiveness and economic development (Karakostas, 2021).

A currency's exchange rate, expressed in nominal terms, does not reflect the level of its purchasing power, and much less the degree of competitiveness of an economy. Rather, the real level of the exchange rate is the relevant one. This is because it accounts for evolution in nominal parity, variations in prices and production costs in one country compared to those of the trading partners or competitors. It shows how changes in country's exchange rates and prices influence its competitive position internationally. An appreciation of the real exchange rate is associated with a loss of competitiveness.

In Morocco, the appropriate level of the dirham's exchange rate and its real parity have always been at the center of economic debate. Certain economic actors find that the exchange rate policy adopted by the country is penalizing exporters. Some economists believe that significant appreciation in the real exchange rate occurred at the end of the 1990 s what involved a weakening of competitiveness of the exposed sectors (Bouoiyour and Marimoutou, 2005).

Precisely, the General Confederation of Moroccan Enterprises (CGEM)[1] considers that the real exchange rate of the dirham has appreciated over the years, which has led to a loss of market share at the international level. The clothing industry association (AMITH) considers that Morocco's real exchange rate appreciated considerably against some Asian competitors in Morocco's clothing sector[2] such as Vietnam, Cambodia, Bangladesh and Middle Eastern countries, such as Egypt, that sell their products in the same markets as Morocco. This real appreciation resulted after real devaluations adopted by these countries (Agenor and El Aynaoui, 2015).

According to the AMITH "the return to the normal level of the dirham's exchange rates would imply a devaluation of 11-12%". In the same way, the Standard Chartered bank in London found that a 10% devaluation would allow Morocco to recover lost competitiveness which started in 1997 (Gulf news, 2001). On his side, many International Monetary Fund mission reports under Article IV revealed an overvaluation of the dirham. For example, in 2013, the real appreciation varied from 1.3% to 11.3%. On their side, the monetary policymakers perceived the exchange rate policy as successful in accommodating shocks without much risk on economic competitiveness.

Other researchers found also that the real effective exchange rate was appreciated in certain periods. For example, Ezzahid and Maouhoub (2020) show that from 2000Q1 to 2019Q4 the real effective exchange rate has a downward tendency. This means real appreciations of Moroccan dirham. Others found that the RER in Morocco exhibited mixed patters–appreciation in the 1990 s followed by depreciation during 2000 s due to lower inflation than in trading partners. Over the longer term, Morocco has experienced Real exchange rate (Zuzana et al., 2013).

These debates and discrepancies on the real value of the dirham raise many questions: Has the dirham been overvalued against the currencies of Morocco's main competitors and trading partners? If so, is it due to an unfavorable inflation differential in Morocco compared to these countries, or to a nominal appreciation of the dirham, or to both at the same time?

The present paper attempts to answer these questions by calculating and evaluating the real parity of the Moroccan dirham. The simplest method, used often by many studies, to calculate this parity consists of assigning each country of the main trading partners a relative weight equivalent to its share in Morocco's external trade. However, this method does not take into consideration the competitiveness of exporters on third markets, in particular those with which Morocco has weak bilateral trade. To overcome this constraint, this paper will assess and calculate the weights by combining both bilateral import weights and double export weights. Indeed, weightings assigned to these countries must reflect both importance of each country in Morocco's import and export as well as its degree of competition in usual third markets. The importance of imports from each country represents its share of Moroccan imports. We will use a double weighting for export to consider each country's share of Moroccan exports and competition experienced by Moroccan exporters in usual foreign markets from local producers and exporters from third countries.

The paper is structured as follows: the first part presents different concepts of real exchange rates as well as their theoretical bases. The second part explains the methodology for computation of real exchange rate of a currency, in particular optimal choice of the sample of main trading partners and competitors as well as the relative weighting coefficients. The third part attempts to compute changes in real rate of the dirham, to analyze its evolution during the period 1980-2020, and to compare it with that established by the International Monetary Fund for Morocco. The last part concludes the paper.

2. THE REAL PARITY OF A CURRENCY: REVIEW OF LITRATURE

The real exchange rate of a currency is generally defined as:

- The nominal exchange rate adjusted by the differential in price levels between countries. In other terms, it is the nominal exchange rate deflated by the level of foreign prices, or costs, relative to the level of domestic prices, or costs, measured in common currency
- The relative price of tradable goods compared to non-tradable goods. The relative price synthesizes the set of incentives that orient the allocation of resources in a country between the two sectors of tradable goods and non-tradable goods and reflects consumer preferences between the two types of goods.

Considered as the most common definition, the first concept is related to purchasing power parity theory (Chinn, 2006). It compares the relative value of currencies by measuring the relative prices of baskets of domestic and foreign consumption or production. This concept of real parity is known as the "external real exchange rate" because it compares the relative prices of baskets of goods produced or consumed in different countries. The second concept, or the "internal real exchange rate" compares, for an economy, the internal relative prices of the production or consumption of tradable goods relative to non-tradable goods. The real exchange rate is in this case a domestic resources allocation indicator.

In fact, the concept of a real exchange rate derives from the purchasing power parity theory. It was also at the center of reflection of several theories emanating from different analytical approaches, in particular the approach relating to: (i) the "Mundell-Fleming one composite good model," which focuses on the competitiveness of the whole goods, and (ii) the "trade-goods real exchange rate" approach based on the competitiveness of exchangeable goods (Hinkle and Nsengiyumva, 1999). Relative labor costs, expressed in foreign currency, for all tradable and non-tradable goods, is another concept of the real exchange rate, although its use is uncommon compared to the two other

1 Created in 1947, the CGEM is the representative of the private sector to public and institutional authorities. It speaks on behalf of its 90,000 direct and affiliated members and ensures a favorable economic environment for business development. https://www.cgem.ma

2 Sector contributing to one-third of Moroccan exports in 1990s-2000s.

concepts. This section will thus present and analyze the different theoretical concepts relating to real exchange rates and examine the methodological foundations specific to each concept.

2.1. Real Exchange Rate and Purchasing Power Parity

Purchasing Power Parity (PPP) is the oldest theory of the exchange rate[3] and has occupied a central place in the analysis of the classical economists such as David Ricardo. It defines the PPP of one currency against another as the exchange rate that equates the unit value of each of these two currencies. The value of a currency is determined in this case by the amount of goods and services it allows to acquire, i.e. by its internal purchasing power which changes in inverse proportion to the general domestic price level (Drunat et al., 1994). The theory of PPP is based on the law of one price which considers that a good should have the same price in all countries when expressed in a common currency (Rogoff, 1996).

There are two versions of the PPP theory:

Absolute PPP: This version considers that the purchasing power of a national currency is identical on the domestic market and abroad. The nominal exchange rate between two currencies (*Edc*) is thus equal to the ratio of domestic (*Pad*) and foreign current prices (*Paf*) of a standard basket of goods, as shown by the following equation:

$$Edc = \frac{Pad}{Paf} \quad (1)$$

Absolute PPP states that the RER between two currencies should equal 1, so when prices are converted to a common price, it should be possible to buy a similar basket of goods in two different countries with the same amount of currency (Cuestas et al., 2022). In practical terms, absolute PPP has been lightly used given insufficient data on the costs of the same baskets of goods in different countries. Moreover, even assuming that there is a perfectly identical methodology in all countries, which is not usually the case for establishing price levels, absolute PPP is not usually exactly verified. Indeed, the arbitration of economic agents does not take place when the price differences between countries are too small to compensate for the additional cost linked to transport costs, taxes and duties, etc.

Relative purchasing power parity: it considers that the nominal exchange rate is proportional to the ratio of domestic and foreign price levels. Changes in exchange rates compensate for inflation differentials between countries (Benassy, 1993). Therefore, the real exchange rate is constant, but not necessarily equal to unity, as is the case with absolute PPP.

$$RERdc = \frac{Edc.Pgf}{Pgd} = \text{constant } Edc = (\frac{Pgd}{Pgf}).k \quad (2)$$

RERdc: Real exchange rate in national currency. *Edc*: Nominal exchange rate, defined as the number of units of national currency per unit of foreign currency.
Pgf, *Pgd*: Respectively the foreign and domestic price indices. *K*: Constant

3 It was developed by the Swedish economist Cassel in 1916.

Unlike the version of absolute PPP, which takes into consideration standard baskets, relative PPP is interested with representative baskets. On the other hand, the latter relates exchange rate fluctuations to inflation rates while the absolute version attributes them to the general price level (Clark et al., 1994). Many authors point out that when the PPP condition holds, it only holds in the long run. Relative PPP has been widely used by most countries due to the availability, monthly, of consumer price indices, especially in most developing countries. These indexes, which often represent the prices of both tradable and non-tradable goods, are most used to calculate the real exchange rate based on PPP.

Real exchange rates based on consumer prices, however, raise two important issues. First, these prices can be influenced by price controls, subsidies, and indirect taxes; hence the need, in interpreting real exchange rates based on consumer price indexes, to distinguish between the effects of changes in indirect taxes, subsidies and price controls and those arising from price changes[4]. Second, countries' consumer price indexes are determined based on different baskets of goods which weights often reflect consumers behaviors that may differ from country to country. This limits the usefulness of the real exchange rate based on the consumer price index for comparing living standards.

Despite its simplicity, the PPP theory has several limitations. First, it assumes verified the law of one price. Also, there are significant fluctuations in real parities. In this regard, Lindert, Krugman, Obstfeld and others have made it a theory valid only over a long period for example, according to P. Lindert." the PPP has better explanatory power over long periods, especially those which do not end in brutal shocks, than for movements from one month to another or from one year to the next" (Lindert, 1989). Short-term exchange rate variations are, in fact, essentially determined by fluctuations in interest rates and financial factors, in connection with the masses of capital circulating between financial centers in search of better remuneration.

2.2. Mundell-Fleming Approach or Real Exchange Rate Approach Based on the Overall Production Costs

The second main concept of the real exchange rate is based on the Mundell-Fleming open economy macroeconomic model used for industrialized countries. In this model, the price index in the definition of the real exchange rate corresponds to a production cost index, which reflects the costs of products intended for both local and foreign market (exports), unlike the consumer price index in PPP theory which reflects the prices of goods produced and sold locally as those imported.

The real Mundell-Fleming exchange rate can be expressed, in terms of foreign currencies, as follows:

$$MFRERfc = \frac{(Efc.GDPDd)}{GDPIDf} \quad (3)$$

4 Consumer price indices are subject to seasonal variations which, although not a problem for the analysis of annual data, may cause seasonal fluctuations in real exchange rates calculated based on quarterly or annual data.

MFRERfc: Mundell-Fleming real exchange rate, in foreign currency.
Efc: nominal exchange rate index, defined as the number of units of foreign currency per unit of national currency.
GDPDd, GDPDf: Domestic and foreign GDP deflators, respectively.

The Mundell-Fleming model considers domestic GDP and exports as a single composite good whose prices evolve in the same way. Likewise, the foreign currency prices of imports are assumed to evolve in a comparable manner to the foreign GDP deflator. Thus, the prices in foreign currency of exports and imports are determined as follows:

$$Efc.GDPIDd = Efc.PXdc = PXfc\ DPIBf = PMfc \quad (4)$$

PXdc, *PXfc*: Domestic export price deflator in local and foreign currency, respectively.
PMfc: Domestic import price deflator (in foreign currency).
TT: Terms of trade.

From the two previous equations we get:

$$MFRERfc = \frac{PXfc}{PMfc} = \mathrm{TT} \quad (5)$$

Thus, the Mundell-Fleming formulation does not distinguish between the terms of trade and the real exchange rate. Since export prices are assumed to be equal to the local GDP deflator and import prices equivalent to the foreign countries' GDP deflator, the real exchange rate and the terms of trade are the same. This model is generally appropriate for industrialized countries, particularly because of the large share of manufactured products in their foreign trade and the low variation in the terms of trade. It is less, however, so for many developing countries whose exports are dominated by primary products and whose terms of trade are determined exogenously. In these countries, export prices often fluctuate much more than the GDP deflator and it is often better to distinguish between the terms of trade and the real exchange rate. Production cost indices (such as the GDP deflator) include export prices but exclude import prices of finished goods, while price indices, like consumer prices, include import prices of finished goods and set aside export prices. On another side, the non-availability of the GDP deflator on an no annual basis is another limitation on the use of the real Mundell-Fleming exchange rate for these countries (Edwards, 1989a).

2.3. Real Exchange Rate Based on Tradable Goods

The "trade-good real exchange rate" is defined as the relative cost of producing tradable goods, measured in a common currency, in the home country and in foreign countries. This version of the real exchange rate uses indexes of prices or production costs relative to tradable goods, rather than the indexes of prices or costs corresponding to all goods as is the case with the PPP theory or the Mundell-Fleming model.

There are two kinds of internationally tradable goods: homogeneous standard and more diversified products, often manufactured. The law of the single price, which is logically more applied only to tradable goods, is more appropriate in the case of homogeneous goods and could lead to a price equalization after considering the costs of transport, tariffs, and other costs of transactions. Indeed, if the transaction costs are negligible (gold for example), the real exchange rate of tradable goods should be equal to 1 (absolute PPP). If transaction costs are negligeable, but constant, the real exchange rate for homogeneous goods should tend to be constant (relative PPP)[5]. Diversified manufactured products, on the other hand, are often imperfect substitutes. However, international markets are quite important for tradable goods with abundant supply potential and very strong competition. Hence, even if manufactured products are not perfectly substitutable, their elasticities are significant and their prices and production costs more competitive.

The usefulness of the real exchange rate for tradable goods in the case of developing countries depends on the structure of production of these goods whether they are homogeneous or diversified. Countries producing only homogeneous goods are "price takers" and face perfectly elastic foreign demand. In this case, foreign demand, rather than domestic demand, will determine prices and hence be at the origin of domestic and foreign price standardization. However, some developing countries produce homogeneous and differentiated goods while their real exchange rates for tradable goods may vary depending on their competitiveness.

2.4. Exchange Rate Theories and Choice of Price or Cost Indices to Establish the Real Exchange Rate

The choice of price or cost indices to establish the real exchange rate of a currency is quite important and it is crucial in computing real exchange rates, making it necessary to determine which of them is more appropriate for different policy objectives (Edwards, 1989b). For PPP theory and the Mundell-Fleming model, the choice of price indices is relatively straightforward. For the theory of the real exchange rate based on tradable goods, this choice is however quite problematic given the lack of data necessary to determine the real parity for most developing countries. Several price indices were then proposed to determine the real exchange rate based on tradable goods: wholesale prices, value added deflators for manufactured goods, unit export values and unit labor cost of work.

2.4.1. Wholesale prices

Wholesale price indices are heavily weighted for tradable goods and are therefore generally more representative of these goods than other indices of tradable goods and non-tradable goods. The real exchange rates for these goods calculated on the basis of these prices are thus often used in the import and export equations for the case of industrialized countries. Since wholesale prices are not

5 The assumption that the relative cost of the basket of tradable goods should be stable implies the following remarks: (i) the composition of tradable goods may change over time; (ii) if the weightings of the categories of goods are different in several countries, a change in the relative prices of certain tradable goods may cause a change in the relative prices of different baskets; and (iii) variations in trade policy or transaction costs can lead to price differences between countries.

appropriate or available for many developing countries, a country's overall production cost is sometimes measured by other variables, such as the consumer price index or the GDP deflator.

2.4.2. The value-added deflators of manufacturing products

They are often used to estimate real exchange rates and assess the competitiveness of tradable goods. For its part, the International Monetary Fund (IMF) establishes in its "International Financial Statistics" database, real exchange rates based on various indices including the deflators of value added in the manufacturing sector. This indicator, however, is not appropriate for computation of real exchange rates for most developing countries because, in general, the manufacturing sector remains weak and characterized by low production of tradable goods.

2.4.3. Unit export values

The real exchange rate calculated based on these unit export values in the manufacturing sector is another indicator used to assess the competitiveness of tradable goods in the most industrialized countries. The IMF uses this indicator for more than 20 countries. This concept of real exchange rate is however useful for countries exporting diversified manufacturing products and less so for countries exporting homogeneous primary products (coffee, cotton, etc.). One of the main limitations of this index is that it can also be subject to sampling bias. It does not include all goods that can be exported; it only covers tradable goods that are priced low enough - at the observed exchange rate - to be exported. Furthermore, if the goods traded are close substitutes, the real export-based exchange rate is unlikely to change much (Clark et al., 1994). The real exchange rate can also be biased if the unit value of a developing country's exports increases, over time, following structural increases in value added in the export sector for example, through the diversification of high added value products.

2.4.4. Labor costs in the tradable goods sector

Some economists, such as Marsh and Tobarick, highlight three advantages of unit labor costs to assess the competitiveness of industrialized economies: the data relating to these costs on a comparable basis; they constitute an important component of the overall cost of production; in the end, labor costs often constitute a component implemented to ensure macroeconomic stability and competitiveness in industrialized countries. Given these advantages, the IMF calculates real exchange rates for 21 industrialized countries based on unit labor costs in the manufacturing sector. The main drawback of these costs, however, is that they consider a single factor of production "labor." In addition, they measure the relative profitability of producing tradable goods only under certain conditions such as, for example, the need for all countries to have the same technology.

In conclusion, the PPP theory, the Mundell-Fleming model, and the tradable goods approach have placed particular importance on the concept of the real exchange rate. The price indexes used to calculate RER are generally determined by theoretical considerations and data availability. If the goal is to capture international price competitiveness on the demand side, the producer price index (PPI) and wholesale price index (WPI) frequently capture tradable goods prices the best. Unit labor costs in the tradable sector, on the other hand, provide an informative assurance. The ratio of tradable-nontradable good prices is frequently proxied in a dependent economy framework by the ratio of PPI (or WPI) to CPI. However, empirical work for PPI/WPI and unit labor cost series is frequently constrained by more limited data availability. As a result, aggregate-level studies typically calculate the RER series using CPI (Demir and Razmi, 2020). The availability of the consumer price index for most countries makes it easy to measure the real exchange rate based on PPP. This is a measure that is internationally comparable.

While for the Mundell-Fleming model, establishing the real exchange rate based on GDP deflators is suitable for developed countries whose external trade is dominated by manufactured products and remains less appropriate for developing countries whose exports are generally dominated by commodities and for which the terms of trade fluctuate considerably. Likewise, the lack of, or insufficient, wholesale price data makes it difficult to calculate the real exchange rate based on tradable goods for a significant number of developing countries. In addition, the usefulness of export unit values and wholesale price indices in these countries are limited by the importance of standard materials in their exports, for which they are "price takers."

3. CONCEPTS AND METHODOLOGY FOR COMPUTATION OF THE EFFECTIVE EXCHANGE RATE

The calculation of the real exchange rate requires consideration of three fundamental elements: the identification of nominal and real exchange rates as well as the appropriate measures of these indices; the assignment of the appropriate weighting per country and finally the choice of the appropriate price or cost indices.

If the operational formulas to establish nominal exchange rates and the methodologies for determining country weights do not contain discrepancies among the different versions of the real exchange rate based on PPP, the Mundell-Fleming model and the competitiveness of goods tradable, the conception of appropriate indices of prices or costs to calculate the real parity of a currency differs, however, from one theory to another. In addition, it is often difficult to have adequate price or cost indices in the case of developing countries. For most of these countries, the consumer price index and the GDP deflator, disseminated on a monthly basis for the former and annually in general for the latter, are the only suitable indices. Chinn (2006) has indicated that unit labor costs are not always available on a timely or consistent basis, Hence, in general trade weighted indices are usually constructed using either consumer price index (CPI) or producer price index (PPI).

This section will present, first, the various concepts and usual calculation methods relating to the nominal and real exchange rates, the way of determining the weights attributed to each country forming part of the sample taken into consideration to determine the real parity, and finally the choice of appropriate price or cost indices.

3.1. Real Parity of a Currency: Concepts and Calculation Methodology

3.1.1. Nominal and real effective exchange rate

The variation in the exchange rate of a currency against a single foreign currency remains of limited meaning and scope since the variation against other currencies could take place in an opposite sense, Hence the need to follow the evolution of the exchange rate not only with respect to a single currency but with respect to several currencies through the nominal effective exchange rate. Defined as the weighted average of the bilateral exchange rates of a currency vis-à-vis those of the main trading partners and competitors, the nominal effective exchange rate thus makes it possible to indicate to what extent the nominal value of this currency evolves vis-a-vis to those of these countries. It can be expressed as follows:

$$NEER = 100 \times \prod_{i=1}^{n} (e_{it})^{weight_i} \quad (6)$$

NEER: nominal effective exchange rate. n: Number of countries; ∏: Geometric mean.

$e_{it} = E_{it}/E_{i0}$: The index of the exchange rate at period t relative to the exchange rate at base period t = 0; *Eit*: The currency value of the ith partner country compared to the dirham at time t; Weight i: The weighting coefficient relating to the ith country, such that $\sum_{i=1}^{n} weight\, i = 1$;

However, changes in the nominal effective exchange rate alone do not reflect the level of a currency's purchasing power or the magnitude of changes in a country's competitiveness. Changes in domestic prices relative to its trading partners or competitors have the same effects as a change in the nominal exchange rate. Thus, for example, if prices increase faster in a country compared to abroad, the competitiveness of its exports is weakened if this increase is not compensated by a depreciation of the same magnitude of its nominal exchange rate. Hence the need to establish the real effective exchange rate which is defined as the nominal effective exchange rate adjusted for the evolution of relative prices, or costs, of the main partner and competitor countries. It thus allows us to establish to what extent the real purchasing power of a currency changes over a given period.

$$REER = 100 \times \prod_{i=1}^{n} \left(\frac{e_{it}}{p_{it}}\right)^{weight_i} \quad (7)$$

REER: Real effective exchange rate; $p_{it} = P_{it}/P_{i0}$: The price index relating to period t compared to the price index relating to the base period; P_{it}: the price index of the ith country compared to the price index of Morocco (relative price index).

3.1.2. Weighting system

For the calculation of the nominal or real effective exchange rate of the currency of a country, it is necessary to consider a sample of representative countries with which it maintains significant trade relations or whose presence in usual third markets would compete with its exports. A weighting coefficient is then granted to each country and which essentially depends on the objective sought. The most common means of calculating an effective real exchange rate is to weight the currencies by trade weights (Chinn, 2006). The simplest method is to give each country a relative weight equal to its share in the trade of the country in question. However, when trade flows differ significantly between countries for imports and exports, it is preferable to calculate separate effective exchange rates for imports and exports, which would allow the impact of exchange rate movements to be assessed on these imports and exports.

In addition, if a country has significant competitors in third markets with which it has low trade, determining the appropriate weights is more complicated. On the other hand, if a country's trade transactions are denominated in international currencies rather than in the currencies of trading partners (many products are settled in dollars), the weights need to be adjusted to reflect the currency composition of foreign trade rather its geographical origin and destination.

In general, four methods are commonly used to calculate the weights used to establish effective exchange rates: Model-based weighting, double-weighting system, weighting in function bilateral trade and weighting linked to world trade.

i. Model-based weighting

Under a model-based weighting system, each currency is assigned a coefficient based on the comparative impact (elasticity) of exchange rate fluctuations on the trade balance of the country concerned. For example, the IMF uses a "Multilateral Exchange Rate Model" to calculate the effect of exchange rate fluctuations on the trade balance of a given country and, therefore, to determine the weights. allocated to bilateral rates included in the effective exchange rate index.

This model-based weighting system remains, however, quite complex given the difficulty of estimating the elasticity of prices and foreign trade flows, which limits its use.

ii. Double weighting system

In the domestic market, local producers of import substitution goods compete with foreign exporters. The relative importance of each of these exporters can be considered as equal to the market share it has in the domestic market, that is, its share in the total imports of the host country. In addition to external trade, the weighting system must consider the competitive relationships between exporters in third markets. Indeed, it is possible that two countries experience strong competition in third markets while their bilateral trade is weak. In this case, a change in the exchange rate in one of the two countries will affect assuredly the competitive position of the other.

For example, although Morocco has low trade with Tunisia, the two countries export similar products to the European Union, the two countries' main trading partner. Therefore, a variation in the real bilateral exchange rate between the Tunisian dinar and the euro has, other things being equal, an impact on Moroccan exports to the European Union. At the level of each third market, the exporters of the country in question face competition from local producers and competition from exporters from other countries

in these markets. The weights derived from these two factors are referred to as the "double export weights."

Thus, bilateral exchange rates between a country's currency and that of its competitors are weighted according to "the contribution of each of the competing countries to the overall supply of competitive goods, including the supply of goods from national producers, in each market and according to the comparative advantage in each market of national exports." The calculation of the overall trade weights assumes a combination of the bilateral import weights and the double export weights. This method is similar to that used by the IMF to calculate real exchange rate indices for a large number of countries.

iii. Weightings based on bilateral and global trade
The other two weighting systems, based on bilateral and aggregate trade, are in fact particular applications of the double weighting method.

a. Weightings according to bilateral trade
Under the bilateral weighting mechanism, a weighting proportional to the share of a country's exports and imports is assigned to each of its trading partners. Thus, in export markets, competition from third countries is not considered and the domestic producer is considered to be the only competitor in terms of exports. For imports, competition between foreign suppliers is considered and a weighting coefficient is assigned to each according to the proportion of all imports that can be attributed to it. The bilateral import weights are calculated in the same way as the import weights, i.e. in the same way for the calculation of the overall trade weights.

b. Weightings based on global trade
As part of the mechanism for calculating the overall weighting coefficients, the currency of each partner country is assigned a weighting coefficient proportional to the share of total exports of all the partner countries of that country. This global weighting mechanism therefore takes competition between producers in third markets to an extreme, but completely ignores the importance of a particular market for a given country.

3.1.3. Choice of price or cost indices

For the calculation of real exchange rates, it is important to use similar price or cost indices for all the countries concerned. As pointed out before, the essential difference between the three versions for the calculation of the real exchange rate is in the use of different domestic and foreign price or cost indexes. Thus, the PPP theory considers the consumer price index to estimate the real exchange rate of a currency; Mundell-Fleming theory prefers the GDP deflator and, finally, tradable goods theory uses price or cost indices for tradable goods. What are therefore the main advantages and limitations of each of these indices?

Consumer price indices, often representing the prices of both tradable and non-tradable goods, are the most common price measure used to calculate the real exchange rate of a currency. They have the advantage of being available and published periodically (monthly) by most countries, including developing ones.

However, they have several drawbacks: they include the prices of products and services that are not traded internationally. They are influenced by indirect taxes, subsidies and sometimes, control measures. They are determined in different countries based on baskets made up of different goods, and different weightings, generally reflecting dissimilar consumer behavior between countries. They may experience seasonal variations which may cause fluctuations in real exchange rate indices calculated based on quarterly or annual data.

Regarding the GDP deflator, it has often been considered that it can be a good index for computation of the real exchange rate (Mundell-Fleming). Its main merit is that it is a representative index of aggregate prices of production. One of the main limitations, however, is the non-availability for many developing countries of statistics on the GDP deflator on a non-annual basis. In addition, it is often not appropriate for international comparisons between developing countries due to the non-standard calculation methods used by some of these countries.

As for wholesale prices and producer prices, they have the advantage of reflecting the evolution of prices especially in the industrial sector, hence a possibly more precise approximation of the price of merchandises making up international trade. However, they are the subject of several criticisms. They often depend on the price of imported goods which does not reflect the cost situation in the domestic market. The real exchange rate calculated using these two measures varies very little since these indices are often dependent on commodity prices especially in developing countries. Despite their limitations, a significant number of economists have proposed that an adequate approximation of the relative prices of tradable and non-tradable goods can be done respectively through the foreign wholesale price index and the domestic consumer price index. However, two drawbacks characterize this proposal: the selection of the components to be included in each index and the weighting to be assigned to each component.

Among the costs used to calculate real exchange rates, unit labor costs, normalized unit labor costs and various measures of value added. Unit labor costs relating to the manufacturing sector are considered as the most important in assessing the competitiveness of an economy for several reasons. They are a true indicator of the relative profitability of tradable goods. They are very convenient from a statistical point of view since comparable data for the manufacturing sector exist for several countries. They are considered as more stable than the prices of relative goods and, therefore, contribute to a better measure of the economic competitiveness of countries.

Several remarks are in order, however. The gains in labor productivity achieved by replacing this labor with capital goods are counterbalanced by the increase in capital costs, which means that the reliance on unit labor costs labor can lead to an overvaluation of productivity gains. Unit labor costs also include a cyclical element in that the productivity of labor varies according to economic cycles (periods of drought, war,). However, it is possible to eliminate the effect of these cyclical factors using different statistical techniques.

Moreover, like the other price indexes, there are several analytical problems relating to the use of this index for the measurement of the real exchange rate: an indicator based on the evolution of wage rates is strongly sensitive to variations in cyclical productivity. For this reason, many economists develop "normalized" unit labor cost indices that correct for changes in wage rates and, therefore, for competitiveness due to these changes in productivity. These indices are calculated, however, only for a limited number of industrialized countries.

Other limitations: The wage rate considers only one factor of production, namely labor. Also, the capital/labor ratio may vary between countries, which risks introducing a bias to the index. Finally, the low quality and the limited availability of data on wage rates for developing countries constitute another limitation of this indicator (Table 1 presenting some characteristics of certain price-cost indices).

4. CALCULATION OF THE REAL EXCHANGE RATE OF DIRHAM AND ANALYSIS OF ITS EVOLUTION DURING THE PERIOD 1980-2020

In the light of the previous discussion related to the methodology of calculating the real effective exchange rate development, this section proposes to calculate that of the dirham during the period 1980-2020, to analyze its evolution and to compare the results obtained with those of the IMF.

4.1. Methodology for Computation of the real Effective Exchange rate of the Dirham

Computation of the development of the real parity of the dirham is carried out in four stages as follows: Designation of the countries to be used for the establishment of the index; determination of the weighting system and the weights assigned to each country; choice of the appropriate price index or costs; and calculation of the nominal and real effective exchange rate of the dirham.

Choice of countries initially focused on several partner countries and competitors of Morocco representing different regions of the world (Europe, America, Africa, Asia). The number of countries has been reduced to 23 for many reasons including: Low representation of certain countries as trade partners (e.g., Norway, Denmark, etc.), competition in third markets (Hungary, Czech Republic, Mexico, Chile, Thailand, Egypt.), too low inflation levels (Argentina, Brazil) or too high (Turkey) during certain periods, which is likely to bias the calculation of the real effective exchange rate of the dirham. The selected countries represent nearly 80% of Morocco's international trade. These are mostly composed of countries in the euro area; certain main industrialized countries (United States, United Kingdom, Japan); as well as emerging countries competing with South-East Asia (India, Indonesia, South Korea, China, etc.), and Africa (Tunisia).

Weightings allocated to these countries reflect both importance of each country in Morocco's import and export volumes as well as its degree of competition in third markets (Table 2). Indeed, the importance of imports from each country represents its share of Moroccan imports. We use a double weighting for export to consider each country's share of Moroccan exports and competition experienced by Moroccan exporters in usual foreign markets from local producers and exporters from third countries[6]. For instance, although Spain is the largest trading partner for Morocco, its competitive intensity in third markets is only 4.7%. The biggest competitors are Germany (19.2%) China (10.4%) respectively.

However, the exchange rate of the dirham continues to rely heavily on: the euro and the US dollar levels recorded on international currency markets; with any appreciation (depreciation) of the euro against the US dollar, the dirham reacts in the same way against the US currency, that is to say an appreciation or depreciation vis-à-vis the euro.

4.2. Methodology for Computation of the Weighting Coefficients

Weight allocated to a country j in the basket, is established on the basis of its importance in Morocco's imports and exports, as well as its degree of competition vis-à-vis her exports in third markets.

$$Weightj = \alpha\ (part\_imp_j^i) + \tfrac{1}{2}\ \beta\ (\ part\_exp_j^i + Dconc_j) \qquad (8)$$

or:
i: Morocco
α: The share of imports in total trade, i.e. 56%;
β: The share of exports in total trade, i.e. 44%;

6 For more information about double weighting, see: Zanello and Desruelle (1997), A Primer of on the IMF's Information Notice System. IMF working paper. WP/97/71. May. 14-18.

Table 1: Characteristics of certain price indices-costs

Price index-costs used	Periodicity	Data availability in developing countries	Observations
Consumer Price Index (CPI)	Monthly	Most countries	Widely used in developing countries
GDP deflator	Annually	Most countries	GDP deflators can be strongly influenced by volatile commodity prices
Unit cost in manufacturing industry	Annually	Some countries	Indicator suitable for the industrial sector.
Manufacturing industry deflators	Annually	Certain countries	-
Wholesale Price Index (WPI)	Monthly	Few countries	Not suitable for most developing countries because of the predominance of primary materials.
Export unit value index	Annually	Certain countries	-
Average wage rate	Annually	Certain countries	Useful when available but may be biased by variations in productivity.
Unit labor cost	Annually	Very few countries	Useful when available

Source: Maciejewski (1983), Real effective exchange indices: A re-examination of the major conceptual and methodological issues. Staff papers, Vol. 30. No 3. IMF, September. 491-541

$part\_imp_j^i$: The share of country j in Morocco's imports from the sample countries

$part\_exp_j^i$: Share of country j in Morocco's exports to the sample countries.

$$üüüü = \frac{\sum_{k \neq ij}(part\_\exp_k^{morocco})(part\_market_j^k)}{\sum_{k \neq i}(part\_eüüü_k^{morocco} - part\ market_{morocco}^k}$$

Dconcj represents the competitive intensity at the level of exports between Morocco and country j on third markets.

$part\text{-}market_j^k$: Market share of country j in market k.

Example: calculation of the weight of Spain in the basket

- Spain's share in Moroccan imports from the sample is 19.4%.
- Spain's share in Moroccan exports to the sample is 23.1%.
- Degree of competition between exporters from Morocco and Spain, on third-party markets, is 2.4%.

Spain weight = 0.64* 19.4% + ½* (0.36* (23.1% + 4.7%)) = 17.4%

Several price indices have been used for calculating the real exchange rate of the dirham such as: Wholesale price, consumer price, GDP deflator, unit labor cost, etc. The use of these indices has been restricted by several limitations (mentioned previously), only the consumer price index, published by the IMF (IMF database, International Financial Statistics, consumer price index), is retained due to its availability on a monthly basis for all the countries in the sample. The IMF also uses the latter index to establish the real effective exchange rates of the currencies of most of its member countries[7].

4.3. Analysis of Evolution of Real Effective Exchange rate of the Dirham during the Period 1980-2020

Calculation of real parity of the dirham during the period 1980-2020 reveals three main phases: A strong depreciation between 1980 and 1990; an appreciation during the period 1991-2000; and a resumption of a weaker depreciation than that of the first phase, for the last period (2001-2020) (Figure 1). These trends are related to both changes in nominal effective exchange rate and in relative prices.

Results obtained in the present paper are generally close to those calculated by the IMF for Morocco and are strongly correlated and

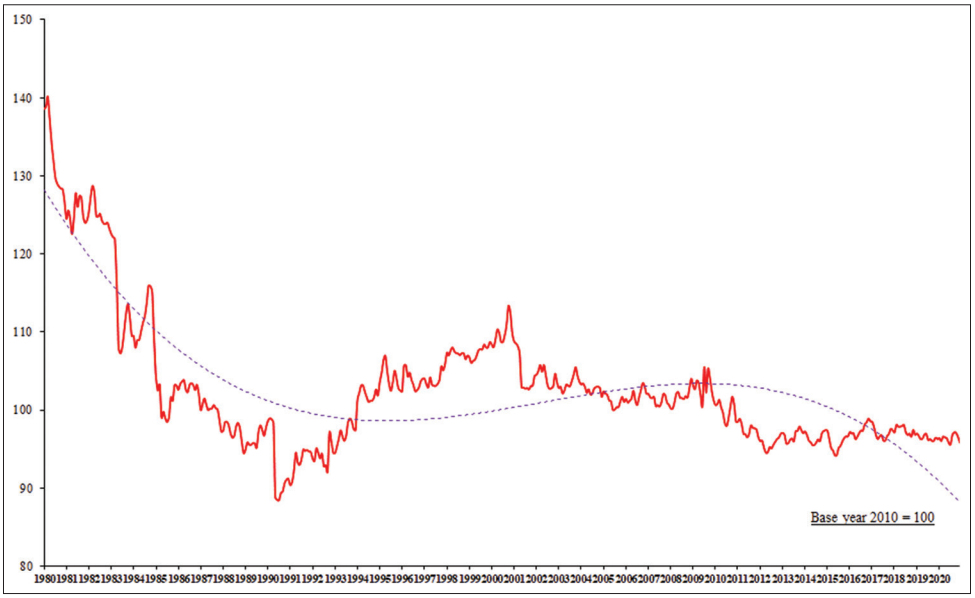
7 The limits are mainly due either to a lack of data, (unit labor cost, etc.), or to a periodicity established on a basis other than monthly (GDP deflator, or the use of different baskets or weightings to establish a price index (wholesale price index, consumer price index, etc.).

Table 2: Weight attributed to each country in the sample (in %)

Country	Weight	Country	Weight	Country	Weight
France	21.7	United Kingdom	4.0	Tunisia	0.9
Spain	17.4	India	2.5	Austria	0.7
Germany	9.3	Portugal	1.7	Greece	0.6
China	9.0	Switzerland	1.6	Irlande	0.6
Italy	7.7	Japan	1.5	Indonesia	0.5
United States	7.5	Sweden	1.5	Finland	0.4
Netherlands	4.4	South Korea	1.3	Malaysia	0.4
Belgium	4.3	Canada	0.9		

Source: Author's calculations

Figure 1: Evolution of the real effective exchange rate of the dirham (1980-2020)



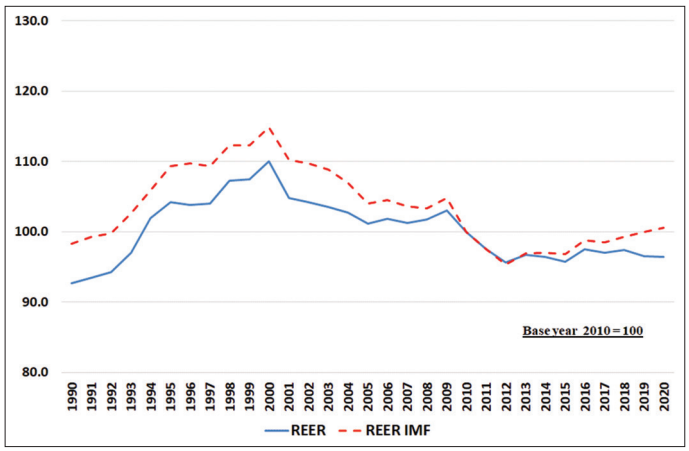
Source: Author's calculations

the trends remain the same (Figure 2). The differences between the two studies sometimes observed are generally due to difference in both composition of the samples of countries used to calculate the real parity of the dirham and in weightings assigned to each country[8].

It should be noted in this regard that the IMF establishes real effective exchange rate indices for more than 180 countries that it publishes on a monthly, quarterly, and annual basis in IMF database: International Financial Statistics, real effective exchange rate.

8 The sample of countries used by the IMF to calculate the real exchange rate of the currencies of the various member countries, including the dirham, and the related weights are not published by this Institution.

Figure 2: Calculation results of evolution of real effective exchange rate of the dirham compared to that calculated by the IMF (1980-2020) (*)



Source: Author's calculations and IMF database: International Financial Statistics. Real effective exchange rate. https://data.imf.org. (*) Data relating to the real exchange rate of the dirham calculated by the IMF are available only from 1988.

4.3.1. Strong real depreciation of the dirham during the period 1980-1989

The real parity of the dirham depreciated by 3.5% on an annual average compared to the sample of the selected countries during this period. This result is mainly linked to a depreciation of the nominal effective exchange rate of 4.1% on annual average which was however attenuated by an unfavorable inflationary differential for Morocco of 0.6%.

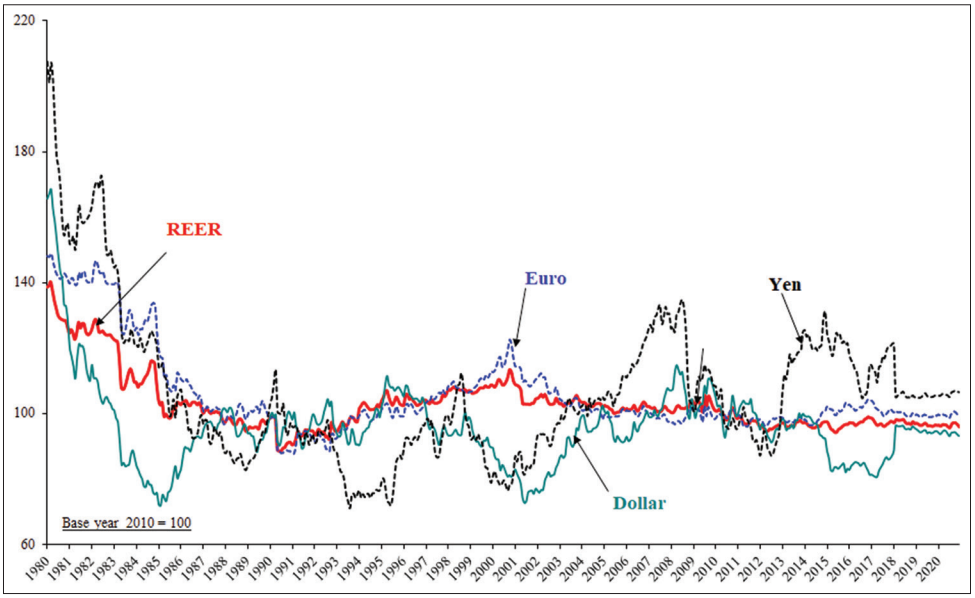
The analysis of the real depreciation of the dirham against the main international currencies shows that it depreciated against the euro by (3.8%)[9], the dollar by (5.2%) and the Japanese yen by (7.3%) (Figure 3). This development is due to inflationary differentials in Morocco compared to its main trading partners and above all a strong nominal depreciation of the dirham against other currencies, in particular following the successive devaluations of the dirham between 1980-1982, and 1983-1985, which marked a new phase of exchange rate policy in Morocco to cope with an overvaluation that arose after the adoption of regime of the dirham's quotation basket in 1973 (Hamdouch, 1988)[10] (Figure 4).

In fact, the Moroccan political exchange rate entered a new cycle characterized by a shift in the value of the dirham, the adjustments have occurred mainly to offset the inflation differential between Morocco and key partners and correct the overvaluation in real terms dirham recorded in the late 70 s (Bouzahzah and Bachar, 2013). Most of the nominal depreciation of the dirham took place during the period 1980-1985. Morocco has made a series of corrections to its exchange rate values as part of the effective application of the structural adjustment programs. A devaluation of 10% for the dirham was

9 It is a fictitious euro established by the European Central Bank.

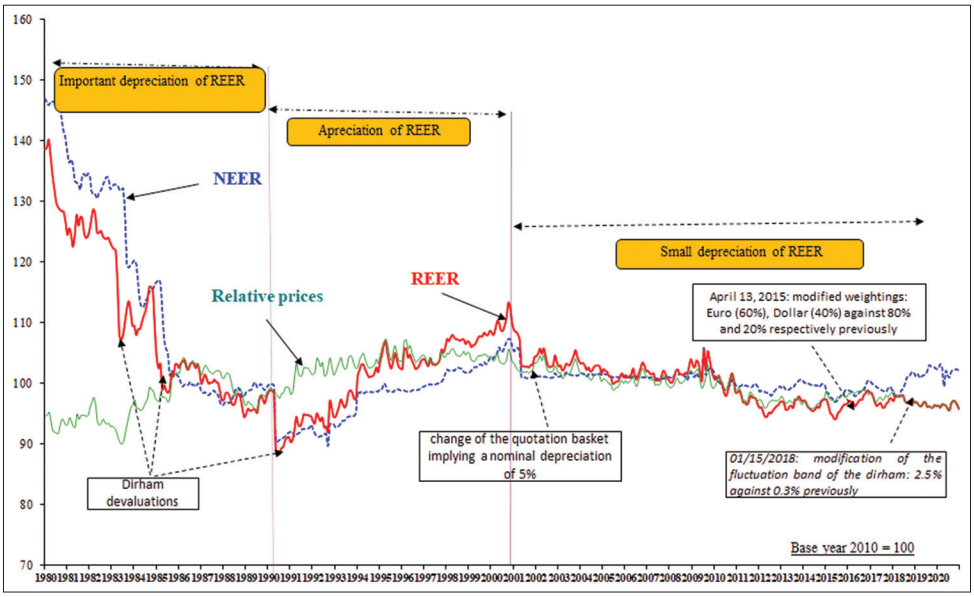
10 Between September 1980 and March 1986, the dirham depreciated 143% against the US dollar, 86% / German mark and 40% / French franc.

Figure 3: Evolution of the real exchange rate of the dirham against the currencies of sample countries (1980-2020)



Source: Author's calculations

Figure 4: Evolution of NEER, REER and relative price indices (1980-2020)
NEER: Nominal effective exchange rate REER: Real effective exchange rate



Source: Author's calculations

undertaken in August 1983 followed by another one in 1984 by 7% between February and April in that year. Further, in 1985, a devaluation of 13% was applied between March and July. Taking into account two earlier devaluations in 1980 by 15%, depreciation between mid-September 1980 and end of March 1982, the dirham has lost 53% of its value in 1985 (Belghazi, 1991). The devaluations adopted by Morocco is in fact part of a global approach aimed at reducing short-term imbalances and restructuring the Moroccan economy as a whole in the medium and long terms (El Bouhadi et al., 2008).

In all, after an overvaluation between 1970 and 1980, the dirham recorded a continuous undervaluation during the decade 1980-90[11]. The remarkable reversal of the real effective exchange rate trends is due to a change both in the nature of the currencies making up the basket and in their quotation rate, resulting in an implicit shift in the dirham (Bouoiyour et al., 2002). The various devaluations of the dirham which have taken place as part of the structural adjustment programs to promote export performance and reduce import surge have also contributed decisively to this undervaluation (Sagou and Mourji, 1988).

4.3.2. Assessment of real parity during the period (1990-2000)

This period was first marked by a change both in the combination of currencies making up Bank Al-Maghrib's basket and in the quotation rates, resulting in a devaluation of the dirham of 9.25% in May 1990. This measure has allowed following the slowdown in economic growth and the current account deficit linked to a deterioration in terms of trade (Achy and Milgram, 2003). In other terms, due to the deterioration of terms of trade during the period 1987-1989 that caused a worsening of the trade deficit, the Moroccan authorities decided this devaluation to further support the competitiveness of the export sector and improve the profile of the balance of payments (Bouzahzah and Bachar, 2013). However, despite this action, the real effective exchange rate index showed an average annual appreciation of 1.7%. This development is due both to a nominal average annual appreciation of the dirham by 1.2% and to price differentials of 0.5%.

Morocco recorded an average nominal annual appreciation of the dirham of 1.1% in the first real appreciation period (1990-1995) and an unfavorable inflationary gap of 1.3% compared with the main trading partners. However, Morocco managed to control its inflation rate during the second half of the decade (1996-2000), which made it possible to attenuate the level of appreciation of the real parity of the dirham at the end of this period.

The real exchange rate of the dirham appreciated annually by an average rate of by 2.3% against the euro during the period 1990-2000, given the effect of a nominal appreciation of 1% and an unfavorable inflationary differential of 1.3% (Figure 3). However, it depreciated against the dollar by 1.4%, mainly due to a nominal depreciation of 2.5%.

The dirham has also appreciated in real terms against certain emerging countries' currencies, mainly due to the sharp depreciation in exchange rates experienced by some countries during this period. This is particularly the case with Asian countries that devalued their currencies following the Asian financial crisis of 1997-1998.

4.3.3. Resumption of real depreciation of the dirham during the period (2001-2020)

On April 25th, 2001, Morocco reorganized the basket of currency quotation of the dirham, which led to a nominal depreciation of

11 "During the 1980s, following the structural adjustment program of 1983, the exchange rate policy had the effect of generating a slow movement of real depreciation.

5% ((Bouoiyour et al., 2002)[12]. This measure, which the authorities achieved by increasing the weight of the Euro in the basket, aimed at boosting export earnings, tourism revenues, transfers of Moroccans living abroad, and foreign direct investments. It aimed also to avoid any loss of competitiveness-price and offset the inflation differential between Morocco and its partners (Bouzahzah and Bachar, 2013). On April 15th, 2015, the weightings of the currencies making up the dirham's quotation basket were modified (raised from 20% to 40% for the US dollar and decreased from 80% to 60% for the Euro) to better reflect the changes in structure of foreign trade (Ait Ali, 2018).

Morocco launched on January 15th, 2018, a new exchange rate regime. This regime represents voluntary and gradual transition from a fixed exchange rate regime to a more flexible one (Bank Al-Maghrib, 2022a). It will, according to the Ministry of Economy and Finance, "determine the parity of the dirham within a fluctuation band of ±2.5%, against ±0.3%, compared to a central rate set by the Bank Al-Maghrib based on a basket of currencies made up of the euro and the dollar at 60% and 40% ratios respectively. The objective of this flexibility in the exchange rate regime is to strengthen the resilience of the national economy to exogenous shocks, to support its competitiveness and to improve its level of growth" (Moroccan Ministry of the Economy and Finance, 2018). On March 9, 2020, the monetary authorities decided to continue the exchange regime reform process by proceeding with a second widening of the dirham's fluctuation band from ±2.5% to ±5% either side (Bank Al-Maghrib, 2022b).

Regarding the evolution of the real parity of the dirham for the period (2001-2020), we observe an average annual depreciation, mostly between 2001 and 2012, of about 0.4% under the effect of a nominal depreciation (0.1%) and a deflationary gap in favor of Morocco of (0.3%) due to lower inflation rate than the competitors and the trading partners (Zuzana et al., 2013).

The appreciation of the dirham in real effective terms has been reversed since 2001. The 5% nominal devaluation of the dirham in April 2001 partly reversed the real appreciation experienced between 1990 and 2000. Since the devaluation, the dirham continued to depreciate in real effective terms reflecting partly the low inflation in Morocco relative to its trading partners and partly the appreciation of the euro with respect to the dollar (IMF, 2005).

More specifically, the real effective exchange rate of the dirham experienced the following changes:

- A depreciation of 0.6% against the euro mainly due to a nominal depreciation resulting, on the one hand, from the appreciation of the euro and, on the other hand, from the strengthening of the weight of the single currency in the dirham quotation basket following the reorganization of the currency basket.
- An appreciation against the dollar and the Japanese yen of 1.1% and 1.2% respectively due to an overvaluation in nominal terms of the dirham in connection with the depreciation the greenback and the Japanese currency, despite an inflationary gap in favor of Morocco.

5. CONCLUSION

The analysis of the evolution of the real parity of the dirham revealed different trends during the period 1980-2020. First a strong depreciation during the decade 1980-1989, linked mainly to the various sliding and devaluation operations carried out during the first 5-year term. Subsequently, the dirham appreciated particularly during the first half of the 1990 s, due to higher inflation compared to its trading partners, particularly in the eurozone, and a nominal appreciation of the dirham which is explained, on the one hand, by the weakness of European currencies vis-à-vis the dollar which led, through the mechanism of quotation of the dirham, an appreciation of the local currency against the euro and, on the other hand, by devaluations made by certain emerging countries, especially in Asia, during the financial crises of the 1990 s. From 2001, the real exchange rate depreciated in line with the control of the inflation rate and the nominal depreciation of the dirham vis-à-vis various currencies of trading partners and competing countries, particularly following the various readjustments of the dirham quotation basket.

The calculation of the real effective exchange rate of the dirham was based on a sample of countries that have significant trade relations with Morocco or which would compete with its exports in usual third markets. The weights for each country of the sample were established by combining both bilateral import weights and double export weights. However, it should be noted that these weighting deserves to be nuanced.

Indeed, it considers the overall imports and exports of each country, which makes it likely that a country could be considered as a competitor in third markets when in fact the structure of its exports to these third markets differs from that of Morocco. Despite this limitation, this method is widely used since it is difficult to have homogeneous products comparable from one country to another.

Analyzing the evolution of the real parity of Morocco, the paper has certainly observed the depreciation of the dirham during in certain periods and the appreciation during others. The question that then arises is whether such an appreciation is a negative sign that has penalized the competitiveness of the Moroccan economy, as the CGEM and AMITH claims, or it is only a logical consequence following changes in the fundamentals of the economy?

Establishing the real exchange rate is, evidently, necessary but remains insufficient to determine whether the value of a currency is appropriate or not and therefore whether it affects, positively or negatively, the competitiveness and economic growth of a country. Indeed, knowing that movements in the real effective exchange rate only give an indication of the evolution of price competitiveness, an appreciation in real terms of a currency is often interpreted as a loss of economic competitiveness, attributed to the nominal anchor of the exchange rate (the misalignment approach) (FEMISE, 2000). On the contrary, the fundamentals approach does not consider appreciation synonymous to a loss of competitiveness if the movement of the real exchange rate is due to structural and fundamental changes in the

12 The monetary authorities have in fact changed the weighting of the various currencies of the basket by allocating greater importance to the euro to the detriment of the dollar to better reflect Morocco's anchoring in the eurozone.

economy. Competitiveness can only be affected if the observed real exchange rate deviates significantly from the equilibrium one, i.e., the exchange rate which corresponds to the economic fundamentals.

Based on these considerations, it is important to determine the real equilibrium exchange rate of the dirham and to compare it with that observed to be able to judge whether the appreciation of the currency reflects the evolution of economic fundamentals and, therefore, does not negatively affect the country's external competitiveness.

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