A Common Monetary Policy For The Maghreb: The Winners and The Losers?

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Abstract:

During the Arab banks-summit in Paris last June 2008, the project of monetary integration in the Maghreb (Algeria, Libya, Morocco, Mauritania and Tunisia) was discussed again. Yet, many efforts have been undertaken to reinforce the completion of the regional integration process in this part of the world. These were initiated in 1989 by the creation of the Arab Maghreb Union (AMU) and expanded last years to cover the possibility of establishing the Maghreb monetary union.
Our aim in this paper consists in assessing the relevance of such a project for three Maghreb countries: Algeria, Morocco and Tunisia.
To do that, we try to simulate an aggregated monetary rule describing a common monetary policy in an open economy. This rule is constructed and compared to national monetary rules already simulated in many other works. Such a construction and comparison allow us to verify if a common monetary policy will be beneficial to all countries or, if on the contrary, it will be beneficial to one country rather than the others.
Our results suggest that a common monetary policy will be more beneficial to Algeria than to Morocco or Tunisia. In fact, the common central bank has to grant more weight to activity rather than inflation or exchange rate, a result which often coincides with the national Algerian rule.

Keywords: Common monetary policy, exchange rate, optimization, Taylor rule, Maghreb

JEL Classification: E37, E40, E47, E50, F31, F37

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I- Introduction:

During the Arab banks'-summit in Paris last June 2008, the project of monetary integration in the Maghreb (Algeria, Libya, Morocco, Mauritania and Tunisia) came up again. Yet, many efforts have been undertaken to reinforce the completion of the regional integration process in this part of the world. These were initiated in 1989 by the creation of the Arab Maghreb Union (AMU) and expanded last years to cover the possibility of establishing the Maghreb monetary union.

Indeed, since 2002, the creation of a single currency and a common central bank for the Maghreb has always been the main concern of the union of Maghreb banks. Moreover, nowadays, the general secretary of AMU is trying to put in place a Maghreb economic community project via a detailed research done in collaboration with the African Development Bank (BAD). Such a project will be useful to create single currency at a later date.

The driving force for these projects may be the awareness of the Maghreb Countries (MC) about the future challenges and the importance of economic and monetary integration as a solution to these challenges (reduction of tariff barriers, enlargement of the Economic and Monetary Union in Europe, liberalization of the textile sector, association agreements with the European Union...).

In fact, in a new environment characterized by huge competition, these countries have to face the "cost of no-Maghreb". So, as an engine for growth and bilateral trade boost, the Maghrebian integration would constitute a considerable support to a more efficient insertion to the world economy (Brack 2008). It would also render the zone an attractive destination for other investors notably the oil-exporting countries of the Middle-East. Besides, the establishment of a supranational central bank as part of a monetary integration process would resolve the problem of dependence of national central banks.

However, on the basis of numerous experiments, notably the European one, here is a heated debate about the question of establishing economic and monetary union between different (or divergent) countries. This economic and monetary union often comes up against many problems, unless there exists a solid institutional setting and a real political involvement.

Indeed, in Europe, economic and monetary integration was envisaged from the start as part of the process of building an "ever closer Europe," entailing not just a customs union but also a single market and not just the closer coordination of national policies but also the creation of supra-national policymaking institutions (Eichengreen et Taylor 2003).

None of these conditions seems to prevail in the Maghreb given the lack of a real desire for political involvement and the low volume of intra-Maghreb trade (between 2 and 3%). Moreover, the economy of these countries has different economic and financial structures, although there is some resemblance about a few economic and social variables (added to geography, language, culture, religion...).

Our aim in this paper consist in evaluating the relevance of the project of monetary integration for three MC (Algeria, Morocco and Tunisia) given their present characteristics. To do that, we try to simulate an aggregated monetary rule describing a potential common monetary policy in an open economy. This rule is constructed and compared to national monetary rules already simulated in many other works. Such a construction and comparison allow us to verify if a common monetary policy (and then the creation of a monetary union) will be beneficial to all countries or, if on the contrary, it will be beneficial to one country rather than the others.

The remainder of the paper is organized as follows: section II describes the evolution of the monetary policy in the three Maghreb countries (MC)[2]. Section III highlights the methodological framework and data. Within this section, the model describing the functioning of MC is presented and the main optimisation method is provided. Section IV presents the empirical results and the corresponding explanations. Finally, section V summarizes the main findings and draws out some policy recommendations.

II- Monetary policies in the Maghreb: a brief description:

Historically, in the three countries, the monetary policy could be characterized by a transition from a situation of financial repression to a situation where the market mechanism prevails and from the discretion to the rule. The final aim is to reach credibility and transparency.
Nowadays, the monetary authorities of these countries try to reach a final goal which is refocused around price stability using different intermediary and operational objectives.
Moreover, for further efficiency, financial liberalization has imposed to them the replacement of direct control instruments by indirect ones. These differ from one country to another. Indeed, each of them has developed its own instruments of monetary policy which can be divided into three categories: operations at the initiative of a central bank, permanent facilities and fine tuned operations.
In these three countries, as well as in MENA, central banks are debtors. Their objective is the resumption of excess liquidity which came from interventions over the exchange market. Contrary to creditor central banks, which determine their monetary policy according to their internal objectives and then act in monetary base to influence the short term interest rate, the operations of debtor central banks consist in reacting and sterilizing the liquidity excess emerging from the increase in exchange reserves. The origin of this excess may be due to an increase in FDI, an excess in current account, an increase in workers remittances from abroad...The final objective is the stabilization of the exchange rate (Rattenhuber & al 2008).
It is effectively the situation in the Maghreb where the resumption of excess liquidity becomes the main concern of monetary authorities (especially in Algeria and Morocco).
It is important to remember finally that the authorities of Algeria, Morocco and Tunisia have decided to liberalize their financial accounts but at a different speed. In fact, Morocco and Tunisia are nearer the realization of this objective than Algeria which has not yet completed its transition toward market economy (IMF 2006).
However, the realization of this objective will impose some changes on monetary and exchange rate policies. In view of this, the monetary authorities of these countries have decided to go more toward a flexible exchange rate and to replace the external anchor of the monetary policy by an internal one via a system of inflation targeting.

III- Empirical Framework and Data:

Our methodology consists firstly in estimating a model characterising the Maghreb. This area is chosen as an average of the three corresponding countries (while taking into account the weight of each one).
Once the model is estimated, we should define the most effective rule. To do so, it is essential to define a loss function which the potential common Central Bank tries to minimise[3].
Our model is estimated using the seemingly unrelated regression (SUR) estimator developed by Zellner (1962). The aim of this technique is twofold. First, cross-equations dependence is

[2] Our focus is limited only to Algeria, Morocco and Tunisia.
[3] This methodology was adopted in many works such as Durand & Payelle (1998), Freedman (1981), McCallum (1994), Penot & al (2001), Penot & Pollin (1999) …

allowed. Second, endogeneity of the regressors is also taken into account by introducing leads and lags of the regressors. The number of optimal lags is determined on the basis of the AIC criterion. Besides, this technique explicitly deals with correlation between errors which make it more efficient compared to equation-by-equation least squares based approaches.
It follows that, once our model is estimated, the residuals which are considered to be the shocks affecting the economy, are recovered. These respect the distribution of historical shocks. It is then a matter of historical simulations which deal with reproducing the past shocks.
Therefore, after the estimation of the model and the recovery of the shocks, we try to determine the monetary rules which best fulfil the objective of the Central Bank. We retain the Taylor rule in an open economy, the form of which is defined below. The final aim is then to determine the parameter of this rule which minimizes the loss function.
Our methodology is done on the basis of quarterly data over the period 1990Q1, 2006Q4 which are extracted from the International Monetary Fund database (International Financial Statistics) and *DATASTREAM*.

III-I- The model:

Our model is that of an open economy. It contains an aggregated IS equation (supply and demand over goods and services market), an aggregated Philips curve equation (inflation-unemployment trade-off) and an aggregated exchange rate equation (exchange behaviour) for the Maghreb.

$$y_t = A(L)y_t - B(L)R_t - C(L)[i_t - \pi_t] + \eta_t$$

$$\pi_t = D(L)\pi_t - E(L)e_t + F(L)y_t + \varepsilon_t$$

$$e_t = G(L)e_t - H(L)\pi_t + K(L)y_t + \nu_t$$

Where y, π, i, R and e are respectively the growth rate of industrial production index (IPI)[4], the growth rate of consumption price index (CPI), the nominal interest rate (the instrument of monetary policy), the real effective exchange rate (REER) and the nominal effective exchange rate (NEER) in the Maghreb. $A(L), B(L), C(L), D(L), E(L), F(L), G(L), H(L)$ and $K(L)$ are the traditional polynomial lags. η, ε and ν are error terms.
Given that the model describes the dynamic of plural aggregated variables, we have obtained these variables by considering the Maghreb as an average country –composed of Algeria, Morocco and Tunisia – and by calculating these variables as follow:
$y_t = \sum \lambda_i y_i \ (i = 1,2,3)$ where $\lambda_i = y_i / y_{tot}$ and $y_{tot} = y_1 + y_2 + y_3$
$Z_t = \sum Z_i / 3 \ (i = 1,2,3)$ with Z representing successively the variables π, i, e then E.
The first equation shows the effect of monetary and exchange rate policy on the activity and therefore on the real sphere. An appreciation (depreciation) of the REER implies a price increase (a price fall) of the domestic goods comparing to the foreign ones which leads to a decrease (increase) in domestic production. Also, a restrictive (expansionist) monetary policy reflected by an increase (decrease) in interest rate acts negatively (positively) on the global

[4] This indicator must be taken with cautious given the bad representation of the total production by the industrial production. The use of this indicator is justified by the lack of data.

demand component and leads to a decrease (increase) in domestic production. The expected coefficients for *E* and $(i_t - \pi_t)$ are then negative.

The second equation shows how economic growth and exchange policy affect prices[5]. An appreciation (depreciation) of NEER makes domestic products less required (more required) and decreases (increases) the inflationary pressures while a rapid (sluggish) economic growth due to expansionist (restrictive) monetary policy for example leads to an acceleration (deceleration) of inflationary pressures[6]. This argument is often stated by central bankers when they claims that demand increases more rapidly then supply. The expected coefficient for e is then negative while that of *y* is positive.

Finally, the third equation shows how the evolution of inflation and activity acts on the exchange rate. Higher (lower) inflation leads to a depreciation (appreciation) of the NEER following a price increase (decrease) of domestic goods while low (high) activity growth has the same effect (reverse effect). The expected coefficient for π is negative while that of *y* is positive.

III-II- The rule:

As mentioned above, our aim here is to determine the monetary rules which minimise a loss function[7]. We retain the Taylor rule in an open economy which the simple form is as follows:

$$i_t = \phi i_{t-1} + \alpha(y_t - y^*) + \beta(\prod_t - \prod^*) + \delta(e_t - e^*)$$

Where α, β and δ are respectively the weight attached to activity, inflation and exchange rate by the Central Bank. Moreover, the existence of the term i_{t-1} expresses the interest rate smoothing behaviour of the emission institute (or the monetary policy inertia). Moving the policy rate by small steps in the same direction increases its impact on the long term interest rate because market participants expect the change to continue and hence price their expectations into forward rates (Mohanty & Klau 2004). Such practice is also often present, especially in countries where banking and financial weakness is significant. It also expresses the willingness to maintain the credibility of the Central Bank and the reduction of uncertainty that mark the key parameters of the structure of the economy. These parameters govern the transmission mechanisms of monetary policy. Lastly, $(y_t - y^*)$represent the output gap or the difference between current production and potential production, $(\prod_t - \prod^*)$is the deviation of inflation from its target value and $(e_t - e^*)$ is the deviation of current exchange rate from its equilibrium level. However, given the difficulty of estimating this level, we replace the expression $(e_t - e^*)$with the nominal effective exchange rate variation $(e_t - e_{t-1})$.

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[5] We consider that the hypothesis of Stock and Watson (1999) is verified (the potential economic activity is constant over the short term period) and that the activity, rather then the output gap, affects inflation.

[6] It is the effect of imported inflation in an opened economy.

[7]The general form of this loss function is :

$E(L_t) = E(\prod_t - \prod^*)^2 + \lambda E(y_t - y^*)^2 + \psi E(e_t - e^*)^2 + \phi E(i_t - i_{t-1})^2$. We suppose that each element in the loss function is identically weighted, which means that $\lambda = \psi = \phi = 1$. This function expresses the willingness of the monetary authorities to reduce inflation fluctuations, output gap and exchange rate variations in accordance with their objectives. The existence of interest rate in the loss function is justified by the fact that most efficient rules in term of activity stabilisation and inflation control generate very high interest rate variations. For further details on the shape of the loss function in a closed economy, see Penot & al (2001), Woodford (1999).

As such, the Taylor rule expresses the behaviour of the Central Bank in setting the interest rate which follows a change in corresponding variables. In general, the Central Banks raise their interest rates when the output gap increases (situation where current production is far from potential production), the inflation gap deepens (situation where current inflation is far from its target value) and also when the exchange rate gap increases (situation where e increase comparing to e_{t-1})[8].

So, our objective consists in observing the behaviour of monetary authorities following a shock hitting the economy. For that purpose, we use a model with four equations: the first three describe the functioning of the economy (the model above) while the last one is the Taylor rule. We look through this rule for the parameters α, β, δ in the interval [0.1:10.1] by choosing a step of 0.1 and by repeating 250 times. We hold the value of the coefficients which corresponds to the minimal loss function.

To do so, we suppose that the money market rate (MMR) is the instrument of monetary policy (while Maghrebian Central Banks have not until now developed an official policy rate). Moreover, most banking rates are indexed in MMR, which reinforces our choice. We further suppose that $\phi = 1$ in the Maghreb since the common Central Bank has to gain in maintaining financial stability and reducing uncertainty by controlling interest rate volatility. Finally, we consider that the average potential growth rate for the region (y^*) is 4.6%[9] while the average inflation target for the same region ($\prod^*$) is 2.5%[10].

IV- Baseline results:

Before estimating the parameters of the model, we established a stationarity test for the different variables to avoid a spurious regression. Using ADF and Phillips-Perron tests, we have obtained the following results:

Results of the ADF test

Variable	ADF	Model (1)	Model (2)	Model (3)
TCN	Level	-4.793***	-7.799***	-6.461***
	First difference			
	DW	1.161	1.678	1.69
TCR	Level	-1.887*	-3.388**	-3.799**
	First difference	-6.468***	-6.62***	-6.69***
	DW	1.9	1.88	1.88
TMR	Level	-1.466	-0.035	-2.82
	First difference	-4.1***	-9.95***	-10***
	DW	2.06	1.71	1.72
TCPI	Level	-1.28	-1.44	-1.55
	First difference	-11.8***	-11.74***	-11.7***
	DW	1.74	1.74	1.75
TIPI	Level	-1.14	-11.99***	-12.24***
	First difference	-5.45***	-5.4***	-5.34***
	DW	2.03	2.04	2.04

[8] This situation may be due to the increase in domestic prices compared to foreign ones, which lead the central bank to raise its interest rate.

[9] This number represents the medium of the averages obtained in these countries over the period 1991-2006. For more details, see Laurence & Boileau (2007).

[10] For further details regarding the choice of this target, see Brack (2008).

Results of the Phillips-Perron test

Variable	PP	Model (1)	Model (2)	Model (3)
TCN	Level	-3.329***	-7.49***	-6.54***
	First difference			
	DW	1.16	1.67	1.69
TCR	Level	-1.66*	-3.33**	-3.88**
	First difference	-6.45***	-6.61***	-6.7***
	DW	1.9	1.88	1.88
TMR	Level	-1.62*	-1.21	-4.17
	First difference	-11.04***	-15.11***	-15.45***
	DW	2.12	2.15	2.15
TCPI	Level	-3.18***	-4.65***	-6.28***
	First difference			
	DW	2.27	2.03	1.9
TIPI	Level	-25.29***	-48.97***	-56.28***
	First difference			
	DW	1.78	2.05	2.07

*** Significant at the 1% level. ***significant at the 5% level. *significant at the 10% level.
Model (1): Without Constant and Trend. Model (2): With Constant. Model (3): With Constant and Trend.

It transpires then from these two tables that the two non stationary variables are the real exchange rate and the real interest rate I (1) while the nominal exchange rate, the growth rate of IPI and the growth rate of CPI are stationary I (0).
We then established an Engel and Granger as well as a Johansen co-integration tests about the relevant variables. The following table shows our results:

Results of the Engel-Granger test

	Model (1)		Model (2)		Model (3)	
	ADF Statistic	*P-value*	*ADF Statistic*	*P-value*	*ADF Statistic*	*P-value*
Level	0.03	0.68	-0.06	0.94	-2.79	0.22
First difference	-4.17***	0.00	-9.31***	0.00	-9.33***	0.00

Results of the Johansen test

Cointegration test	Model (1)		Model (2)		Model (3)	
	Trace statistic	0.05 critical value	Trace statistic	0.05 critical value	Trace statistic	0.05 critical value
TCR - TMR	4.28	12.32 (0.67)	17.74	20.26 (0.10)	24.38	25.87 (0.07)

Trace test indicates no cointegration at the 0.05 level

Cointegration test	Model (1)		Model (2)		Model (3)	
TCR - TMR	Max-Eigen statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value	Max-Eigen statistic	0.05 critical value
None	2.73	11.22 (0.82)	15.11	15.89 (0.06)	14.43	19.38 (0.22)
At most 1	0.61	4.12 (0.49)	2.63	9.16 (0.65)	9.95	12.51 (0.13)

Max-Eigen test indicates no cointegration at the 0.05 level

*** Significant at the 1% level. ***significant at the 5% level. *significant at the 10% level.
Model (1): Without Constant and Trend. Model (2): With Constant. Model (3): With Constant and Trend.

It turns out from these two tables that the two variables (real money rate and real exchange rate) are not co-integrated. The regression is therefore made by using the first difference of the two variables for equation (1). However, for equation (2) and (3), the co-integration problem does not arise and the regression is simple.
The estimation of our model has then allowed us to reach the following results[11]:

SUR estimate for equation 1
Dependant variable: y_t

Variables	**Estimate**	**t-value**
Intercept	0,01643	3,26
y_{t-1}	$-0,74658$	-7,03
y_{t-2}	$-0,38993$	-2,81
y_{t-3}	$-0,58523$	-5,1
dtcr_{t-2}	$-0,00277$	-2,35
dtmr_{t-2}	$-0,02904$	-3,34
$N = 61$	$DW = 1,884$	$\overline{R}^2 = 0,7623$

[11] Non significant coefficients are not transferred here, unless they are about one lag.

SUR estimate for equation 2

Dependant variable: π_t

Variables	Estimate	t-value
Intercept	-0,01619	-1,94
π_{t-1}	0,47446	4,81
π_{t-2}	0,28297	2,85
tcn_{t-1}	-0,000066	-0,19
y_{t-1}	0,19271	5,65
y_{t-2}	0,23024	6,81
$N = 61$	$DW = 2{,}002$	$\overline{R}^2 = 0{,}7563$

SUR estimate for equation 3

Dependant variable: tcn_t

Variables	Estimate	t-value
Intercept	8,47663	2,50
tcn_{t-1}	36,5577	13,2
π_{t-3}	0,99089	2,6
y_{t-1}	-2,52692	-1,8
$N = 61$	$DW = 1{,}743$	$\overline{R}^2 = 0{,}9991$

From these tables, we can notice that the extent of monetary policy on the real sphere is modest while the weight of the banking sector in the Maghreb is important. Indeed, although there is a small availability of capital direct contributions, the potential common central bank seems not to act via interest rate. This behavior may express the desire to allow advances to the public sector and to avoid banking disturbance. It may also be strengthened by the importance of short-term debts of Maghrebian companies and households and the harmful effect of a variation in the interest rate.

Moreover, the existence of bank liquidity excess in the three countries can explain the weak capacity of monetary authority in managing money market operations and so, in influencing banking conditions. Interest rate channels turn out to be less functional in the Maghreb.

Similarly, the effect of exchange policy on activity is low although the degree of openness of the Maghreb is important (the average rate is about 82,1% in 2006[12]). In fact, a real exchange rate appreciation affects the real activity only after two quarters and at a small fraction. This weakness of the exchange rate channel may express the unwillingness of monetary authorities to use this instrument. The main cause may be the relatively great part of the debt labelled in foreign currency (especially in Morocco) and particularly the fear of imported inflation effects (especially for Tunisia and Algeria).

Concerning the effect of activity growth on inflation, it turns out to be significant. Accelerated economic growth for example is translated by an increase in the inflation level and the effect appears from the first quarter. This can reflect the fact that in an open economy, the effect of growth on inflation is more important than in a closed one. A significant growth rate will cause an acceleration of imports and then an inflation bias (imported inflation). Moreover, the rigidity of the Maghrebian labour market may not allow a rapid adjustment, which will be translated by price inertia. This inertia may be explained by the still important presence of the

[12] Authors' calculation.

public sector in the economy, low competition between sectors but also the presence of industries characterised by sticky prices.
In return, the effect of exchange policy on inflation turns out to be small. An appreciation of nominal exchange rate for example does not affect the price level (although the three economies are open). This effect seems to be the result of continuity in controlling capital movements and the absence of total convertibility of the three currencies (the Algerian dinar, the Moroccan dirham and the Tunisian dinar). Moreover, as Devereux and Engel (2002) noted, in a country where the market power of local participants is important, variations in the exchange rate do not hardly affect domestic prices. Besides, as has been mentioned already, a good proportion of prices is still administered by the governments of these countries reflecting the firmness in establishing price stability. This result can then reflect the nominal rigidities and slow adjustment of the prices of good which could make domestic prices less responsive to exchange rate movements.
As for the effect of growth on the exchange rate, it differs from what is expected. Indeed, accelerated economic growth will be translated by a depreciation of the nominal exchange rate. Rapid growth in the Maghreb may lead to an increase in prices (as found above from the estimation of equation 2) and then to a depreciation of the nominal exchange rate. This result agrees with many works which mention the absence of a Balassa-Samuelson effect (especially in the case of Algeria) but should be relativized given the low significance of the coefficient. It should be also relativized regarding the effect of inflation on the exchange rate. This effect shows that an acceleration of inflation will be translated by an appreciation of the nominal exchange rate at the end of the third quarter instead of depreciation.
Finally, the simulation work has yielded the following results:

Optimization results

Coefficients	α	β	δ	Loss function
Estimate	2,1	1,3	0,1	175,285
	2,3	1,1	0,1	177,051
	2,5	1,3	0,1	177,445

It turns out that the optimal Taylor rules that can be held as follows:

$$\Delta i_t = 2.1(y_t - 0.046) + 1.3(\prod_t - 0.025) + 0.1(e_t - e_{t-1})$$

These results show that the common central bank has to grant more weight to activity rather than inflation or exchange rates. In fact, when production corresponds to its potential value, an increase of half a point in activity will necessitate an increase in interest rate by 1.05%. In return, in the hypothesis where inflation will be on its target value, an increase of half a point in prices will necessitate an increase in interest rate by 0.65%. Finally, when the nominal exchange rate corresponds to its past value, an increase of half a point in the exchange rate will necessitate an increase in interest rates by 0.05%.
This result may outline the behaviour of Central Banks that partly accommodate non monetary pressures on prices in order to reduce costs in terms of output. It may also reflect the willingness of the monetary authorities to absorb the demand shock provoked by expansionist fiscal policies. The dependence of the Algerian budgetary policy on petroleum receipts and the Moroccan and Tunisian ones on agricultural products could lead to a demand shock and will render the monetary authority's reaction more aggressive vis-à-vis the stabilization of the activity.

Likewise, for small open economies where excessive variation of activity considerably affects prices, the Central Bank must grant more weight to activity in order to respect its planned inflation objective.

However, we can notice from the rule that the weight of the exchange rate is relatively weak compared to the others objectives. This result may reflect the characteristics of the behaviour of Maghrebian Central Banks which have means of controlling this variable other than interest rate. These banks often use the control of capital account, foreign exchange swaps… in order to stabilize the exchange rate expectations. Such behaviours may influence the future actions of the common central bank.

In the same vein, the small reaction of monetary policy for exchange rate variations may reflect the nature of the shocks hitting the economy (Mohanty & Klau 2004). Indeed, according to Taylor (2002), if the exchange rate varies due to temporary disturbances, the interest rate should remain unchanged because such exchange rate movements do not have much effect on expectations of inflation.

In our case, the non reactivity of the Maghrebian Central Banks to this variable (exchange rate) shows that shocks are often temporary. This hypothesis seems to be consolidated in several works that show that the Maghrebian exchange rates are near their equilibrium value.

A question can arise at this level: given the specificities of the Maghrebian economies, will the reinforcement of this rule be convenient to all these countries or in contrast will it be convenient to one country rather than to the others?

To answer this question, we turn to similar past empirical studies which deal with monetary rules in MC (and sometimes in emerging economies) in order to compare our rule to those.

Haddou (2002) attempts to propose for the Central Bank of Tunisia a formation mechanism of interest rate, which balances between macro and micro monetary objectives. She considers a system of four equations which represent the functioning of the economy. This system is estimated econometrically on the basis of quarterly data available to serve as empirical basis for simulations. The system was estimated by the SURE method (Zellner) over the period 1988-1999.

The author simulates the model with different rules. She evaluates the performance of each of them to determine the best one. Performance measurement advocated for these rules is based on the trade-off between inflation variability and output. The most efficient rule finally found indicates that the Tunisian monetary authorities have to grant more weight to inflation rather than to the output gap.

Ben Tahar & Rahmani (2006) estimate a set of Taylor rules for the central bank of Tunisia. These estimations are made on the basis of quarterly data over the period 1990-2004 and by using the GMM (Generalized Method of Moments) technique. In all estimated rules, the central bank seems to grant a greater weight to inflation rather than to output. However, the monetary authority reacts neither to the evolutions of the stock market index nor to the exchange rate. However, it would be rather sensitive to the BVMT's volatility as measured by its standard deviation.

Belhadj (2008) simulates optimal Taylor rules for Algeria, Morocco and Tunisia. He estimates first for each country a model of an open economy and then he determines the monetary rules which best fulfil the objective of each Central Bank on the basis of historical simulations which deal with reproducing past shocks. The estimation is based on quarterly data over the period 1990-2006. The optimal rules show that Algeria has to grant more weight to activity while Tunisia has to grant more weight to inflation. Finally, Morocco has to grant similar weight to activity, inflation and exchange rate.

Lo & al (2003) use Taylor's policy rule for a sample of 102 countries over the period 1949 to 2001. They show that the inflation target deviation coefficient is larger in more open economies since the corresponding costs associated to this kind of deviation are high.

Aizenman & al (2008) uses Taylor rule models to test emerging-market central banks' responses to inflation, output gaps and real exchange rates. They collect quarterly data for 16 emerging market countries over the period 1989-2006 and suppose the following monetary policy reaction function:

$$i_t = \rho i_{t-1} + \alpha(y_t - y^*) + \beta(\prod_t - \prod^*) + \gamma X_t$$

In which Xt may take a few external variables that may also be part of the policy reaction function like the real exchange rate or foreign reserves.

They find a significant interest rate response to inflation and real exchange rates variables in countries that are following a system of inflation targeting. In contrast, their results show that the output gap is not significant in these countries and its coefficient is lesser than the other variables.

It follows from all these studies that the national rules seem not to coincide with the common rule, especially in the Moroccan and Tunisian cases.

So, how we can explain these results? In other words, why does this optimized rule seem to be more beneficial to the Algerian case rather than to the Moroccan or the Tunisian ones ?

One of the probable explanations is the following: given Algeria's much larger size, large budget and an export structure that differs greatly from its neighbors (which export other primary commodities while Algeria exports oil), Algeria has the potential to influence monetary policy in ways that potential partners in a monetary union would find undesirable, unless there is an effective way of disciplining countries' fiscal policies and absence of similar shocks to the prices of countries' exports and imports (or "terms of trade"). In that case only, would a single currency for the Maghreb seem advisable[13].

Moreover, Algeria (which is a rental economy) could benefit further from the diversification of Moroccan and Tunisian economy via getting agricultural, manufactured and fishing products while Morocco and Tunisia can only beneficiate from Algerian oil products[14]. Besides, many empirical works have simulated the net gain for MCs from a process of economic integration and the results often indicate that the gainer is Algeria[15].

Another likely explanation is related to the fact that, once Algeria has the higher inflation rate in the zone (6% against 3% for Tunisia and 2, 5% for Morocco in 2006), the adhesion of this country to a monetary union – where a common monetary policy is conducted – allows it to tie its hands with the other countries and then to import credibility. Just the fact of imposing a rule in this country will be considered as an advantage. Indeed, in Algeria, monetary policy sometimes plays the role of fiscal policy; instead of having transparent fiscal subsidies, the monetary authorities try to grant advances to the economy (commercial banks). Many Algerian banks and corporations are bankrupt but the authorities always commit to help them by offering funding facilities (thanks to hydrocarbon receipts)[16]. It follows that imposing a monetary rules helps authorities avoid an inflationary bias.

V- Conclusion and policy recommendations:

Starting from the idea that many efforts have been made to bring together the economies of MC and reinforce the financial and monetary cooperation between them in order to create a single currency, this paper has tried to evaluate the pertinence of such a decision by evaluating the consequences of enforcing a common monetary policy between the countries of this region.

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[13] In that case, we consider the Algerian economy as a "locomotive".

[14] This hypothesis should be interpreted cautiously because it contradicts the theory of optimum currency areas.

[15] For more details, see in particular Bchir M-H & al (2006), Bousetta (2003), World Bank (2006).

[16] In this case, we call the central bank "a financier of last resort" and not "a lender of last resort".

We first described the characteristics of monetary and exchange rate policies in the three corresponding countries and explained their foundations. It turns out that, although the monetary policies of MC have similar final objectives, the operational frames and the monetary instruments used for the realization of these objectives differ from one country to another.

We then presented a simple model reflecting the characteristics of the MC. The estimation of this model showed that the extent of monetary and exchange rate policies on activity are low and then the interest rate as well as the exchange rate channels are weak. Moreover, the effect of activity growth on inflation turned out to be important while the effect of exchange rate on inflation is low. Finally, the effect of growth on the exchange rate seems to be significant while it is the reverse for the effect of prices on the exchange rate.

Therefore, we simulated a Taylor rule for this region based on the above-mentioned estimated model and the adoption of a specific methodology often used in many empirical works. Our optimization results suggest that the common central bank has to grant more weight to activity rather than to inflation or exchange rates.

Finally, we compared this result with many others and we found that the application of a common monetary policy over the Maghreb zone would not be beneficial for all countries. Indeed, it would not benefit to Morocco or Tunisia given that the potential common central bank have to grant more weight to activity, a result seldom found in other works.

However, making this common monetary policy beneficial to all countries and then ensuring a long term success of the monetary integration process in the Maghreb needs more efforts. These efforts have to be about improving coordination of financial, monetary and exchange rate policies. In this vein, the central banks of the MC have to accelerate their cooperation via sharing and exchanging information. They also have to overcome their political conflicts. In fact, these countries have to set in motion a "state rhetoric" calling for « Maghreb solidarity and fraternity » and pushing citizens towards feeling "Maghrebian". This feeling may constitute a permanent driving force toward cooperation and, at the same time, a major hindrance to future conflicts...

All these measures can help the MC to improve nominal and real convergence and to become a homogeneous bloc. They can also bring the monetary integration process more in line with the economy of these countries.

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