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Capital Account Liberalization and Exchange Rate Flexibility: Scenarios for the Moroccan Case

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Abstract

This paper explores the links between gradual capital account liberalization and the exchange rate regime in Morocco where the process of economic and financial openness is relatively advanced. Using a game theory model with two economic agents, that are monetary authorities and domestic firms, we explore the best choice concerning the exchange rate regime for Morocco in a context characterised by increasing openness especially of capital account. The results show that welfare under a flexible exchange rate regime is higher compared to welfare under a fixed exchange rate regime. The analysis also shows that the flexible exchange rate will improve competitiveness. However, flexibility will undermine price stability.

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Keywords Capital account liberalization; exchange rate regime; competitiveness; inflation; Morocco

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1. Introduction

The end of the Bretton Woods system in the 1970s was followed by the emergence of financial globalization as a new stage in the evolution of the international monetary system. It resulted since the early 1990s, to a stronger integration of emerging countries in international financial markets (Jégourel et Téfletche, 2001, pp. 399-400). The integration process is reinforced by the commitment of these emerging countries to adopt market economy and to open their economy to international capital flows. Consequently, the emerging economies adopted structural economic reforms¹ with a gradual opening of their economies including the opening of their capital account.

The objective is to open their economies to global economy so as to spur economic growth (Abbate, 2002, p. 17). For emerging countries, capital account liberalization have many advantages such as acceleration of economic convergence by providing access to foreign savings, increasing the resilience of the economy to exogenous shocks by facilitating economic diversification, improving the efficiency of the banking system by increasing competition, etc. (Mongrué and Robert, 2005, p. 3).

Like most emerging and developing countries, and to take advantage of its integration into the global economy, Morocco has followed an economic openness policy through a gradual and accompanied process of openness. The goal of this gradual strategy is to avoid macroeconomic imbalances associated with trade and financial openness and to ensure economic competitiveness. Morocco's efforts in capital account liberalization are reflected mainly by the liberalization of foreign investment, external financial resources of domestic firms, foreign currency investments abroad, granting MAD loans to non-residents, etc. These efforts are likely to accelerate the economic opening and to strengthen the interaction with global economy in terms of financial inflows and outflows. This leads us to question the fixity of exchange rate in Morocco and the opportunity for Moroccan monetary authorities to adopt a flexible exchange rate regime in the current context of gradual opening of capital account.

In this paper, we use a game theory model to explore the consequence of capital account liberalization on the choice of an exchange rate regime in Morocco. Thus, the question that we seek to answer is: how full capital account openness, in a gradual opening context, affects the choices of monetary authorities in terms of exchange rate regime? In other words, is the choice of the flexible exchange rate, in the current context of transition to an open capital account an optimal choice? The aim of this paper is to explore the exchange rate flexibility question for the Moroccan case as a small open developing economy, where the process of economic and financial openness is relatively advanced. We draw heavily on the papers of Agenor (1994), Ben Ali (2006) and Zhang (2001) to devise the model that will be used to evaluate the loss-functions of monetary authorities and domestic firms that control the price level of non-tradable goods.

We present in the second section a review of the literature about this issue. In the third section, we discuss the current situation and the constraints that push the Moroccan monetary

¹ Especially after the adoption in the 1980s of the Structural Adjustment Programs (SAPs).

authorities to migrate toward a flexible exchange rate regime. The fourth section is dedicated to the presentation of the model and its justifications. The fifth section presents the basis of simulation, the results and their discussion. The last section is reserved to the presentation of some concluding remarks.

2. Capital flows and the risk of real exchange rate appreciation

Before the emergence of the monetary-approach, trade inflows and outflows were the primary determinants of exchange rate. Thus, the trade surpluses and deficits explains exchange rate appreciation and depreciation. However, the intensification of capital inflows and outflows in the 1970s began to influence real exchange rate fluctuations. In several emerging countries, the real appreciation is associated with increases in capital inflows and the real depreciation is associated with declines in capital inflows (Edwards, 2000, p.221).

The stylized facts from emerging and developing countries (esppecially in Latin America and Asia) shows that the openness to international capital markets induces an increase in capital inflows. These inflows produced an appreciation of currencies. However, other factors may explain this appreciation; these include the declining value of the dollar, the dynamics of international capital markets and rising commodity prices (Jonglez, 2008, p. 1). The pressure on the exchange rate, resulting from capital inflows instability, may shorten business investment horizons and strengthen undesirable effects on inflation and public debt, and the possibility of *currency mismatches*² (De Conte and Valente, 2006, p. 2).

To address the currency's real appreciation risk under a fixed exchange rate, the monetary authorities may adjust the nominal exchange rate. In several developing countries, to reduce the risk associated with openness; namely the volatility of capital inflows and the costs associated with different types of sterilization, the monetary authorities have adopted a more flexible exchange rate regime (Lopez-Mejia, 1999, pp. 33-46). The flexible exchange rate regime seems necessary for developing countries in the context of high capital inflows to avoid the situation of high exchange rate appreciation.

Exchange rate regimes have been widely discussed. Many authors such as: Friedman (1953), Williamson (1993), Ghosh and al. (1997), Levy-Yeyati and Struzenegger (1999), Reinhart and Rogoff (2002), Frankel (2003), Calvo and Mishkin (2003), Combes and al. (2011) and many others have extensively debated the subject. The economic literature about this subject may be classified into three strands. The first class discusses the choice of exchange rate regimes in industrialized or developed countries (e.g. monetary union, Free floating, etc.). The second class

The works of the third category are for us of particular importance. It is a choice that affects economic policy in emerging or developing countries in a context of gradual financial integration and high capital flows' volatility. Empirical studies are primarily concerned with the experience of two areas in terms of openness and the implications for exchange rate regimes: Asian countries experience (Malaysia, Philippines, Indonesia, Thailand, etc.), as well as Latin America countries' experience (Chile, Brazil, Argentina, etc.).

In Latin America, Chile's example may be important for the Moroccan case. Chile has followed a sequential process of liberalization, starting with current account liberalization and then capital account liberalization. This strategy has led to massive capital inflows which have increased tenfold the amount of foreign exchange reserves (from 1977 to 1981: 7% of GDP). To fight inflation (inflationary pressures) generated by capital inflows, the monetary authorities announced in advance the devaluation of the exchange rate. The real effective exchange rate has remained fairly stable until 1979, and then begins to appreciate, which has produced a high exchange rate appreciation in Chile crisis of 1982 (Fischer and Reisen, 2001, pp. 50-52).

In the Asian context, the experience of capital account liberalization leads to several lessons. First, more open capital account, without taking into consideration the underdeveloped financial system and speculative capital inflows, may lead to a double crisis: currency crisis and debt crisis (Asian crisis of 1997). The second lesson is that the nature of the exchange rate regime must be taken into account in assessing the opportunities of capital account liberalization (Mongrué and Robert, 2005, p.10).

A series of papers treated, since the late 1990s, in the context of the southern Mediterranean and MENA countries, the links between capital account liberalization and exchange rate regime. This becomes a major issue especially after the accession of most of these countries to the GATT and WTO, the conclusion of association agreements with the European Union, and the proliferation of free trade agreements. In his study, Mouley (2012) concludes that the sequential opening and scheduling framework of macroeconomic management policies requires transition to a more flexible exchange rate regime.

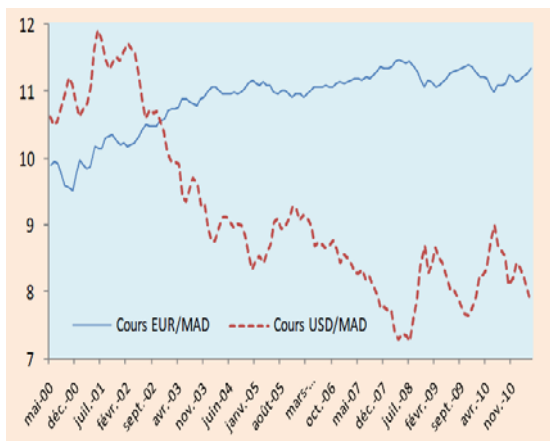
The Tunisian experience is a reference example for the Moroccan capital account liberalization. As part of its openness strategy, Tunisia confronts the risk of conducting a real exchange rate targeting. Ben Ali (2006) shows, through a simulation analysis using a game theory model, that the option for exchange rate flexibility would be an optimal choice for the Tunisian case. Thus, the prospect of full capital account liberalization is compatible with a flexible exchange rate regime. The exchange flexibility will help to ensure competitiveness and reduce inflationary effects associated with openness.

3. Morocco's opportunity to migrate toward a flexible exchange rate regime

For Bank Al-Maghrib, the Morocco's central Bank, « *le choix pour le Maroc s'est porté sur un régime de change intermédiaire de parité fixe avec un rattachement de la monnaie nationale, dans des marges de fluctuations inférieures à +/- 0.6% de part et d'autre du taux central, à un panier de monnaie* »³. Thus, Moroccan exchange rate regime is described by the IMF as a conventional fixed exchange regime that links the local currency at a fixed rate to a basket of currencies of major trading or financial partners. The weight of each currency depends on the importance of trade or capital flows with those partners. For Morocco, the basket of currencies consists of the EUR and the USD with weights of 80% and 20% respectively. The objective of the Moroccan monetary authorities is to ensure the stability of the MAD in terms of nominal effective exchange rate and reduce the fluctuation effect of international currencies.

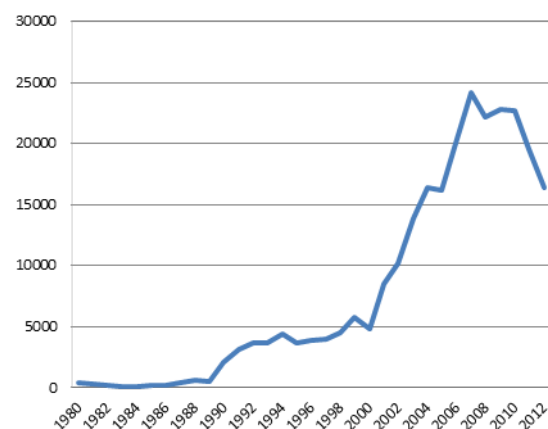
The Moroccan Dirham, partially convertible since 1993 - date of accession to Article 8 of the IMF statute - is freely determined in the interbank foreign exchange market. The BAM operates daily to maintain the exchange rate within fluctuation margins (Mouley, 2012, pp.12-13). The evolution of the MAD nominal exchange rate (Figure 1) shows some stability compared to EUR (weight of 80% in the basket), while its evolution against the USD (weight of 20% in the basket rating) has a downward trend. This Exchange rate policy allowed monetary authorities to accumulate high levels of foreign exchange reserves (Figure 2).

Figure 1: EUR/MAD and USD/MAD Evolution



Source: Mouley, (2012), p. 13.

Figure 2: Morocco's foreign exchange reserves(in Million of USD)



Source: UNCTAD, calculations: Authors

The opening of the capital account may produce a risk concerning the maintaining of the exchange rate at an incompatible level with economic performances. The link between full capital account liberalization and flexibility should be taken into consideration for a successful transition. The shift to a more flexible exchange rate regime is conditioned by strengthening analytical capacities of the central bank and understanding the monetary policy transmission mechanism. The objective is to adapt the economy to shocks and moderate any

³ Bank Al-Maghrib www.bkam.ma official web site (2013)

economic volatility, this may help Morocco to support external competitiveness and boost economic growth (Mouley, 2012, pp. 12-13).

In 2011, the IMF confirmed that the Moroccan monetary authorities have the resources to move to a more flexible exchange rate regime. That is they have independence, expertise, statistical resources, and comfortable foreign exchange reserves. However, the desire to ensure the sustainability of public finances and maintain financial stability necessitates the adaptation of the operational framework for active intervention on the foreign exchange market (IMF, 2011, pp. 10-11). As part of its consultation in 2012, the IMF encourages Moroccan monetary authorities “to move toward greater exchange rate flexibility to enhance external competitiveness and the economy’s ability to absorb shocks, in coordination with other macroeconomic and structural policies” (IMF, 2012, p. 2).

To explore the opportunity for Morocco to transit to a flexible exchange rate regime in a context of a gradual capital account opening in Morocco, we use an analytical framework integrating economic openness (included capital account liberalization) and various parameters related to the exchange rate. The model aims to know if exchange rate flexibility choice, in the current context of gradual openness of capital account, is an optimal choice for the Moroccan case.

4. The model

The adoption of flexible exchange rate in Morocco, in a current context of gradual capital account liberalization, raises the question of the benefits that can provide a more flexible exchange rate regime compared to the current pegged exchange rate regime. The fixity-flexibility choice represents a real dilemma for monetary authorities; they have to make a trade-off between price stability and competitiveness. Thus, the fixity-flexibility arbitrage can be analysed in terms of benefits and risks (Table 1).

Table 1: Benefits and Risks of fixed and flexible exchange rate regimes

Choices	Benefits	Risks
Fixed exchange rate (No adjustment)	<ul style="list-style-type: none"> ▪ Stability of MAD; ▪ Confidence in local currency (discipline). 	<ul style="list-style-type: none"> ▪ Insufficiency of foreign exchange reserves; ▪ Real appreciation of exchange rate ;
Flexible exchange rate (Adjustment)	<ul style="list-style-type: none"> ▪ Absorption of shocks; ▪ No need for foreign exchange reserves. 	<ul style="list-style-type: none"> ▪ Volatility risks; ▪ Inflation risk (less constraints on monetary policy).

It turns out that the objective of price stability involves also domestic firms in this Fixity-Flexibility dilemma. Because the price of the non tradable goods is one of the means by which these firms react to changes in exchange rates. The idea is that an increase of nominal exchange rate, i.e. devaluation, by the monetary authorities pushes domestic firms to increase the prices of non-tradable goods⁴.

⁴ If the real exchange rate RER equal to $E \cdot \frac{P_T}{P_N}$, so $\Delta E = \left(\frac{RER}{P_T}\right) \cdot \Delta P_N$ where RER and P_T are stable in short-term

Among the techniques widely used in economics to model the behaviour of opposing agents in terms of benefits is game theory. It analyses situations where "players" make decisions and each player is conscious that his gain depends not only on his own decision, but also on the decision of the other player. Using a game theory model is justified by the fact that each player; i.e. monetary authorities or domestic firms, can take several decisions and affects each other level of satisfaction. The analysis of exchange rate regimes in a welfare fashion has been introduced by Aizenman (1994), Chin and Miller (1995), Devereux and Engel (2000), etc.

In mathematical terms, optimal choice implies the introduction of an objective-function to minimize if it is defined in terms of costs or losses (loss-function) or to maximize if it is defined in terms of benefits (gain-function). The model considered in this work is based on the framework proposed by Agénor (1991, 1994) for developing countries, and used by Ben Ali (2006) to explore the Tunisian case, and Zhang (2001) to explore the Chinese case. Our paper draws heavily on this literature. The model is suited to a small open economy producing tradable and non-tradable goods and where economic agents interact through an optimization game and each player tries to maximize his welfare.

The model can be presented as a sequential non-cooperative game where the second player observes the choice of the first player and takes decision in function of the first player's decision. Each player seeks to maximize his welfare using the instruments at his disposal. Before defining the objective-functions of "players", it would be necessary to define variables and parameters and to describe prices determination in this small economy.

The variables used at level are:

- P : General price level.
- P^* : Target level of general price level.
- P_T : Price of tradable goods.
- P_N : Price of non-tradable goods.
- E_n : Nominal exchange rate.
- E_r : Real exchange rate.
- E_r^* : Equilibrium real exchange rate.
- M : Domestic money supply.

Log-linearization and differenciation of this variables give:

- p : Inflation ($= \ln P - \ln P_{-1}$).
- p^* : Target level of inflation.
- p_T : Inflation of tradable goods ($= \ln P_T - \ln P_{T-1}$).
- p_N : Inflation of non-tradable goods. ($= \ln P_N - \ln P_{N-1}$).
- e_n : proportional rate of change of nominal exchange rate ($= \ln E_n - \ln E_{n-1}$).
- e_r : proportional rate of change of real exchange rate ($= \ln E_r - \ln E_{r-1}$).
- e_r^* : proportional rate of change of equilibrium real exchange rate ($= \ln E_r^* - \ln E_{r-1}^*$).

m : proportional rate of change of domestic money supply ($= \ln M - \ln M_{-1}$).

The structural parameters of the model are:

α : weight granted by monetary authorities to competitiveness.

β : weight granted by monetary authorities to inflation ($= 1 - \alpha$).

$1 - \mu$: openness degree with $0 < 1 - \mu < 1$

ρ : elasticity of prices of non-tradable goods relative to the misalignment of real exchange rate.

v : elasticity of prices of non-tradable goods relative to domestic money supply of real exchange rate.

4.1. General, tradable, and non-tradable goods prices determination

The general price level P is determined by a Cobb- Douglas function as follows:

$$P = (P_N)^\mu \times (E_n \times P_T)^{1-\mu} \quad (\text{Eq. 1})$$

This is explained by the fact that prices of tradable goods are determined internationally and prices of non-tradable goods are determined within the economy. In order to simplify the manipulation of the model, it is more convenient to work with all variables in proportional rate of growth (i.e. in difference). Thus, the general price level equation becomes:

$$p = \mu \cdot p_N + (1 - \mu) \cdot (p_T + e_n) \quad (\text{Eq. 2})$$

Prices of tradable goods are determined internationally, because Morocco as a small economy can not influence prices of tradable goods in international markets. For simplicity we assume that prices of tradable goods are fix, which means that their proportional rate of growth is $p_T = 0$. Thus, the first equation of the model is given by:

$$p = \mu \cdot p_N + (1 - \mu) \cdot e_n \quad (\text{Eq. 3})$$

The prices of non- tradable goods P_N are determined by two factors. The first is the deviation of the real exchange rate from its equilibrium level. Thus, a real depreciation increases the external competitiveness of the economy. As a consequence, we observe an increase of the tradable goods' demand (i.e. increase in exports). Therefore, domestic firms shift resources from non-tradable goods sector to the tradable goods sector. This resources transfer lowers the production of non-tradable goods (decrease of supply), which leads to an increase of their prices. A real exchange rate appreciation produces exactly the opposite effects. The deviation of the real exchange rate from its equilibrium level (misalignment) is measured by $\frac{E_r}{E_r^*}$ and the elasticity of prices of non-tradable goods relative to the misalignment

is denoted ρ . So the first factor is denoted by: $\left(\frac{E_r}{E_r^*}\right)^\rho$ with $\rho > 0$ and the real exchange rate E_r is given by: $E_r = E_n \frac{P_T}{P_N}$. We obtain the expression of the first factor determining P_N .

$$\left[\frac{E_n \frac{P_T}{P_N}}{E_r^*} \right]^p$$

The second factor affecting non-tradable goods price is domestic money supply denoted by \mathbf{M} and the elasticity of the prices of non-tradable goods relative to the money supply is \mathbf{v} . The second factor is denoted by: \mathbf{M}^v with $\mathbf{v} > \mathbf{0}$. Thus, the first and the second factors allow us to write the expression of the prices of non- tradable goods \mathbf{P}_N . The second equation of the model is given at proportional rate of changes:

$$\mathbf{p}_N = \rho \cdot [(\mathbf{e}_n - \mathbf{p}_N) - \mathbf{e}_r^*] + \mathbf{v} \cdot \mathbf{m} \quad (\text{Eq. 4})$$

After expressing the price's determination mechanisms in this small economy, it is time to define the objective-functions of the monetary authorities and of domestic firms.

4.2. Objective-functions of monetary authorities and of domestic firms

Monetary authorities are confronted to a trade-off between competitiveness and price stability. The objective-function of the monetary authorities in terms of this trade-off can be represented by a Cobb- Douglas function. The competitiveness is defined by the deviation of the real exchange rate from its equilibrium level (or target level \mathbf{E}_r^*) and the price stability is defined by the square of the deviation of inflation from its target level \mathbf{P}^* . The objective-function of monetary authorities is given in proportional rate of change as follows:

$$L^{MA} = -\alpha \cdot [(\mathbf{e}_n - \mathbf{p}_N) - \mathbf{e}_r^*] + \frac{1}{2} \beta \cdot [\mathbf{p} - \mathbf{p}^*]^2 \quad (\text{Eq. 5})$$

The welfare of domestic firms is defined in terms of relative prices of non-tradable goods. That means domestic firms react by changing \mathbf{P}_N . Indeed, domestic firms attempt to protect themselves by adjusting continuously the price of non-tradable goods to changes in the price of tradable goods. The objective-function of domestic firms is given in proportional rate of change as follows:

$$L^{DF} = \frac{1}{2} \cdot [\mathbf{p}_N - \rho \cdot [(\mathbf{e}_n - \mathbf{p}_N) - \mathbf{e}_r^*] - \mathbf{v} \cdot \mathbf{m}]^2 \quad (\text{Eq. 6})$$

4.3. Analysis of the behaviour of players in the case of exchange rate fixity

In a strict exchange rate fixity regim we will have $\mathbf{e}_n = \mathbf{0}$. Consequently $\mathbf{p} = \mu \cdot \mathbf{p}_N$ and $\mathbf{p}_N = \rho \cdot [(-\mathbf{p}_N) - \mathbf{e}_r^*] + \mathbf{v} \cdot \mathbf{m}$. The objective-functions of the two agents become:

$$L^{MA}_{fixe} = -\alpha \cdot [-\mathbf{p}_N - \mathbf{e}_r^*] + \frac{1}{2} \beta \cdot [\mathbf{p} - \mathbf{p}^*]^2 \quad (\text{Eq. 7})$$

$$L^{DF}_{fixe} = \frac{1}{2} \cdot [\mathbf{p}_N - \rho \cdot [-\mathbf{p}_N - \mathbf{e}_r^*] - \mathbf{v} \cdot \mathbf{m}]^2 \quad (\text{Eq. 8})$$

Minimizing L^{DF}_{fixe} with respect to the proportional rate of change of non-tradable goods prices p_N allows to determine the optimal rate by which domestic firms increase the non-tradable goods prices.

$$\hat{p}_N = \frac{v.m - \rho \cdot e_r^*}{1 + \rho} \quad (\text{Eq. 9})$$

Under exchange rate fixity we have $e_n = \mathbf{0}$, domestic firms raise prices by \hat{p}_N . This value is substituted in (Eq. 7). We obtain the expression of the objective-function of monetary authorities depending on model's parameters.

$$L^{MA}_{fixe} = -\alpha \cdot \left[\frac{\rho \cdot e_r^* - v.m}{1 + \rho} - e_r^* \right] + \frac{1}{2} \times \beta \cdot \left[\mu \cdot \frac{v.m - \rho \cdot e_r^*}{1 + \rho} - p^* \right]^2 \quad (\text{Eq. 10})$$

4.4. Analysis of the behaviour of players in the case of exchange rate flexibly

Under a flexible exchange rate regime E_n may change and thus e_n is different of 0. Then, the objective-function of the two agents will be as in the general form developed earlier. The proportional rate of increase of the general price index p is replaced by its value $\mu \cdot p_N + (1 - \mu) \cdot e_n$ in L^{MA} . Thus, under the exchange rate flexibility the objective-functions of the monetary authorities and of domestic firms are obtained as follows.

$$L^{MA}_{flexible} = -\alpha \cdot [e_n - p_N - e_r^*] + \frac{1}{2} \beta \cdot [\mu \cdot p_N + (1 - \mu) \cdot e_n - p^*]^2 \quad (\text{Eq. 11})$$

$$L^{DF}_{flexible} = \frac{1}{2} \cdot [p_N - \rho \cdot [e_n - p_N - e_r^*] - v.m]^2 \quad (\text{Eq. 12})$$

Minimizing the objective-function of monetary authorities with respect to the proportional rate of increase of the instrument, which is the exchange rate, yields the value of the rate of money devaluation.

$$\bar{e}_n = \frac{\alpha - \beta \mu p_N + \beta \mu^2 p_N + \beta p^* - \beta p^* \mu}{\beta - 2\beta \mu + \beta \mu^2} \quad (\text{Eq. 13})$$

Minimizing the objective-function of domestic firms with respect to the proportional rate of increase to their instrument, which is the non-tradable goods prices, yields the equilibrium proportional rate of change of non-tradable goods prices.

$$\bar{p}_N = \frac{\rho \cdot e_n + v.m - \rho \cdot e_r^*}{1 + \rho} \quad (\text{Eq. 14})$$

The value of \bar{p}_N is replaced in \bar{e}_n and the value of \bar{e}_n is replaced in \bar{p}_N , then the equilibrium values are obtained:

$$\hat{e}_n = \frac{\alpha + \alpha \rho + \beta \rho - \beta e_r^* \mu^2 - \beta v + \beta \mu^2 + \beta p^* + \beta p^* \rho - \beta \mu - \beta \mu \rho}{\beta(\mu \rho + 1 + \rho - 2\mu + \mu^2)} \quad (\text{Eq. 15})$$

$$\hat{p}_N = \frac{\alpha\rho + \beta p^* \rho - \beta p^* \mu \rho - \beta \rho e_r^* + 2\beta \mu \rho e_r^* - \beta \mu^2 \rho e_r^* + \beta \nu m - 2\beta \mu \nu m + \beta \mu^2 \nu m}{\beta(1-2\mu+\mu^2-\mu\rho+\rho)} \quad (\text{Eq. 16})$$

We replace the values of \hat{e}_n and \hat{p}_N in equation (Eq. 11), we obtain the objective-function of the monetary authorities under the exchange rate flexibility choice.

$$L_{flexible}^{MA} = -\alpha \cdot \left[\frac{\alpha + \beta \mu \nu m + \beta \sigma - \beta p^* \mu - \beta \nu m - \beta e_r^* + 2\beta \mu - \beta e_r^* \mu^2}{\beta(1-2\mu+\mu^2-\mu\rho+\rho)} \right] + \frac{1}{2} \beta \cdot \left[\frac{\alpha}{\beta(1-\mu)} \right]^2 \quad (\text{Eq. 17})$$

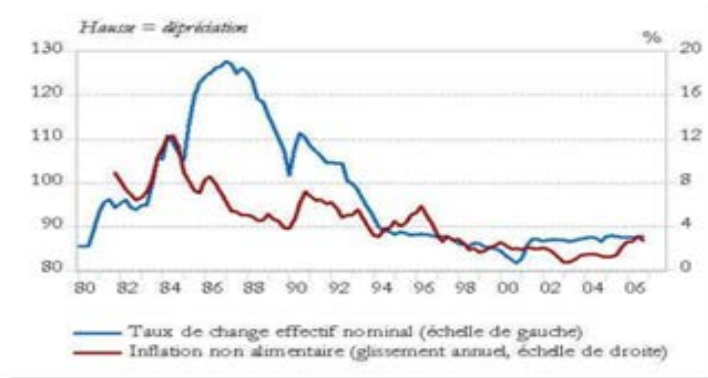
5. Simulations and discussion

In this section, we discuss the sources and justification of used values of the model's parameters then perform a simulation and finally discuss the results.

5.1. Values of the model's parameters and simulation

In inflation terms, it is clear, according to Article 6 of the Bank Al -Maghrib Statute that “the objective of monetary policy is to ensure price stability”. In competitiveness terms, Bank Al-Maghreb state that “the basket trading of MAD aims to ensure the stability in terms of nominal effective exchange rate and reduce the effect of international currencies fluctuations”.

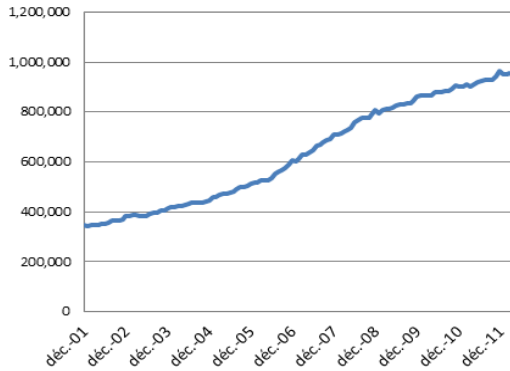
Figure 3: Nominal effective exchange rate and inflation.



Source: El Aynaoui, K. (2007)

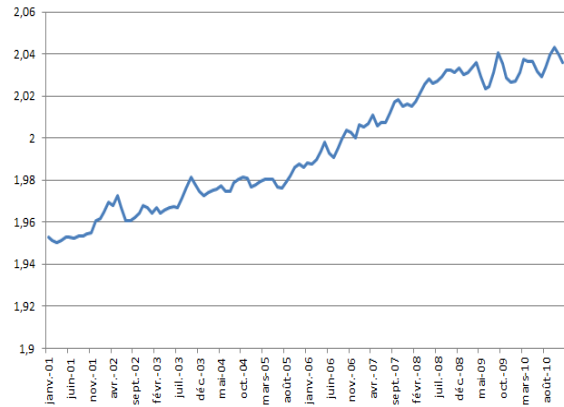
The objective of stabilizing prices and nominal exchange rate leads us to conclude that the Moroccan monetary authorities give more weight to price stability than external competitiveness, so the value of α is less than 0,5. We assume that $\alpha = 0,3$ and $\beta = 1 - \alpha = 0,7$. For domestic money supply we use the average annual growth rate of money supply (M3) during the period 2001-2011 which is $m = 13,71\%$.

Figure 4: Money supply (M3) evolution



Source : BAM

Figure 5: Monthly evolution of inflation.



Source : HCP

For the target level (or equilibrium level) of the real exchange rate E_r^* , we use the average annual growth of REERE for the proportional rate of change of the target level of the real exchange rate $e_r^* = 1,11\%$. For the general level of prices P^* ; we suggest that the target level of inflation is fixed at $p^* = 2\%$ because of the objective of price stability assigned to BAM.(See Figure 5).

The elasticities of the prices of non-tradable goods relative to the misalignment ρ and to domestic money supply v are difficult to estimate. We retain the estimated values for the Tunisian case that shows some similarities with respect to the Moroccan case, thus we assume that $\rho = 0,4$ and $v = 0,6$. The degree of economic openness $(1 - \mu)$ is varying from $0,30$ to $0,9$. Thus, we simulate the model based on the approximate values and we calculate the values of the objective-functions of the monetary authorities under the two choices.

5.2. Results and discussion

Changes of $1 - \mu$ from value 0 (strict closed economy) to value 1 (totally opened economy) means the transition of the economy from a state to another. In the Moroccan case, we assume that the minimum value of $1 - \mu$ cannot be less than 30% and the maximum value cannot exceed 90%. The following table shows the loss-function values of the monetary authorities based on different openness values.

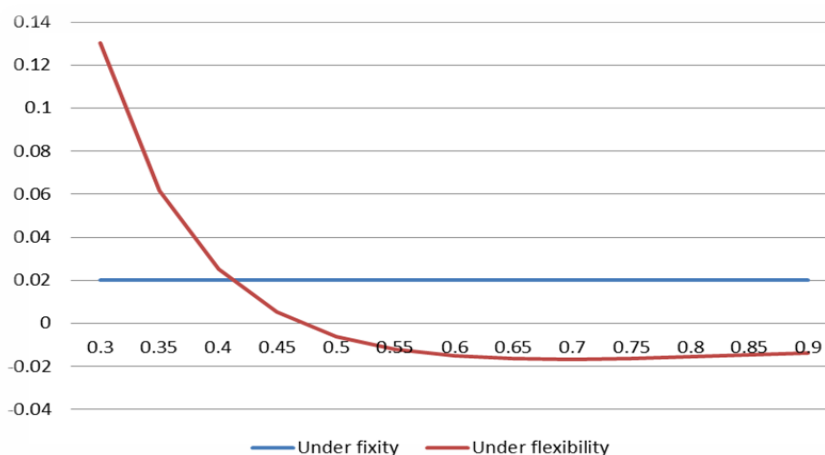
Table 2: Objective-functions values with varying openness' degree

(1) (1- μ)	(2) L^{MA}_{fixe}	(3) $L^{MA}_{flexible}$	(4) Competitiveness (Under Fixity)	(5) Competitiveness (Under Flexibility)	(6) Inflation (Under Fixity)	(7) Inflation (Under Flexibility)
0,3	0,02013087	0,13015082	0,02000571	-0,5841349	0,00012516	0,71428571
0,35	0,02009678	0,06144342	0,02000571	-0,46333792	9,107E-05	0,52478134
0,4	0,02006811	0,0250125	0,02000571	-0,37677321	6,2391E-05	0,40178571
0,45	0,02004483	0,00506292	0,02000571	-0,31239739	3,912E-05	0,31746032
0,5	0,02002697	-0,0059681	0,02000571	-0,26311095	2,1255E-05	0,25714286

0,55	0,02001451	-0,01196601	0,02000571	-0,22448077	8,7976E-06	0,21251476
0,6	0,02000746	-0,01503829	0,02000571	-0,19360971	1,7472E-06	0,17857143
0,65	0,02000582	-0,01637751	0,02000571	-0,16853305	1,0396E-07	0,15215554
0,7	0,02000958	-0,01668146	0,02000571	-0,14787679	3,8678E-06	0,13119534
0,75	0,02001875	-0,01636913	0,02000571	-0,13065484	1,3039E-05	0,11428571
0,8	0,02003333	-0,01569714	0,02000571	-0,11614357	2,7617E-05	0,10044643
0,85	0,02005332	-0,01482484	0,02000571	-0,1038016	4,7602E-05	0,08897677
0,9	0,02007871	-0,01385195	0,02000571	-0,09321703	7,2994E-05	0,07936508

For openness degree superior to 40% (column 1, Table 2), the objective-function values of the monetary authorities under flexibility choice (column 3, Table 2) remain below the objective-function values under fixity choice (column 2, Table 2).

Figure 6: Objective-fuction of monetary authorities under fixity and flexibility.



For openness degree equal to 80%, the objective-function value - 0,01569714 of the monetary authorities under flexibility choice $L^{MA}_{flexible}$ is less than the objective-function value 0,02003333 of the monetary authorities under fixity choice L^{MA}_{fixe} . This indicates that the loss occurred under the exchange rate flexibility choice is less than the loss occurred under the exchange rate fixity choice. Consequently, flexibility would be an optimal choice for monetary authorities. In competitiveness and inflation terms, column (3), (4), (5) and (6) of table 2 shows the loss values in terms of competitiveness and inflation under fixity and flexibility choices (See Figure 7 and Figure 8).

Figure 7: Competitiveness loss under fixity and flexibility

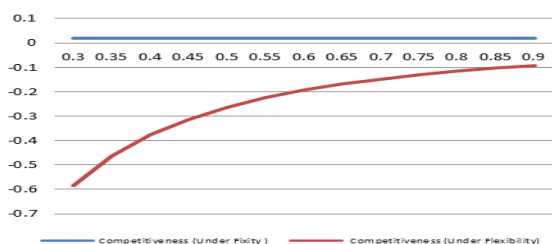
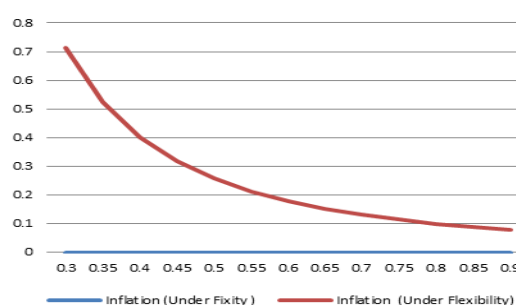


Figure 8: Inflation-loss under fixity and flexibility



In competitiveness terms, the loss values of competitiveness under flexibility choice are lower than the loss values of competitiveness under fixity choice. The competitiveness-loss under fixity choice does not vary in function of openness degree, while the competitiveness-loss under flexibility choice increases considerably in function of openness degree. In inflation terms, the loss values of inflation under flexibility choice are lower than the loss values under fixity choice. The inflation-loss under fixity choice increases in function of the openness degree, while the inflation-loss under flexibility choice decreases in function of openness degree.

6. Concluding remarks

In this paper we want to appreciate the welfare effect of the choice of the exchange rate regime in the case of Morocco. We used a simple game theory model with two agents that are the monetary authorities and domestic firms. We have introduced the mechanisms of prices determination and objective-functions of monetary authorities and of domestic firms. To simulate the model, the parameters are approximated using stylized facts. The main result is that, the loss-function values of monetary authorities under flexible exchange rate regime remain below the values under the fixed exchange rate regime for a degree of openness above 40%.

We conclude that the flexibility choice is an optimal choice in a context of gradual opening of the economy when the degree of openness exceed 40%. The flexibility of the exchange rate will allow Moroccan monetary authorities to improve the external economic competitiveness. However, in terms of the general price level, the flexibility of the exchange rate will undermine price stability. The most important remark that we can retain is that the gradual flexibilization of exchange rate regime is necessary for the gradual openness of capital account. In other words, Moroccan strategy of capital account liberalization should be taken into consideration in the exchange rate flexibility choice.

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