

# **EXCHANGE RATE AND INFLATION TARGETING IN MOROCCO AND TUNISIA**

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## **Abstract**

The objective of this paper is to examine why Morocco and Tunisia should progressively opt for a monetary policy based on inflation targeting rather than exchange-rate targeting and money-growth rules, as their financial markets are increasingly liberalized and the exchange rate regime flexibility enhanced. First, the sources of inflation (cost push and demand pull factors as well as factors due to financial liberalization) are identified. Then, they are empirically tested for Granger causality and for regime transition with a Markov Switching model. Finally the institutional and operational conditions for the success of an inflation-targeting framework are outlined.

## **Section: I: Introduction**

Several countries in the Middle East and North Africa (MENA) region are considering, or have already begun the process of opening their domestic markets to international trade and capital flows, in order to bolster investment and, by extension, growth. However, as underscored by recent experience from the emerging markets of Latin America and South East Asia in the 1990s, large and volatile capital movements can exert intense macro-economic pressures and contribute to the onset and depth of financial crises. At the heart of these crises has been the interplay between rapid capital flows and fixed exchange rate regimes which became vulnerable to speculative attacks, as in Mexico in 1996, Asia in 1997 and Russia in 1998 (Mussa et al, 2000). Thus, it is reasonable to suggest that unless MENA countries make their exchange-rate regimes more flexible, they may become susceptible to the negative consequences arising from their economic and financial liberalization.

Some MENA countries, such as Morocco and Tunisia, are already targeting the real exchange rate rather than the nominal rate, in order to maintain competitiveness and avoid currency overvaluation while opening their markets to the international capital flows (Domaç and Shabsigh, 1999; Fanizza et al, 2002). After a long period of quasi-nominal pegs to the French Franc until about 1984, these two countries implemented Structural Adjustment Policies (SAPs) and let their currency depreciate by about 40% over the next few years, before gradually adopting fixed peg against a composite currency (i.e., nominal exchange rate targeting) for Morocco and a crawling peg (i.e., real exchange rate targeting) for Tunisia. Also, they have so far judiciously used discretionary (fiscal and monetary) and indirect (incomes) policies to maintain price stability, with some success in the absence of severe real shocks.

However, this overall policy strategy is likely to become less effective as their markets are liberalized and their economies become more vulnerable to external shocks. In particular, nominal or real exchange rate targeting will become more complex since volatile capital flows make it more difficult to estimate the exchange rate equilibrium, and more risky since targeting errors lead to more resource misallocation and greater output volatility in a more open financial environment. Furthermore, they need to take into account the effects of their economic and financial liberalization programs (as well as the increasingly important role of expectations) on inflation. For these reasons, Morocco and Tunisia are planning to modify their exchange rate and monetary policies. Already, they have adopted more market-based monetary policy tools, such as open-market operations, and they are currently planning to progressively opt for greater exchange rate flexibility.

Following their capital account liberalization, policy-makers should consider also a different approach to controlling inflation, a necessary condition for a successful emerging economy. Compared to discretionary policies, most economists agree that rule-based policies (via money-growth rules or interest rules) are more effective and more capable of building credibility. Inflation targeting appears to be another interesting solution to control inflation, as long as certain macro-economic, institutional and operational conditions are fulfilled (Carare et al, 2002; Khan, 2003).

The main objective of this paper is to investigate the conditions governing the success of an inflation-targeting policy in Morocco and Tunisia. First, the paper assesses the sources of inflation, in particular cost push factors (wage-price nexus, external shocks, exchange-rate pass-through) and demand pull factors (expansionary fiscal and monetary policies) as well as factors due to financial liberalization. Second, we estimate a Markov Switching model, where the transition from one inflation regime to another depends on variables selected as proxy for the sources of inflation identified. Granger causality tests will also be carried out to ascertain

the robustness of the results. Empirical results should reveal the significant factors driving inflation, which should be controlled or, at least, monitored to make inflation-targeting effective. Finally, the paper outlines the institutional and operational conditions for the success of an inflation-targeting framework.

Several important questions will be also discussed in this paper: what is the degree of efficiency of the current money targeting policy, and what are the sources of inflation under this policy? Was there a change of inflation regime as a result of the SAPs implemented in the mid-1980s, the budget deficit reductions or the increasing central bank independence? Did new sources of inflation appear following the change in monetary policy, and what is the degree of credibility of this new monetary policy? What is the effect of international price fluctuations on domestic inflation? To which extent would it be preferable to target inflation rather than a monetary aggregate, following the liberalization of financial markets in Morocco and Tunisia?

The rest of the paper is organized as follows; Section II reviews the exchange rate and monetary policies which were implemented by Morocco and Tunisia, and presents the potential benefits of a more flexible exchange rate regime combined with a policy of inflation targeting. Section III discusses the theoretical sources of inflation and describes the methodology used to identify inflation regime changes and their determinants. Section IV presents the empirical results obtained for Morocco and Tunisia. Section V analyzes some issues related to the choice of a monetary policy framework. Section VI offers conclusions.

## **Section II: Exchange Rate and Monetary Policies in Morocco and Tunisia.**

### ***A. Exchange Rate Policies: from Fixed to Real Exchange Rate Targeting***

The 1970s and 1980s have been characterized by a series of severe external shocks in the world economy. Following the demise of the Bretton-Woods system of fixed exchange rate system, major industrialized countries moved to a system of floating exchange rates in March 1973; two major oil prices shocks in 1973-74 and 1979-1980 combined with dramatic fluctuations in prices of several primary goods caused two worldwide economic

recessions and inflation peaks; the US dollar experienced a sharp appreciation in 1980-1985 followed by an equally sharp depreciation in 1985-1987; last but not least, many developing countries suffered a major external debt in the mid-1980s. The 1990s saw a rapid growth of world trade and capital markets to which developing countries began to borrow easily and rapidly. However, a number of these emerging economies suffered severe currency and economic crises as a result of sudden shifts in capital flows.

In this global context, Morocco and Tunisia also experienced a number of economic changes. Until the end of the Bretton-Woods system in 1973, both nations had pegged their respective currency to the French Franc, given the importance of France as their principal trading partner. The managed floating rate regime that both countries then officially adopted until the early 1980s actually maintained their nominal exchange rate within a stable band relative to the French Franc. It should be noted that the two nations followed similar exchange rate and monetary policies during and after the two oil shocks despite the fact that Morocco is a net oil importer and Tunisia is a net oil exporter. In 1983-84, both countries embarked in Structural Adjustment Policies (SAPs) aimed at boosting the development of the private sector and removing the distortions due to a very large public sector. By that time, most economists began to recognize that these distortions had negative effects on productivity gains and biased the allocation of resources in favor of the public sector, thereby hindering the contribution of the private sector to growth and employment creation. The adjustment strategy was twofold: (i) dismantling government controls and restrictions to improve the functioning of

competitive markets and to foster the restructuring of enterprises; and (ii) limiting the heavy burden of a large public sector on the economy, improving monetary and fiscal management, and controlling inflation and managing real exchange rates to preserve external competitiveness. As a result, both nations initially let their respective currency depreciate by about 40% over the next few years (1984-87), before gradually adopting a fixed peg against a composite currency (i.e., nominal effective exchange rate targeting) for Morocco and a crawling peg (i.e., real effective exchange rate targeting) for Tunisia (IMF, 2004). It is interesting to note that the number of currencies in the basket used to compute these effective rates have increased, but the weights have not been made public. Nevertheless, it is safe to assume that the French Franc (and now the Euro) still carries an important weight in this basket, given its continued importance in trade for Morocco and Tunisia. On the other hand, the share of the long-term external debt held in U.S. Dollars rose in the early 1980s to 60% for Morocco and to 35% for Tunisia. It is therefore likely that the weight of the Dollar is also significant, though less than for the French Franc. In any case, Figures 1 and 2 (respectively for Morocco and Tunisia), which show the nominal and real exchange rates relative to the Euro, to the Dollar and to a basket of currencies weighted by their trade patterns, confirm the exchange rate policies described above.

**<INSERT FIGURE 1 HERE>**

**<INSERT FIGURE 2 HERE>**

Unlike other emerging economies, Morocco and Tunisia were more prudent in their capital account liberalization policy in the 1990s, and did not suffer from currency or financial crises. Their exchange rate policies, combined with sound monetary and fiscal policies, helped those two countries to reduce inflation rates from 8% in 1991 to less than 3% since 1999 and to establish a credible commitment to macro-economic stability. Indeed, their exchange rate policies tend not only to preserve external competitiveness, but also to bring some discipline in macro-economic policies, if a government wants to avoid lower economic growth and inflation volatility. Nevertheless the limitations specific to these exchange rate regimes are beginning to emerge as the process of economic and financial liberalization is pursued. A more flexible exchange rate regime combined with a monetary policy focused on inflation targeting could provide a solution to this dilemma.

During 2003-2004, the Moroccan government pursued its policy towards currency convertibility by offering the possibility for firms to keep 50% instead of 30% of their export receipts in foreign currencies and for non-residents to subscribe to Treasury bonds. These measures were aimed at improving the depth of the foreign exchange and financial markets. Also in 2004, a new Tunisian fiscal law provides for further capital account liberalization and exchange rate policy flexibility. The share of foreign exchange reserves which firms are allowed to keep will rise from 50 to 70% and new instruments will be made available to facilitate the coverage against exchange risks and to consolidate the financial position of the industrial exporting sector. The challenge is now to enhance currency convertibility and liberalize financial flows while reinforcing the credibility of macro-economic policies and minimizing the risks of a currency misalignment.

Despite the huge amount of theoretical and empirical research on foreign exchange markets, there is still no clear consensus on one single model of fundamental equilibrium exchange rates. Given this inherent difficulty, it is not surprising that studies do not always agree on estimates of currency misalignment for Morocco and Tunisia.

For example, Achy (2000) estimates a model of equilibrium exchange rate and concludes that the Moroccan Dirham was slightly overvalued by about 8% in 1998. Bouoiyour et al (2002) use a nonparametric approach to evaluate the misalignments of the Moroccan currency between 1967 and 2001, and find evidence that the Dirham has been overvalued from the mid-1970s to the mid-1980s, and also more moderately since the mid-1990s. Interestingly, they estimate that the time period necessary to reduce the misalignment by half is more than 8 years. Fanizza et al (2002) consider that the Tunisian Dinar was at equilibrium in 2002. In any case, it appears that Tunisia, and to a lesser extent Morocco, may have avoided the pitfalls of their real effective exchange rate targeting policy, which are usually a persistently high inflation rate and/or a misalignment of the exchange rate leading to a balance of payments crisis, as Latin American countries often experienced.

On the other hand, Domaç and Shabsigh (1999) estimate three different measures of currency misalignment for Morocco and Tunisia, but also for Egypt and Jordan, between 1970 and 1995, and show evidence of significant currency overvaluation, which reduced their economic growth. Nevertheless, the real exchange rate targeting policies appear to have protected the external balance from worsening during domestic expansionary policies and to have encouraged governments to establish sounder macro-economic environment, especially in the 1990s.

In any case, the difficulties to estimate the equilibrium exchange rate will increase with the liberalization of financial markets, given the structural changes in economic relationships and policies. The monetary authorities could cause the currency to become increasingly misaligned because of a lack of information about the new underlying economic mechanisms. The consequences of a significant exchange rate overvaluation could be very damageable for a small opening economy, which relies on exports to boost its growth and employment rates. At least, a currency misalignment would induce some distortions in the prices of traded and non-traded goods that could introduce an inefficient bias in the allocation of resources, such as investment decisions, and a fall in output relative to its potential level. A persistent misalignment would cause a loss of competitiveness following a rise in export prices and would cause a worsening of the current deficit as well as a loss of foreign exchange reserves that could lead to a balance of payments and economic crisis. In the context of increasing capital account liberalization, the central bank could intervene in the foreign exchange markets to defend its currency against destabilizing speculation, thereby depleting its foreign exchange reserves rapidly. In case of significant currency overvaluation, this speculation could force the central bank to act as a lender of last resort to avoid a collapse of the financial sector. Currently, Morocco and Tunisia are relatively sheltered because of the remaining capital controls, but the liberalization of their capital accounts will make this problem more acute.

### ***B. Inflation, Economic Growth and Trade Liberalization Policies***

The various exchange rate regimes in Morocco and Tunisia played an important role in explaining their inflation rates, as illustrated in Figure 3. First, the policy of stable nominal rates relative to the French Franc that was implemented until the early 1980s helped to maintain inflation rates at similar levels or at least with similar trends to those in France. Of course, the volatility of agricultural production caused additional fluctuations in inflation. It is interesting to note that the two oil shocks of the 1970s triggered higher peaks of inflation (in 1974 and 1981-82) in Tunisia than in Morocco although the latter is a net oil importer while the former is a net exporter. However, it appears that inflation inertia was relatively pronounced in Morocco, whereas it was much weaker in Tunisia. Following the SAPs in 1983-84, inflation followed a long-term decreasing trend to fall below 3% in 2003. It is likely that price controls have initially played a significant role in canceling imported inflation from

the currency depreciation engineered by both countries in 1984-87. One could nevertheless argue that sound monetary and fiscal policies, combined with a stable (nominal or real) effective exchange rate targeting policy, contributed to their disinflation over the last 15 years. Inflation in Morocco is also more volatile due to the higher vulnerability of the Moroccan economy to external and internal shocks. This may be a reason why Morocco officially adopted a nominal peg against a composite currency (i.e., nominal effective exchange rate targeting) whereas Tunisia selected a crawling peg (i.e., real effective exchange rate targeting).

**<INSERT FIGURE 3 HERE>**

For the same reasons, output variance is higher in Morocco than in Tunisia. Per capita economic growth is also lower on average in Morocco (2%) than in Tunisia (3%) over the last 40 years. Figure 4 shows these actual growth rates of per capita GDP as well as their smoothed levels through a Hodrick-Prescott filter. Both nations experienced lower growth following the oil shocks, but Tunisia appears to have recovered faster than Morocco, thanks to more cautious stabilization policies. The Moroccan economy is also more vulnerable to external (imported oil and food price) shocks and internal (agricultural production) shocks and its government budget is more rigid. For example, the agricultural sector has an important role in the economy despite the low share of value added in GDP (16%), because the sector employs 44 % of the active population.

**<INSERT FIGURE 4 HERE>**

Morocco and Tunisia need to achieve higher economic growth to create more jobs for the coming generation of workers. Their future growth levels depend in part on their degree of trade openness (the ratio of exports and imports to GDP reaches 70% for Morocco and 90% for Tunisia, according to the World Bank), which will continue to rise as a result of free trade agreements, such as the recent agreement signed with the European Union. This trade liberalization strategy tends to limit the destabilizing impacts of exogenous shocks on its economy. But it demands substantial restructuring efforts to diversify production and, more importantly, to generate some competitive gains to cope with changes resulting from the emergence of China, the end of the Multi-Fiber Agreement and so forth. A more flexible exchange rate could also help to smooth out the effects of

foreign and domestic shocks on trade expansion, competitiveness, growth and employment. To be less vulnerable to currency fluctuations, Morocco and Tunisia have increased the share of domestically financed public debt, but the counterpart is a growing crowding-out effect on the private sector development. To attract new international financing resources, they would have to reverse this trend. Meanwhile, Moroccan and Tunisian authorities are reforming their banking and financial domestic markets to create a broader base of domestic saving. Those measures could reduce government absorption, release resources to the private sector, and improve resource allocation as well as economic growth.

So far, it does not appear that trade liberalization policies have had an effect on growth, since economic structures have not had enough time to significantly change. Average annual growth rates of GDP per capita between 1990 and 2003 are still amongst the lowest of the MENA region, with 1% for Morocco and 3% for Tunisia. As a result, unemployment rates are still high, and the low growth rates are insufficient to bring them

down soon. Moreover, the future economic take-off in Morocco could be hindered by the high illiteracy rate, especially among women (close to 50%, though significantly declining in the young population), and by substantial demographic pressure.

### ***C. Improved Fiscal and Monetary Policies***

Morocco and Tunisia have reviewed and revised their fiscal and monetary policies, to allow for a better management of inflation and growth. Tighter fiscal policies have been implemented in the second part of the 1980s in accordance with the SAP. The budget deficits for Morocco and Tunisia have been reduced from their heights reached after the second oil shock and worldwide recession. More recently, these deficits have automatically increased because of the persistently sluggish growth in Europe, the negative impact of the September 11 event on tourism, and several consecutive droughts. The authorities have also increased autonomous spending to support their economies, but this expansionary policy has been prudent. These overall long-term improvements in budgetary and monetary discipline have had a significantly positive effect on disinflation, but also some counterproductive effects. To limit budget deficits, the Moroccan and Tunisian governments have often reduced public investment expenditures. Yet, public investments such as in education are crucial for the economic development of a private sector, since the public sector cannot play the role of employer of first resort forever. This restrictive policy on education also increased the gap between the skills necessary and the knowledge taught, and encouraged high school graduates to wait for a job in the public sector, which in turn forced the governments to renege on their promise to end their commitment to guarantee a public job to these high school graduates. Ultimately, these governments could lose some of their credibility, which would be costly in terms of their new macro-economic policies whose success will depend increasingly on economic agents' expectations. The success of the Moroccan and Tunisian stabilization policies is also the result of a sharp decrease in real wages and governmental efforts to restrain the growth of private demand. Disinflation was ultimately achieved, but at a certain cost for the population of Morocco and Tunisia.

In the mid-1990s, Moroccan and Tunisian governments also opted for a policy of substituting foreign debt for domestic debt. Its goal was to minimize the consequences of possibly large exchange rate fluctuations. This policy has been helpful in lowering the overall debt (when calculated in local currency) and the debt service. As a result, the Treasury bonds market expanded and improved with the creation of a second market, the advance publication of the public financing requirements, the shortening of the debt term, the reduction of the bond amount, the relaxation of the financial agents' working constraints. There are two counterproductive effects to this positive evolution. First, in the absence of others credible national agents (enterprises, insurance companies, and so forth), the domestic banks are basically those who subscribe to low-risk bonds that guarantee comfortable yields. This situation allowed banks to impose very drastic conditions to get loans and a very high risk premium for households and small to medium enterprises, while developing very close partnerships with large firms that could cause a rapid rise in bad loans. The private sector now suffers a growing crowding-out aggravated by the large availability of Treasury bonds generated by new deficits, which do not incite banks to diversify their activities in favor of new entrepreneurs. Second, the efforts made by the Moroccan and Tunisian governments to encourage banks to lend to the private sector have resulted in rather low pay-offs. Banks invoke the lack of reliable information about the borrower's effective situation (a system of information centralization has been implemented only recently and an improvement in its effectiveness will require more skilled employees, better technical knowledge and more advanced equipment). This problem has been well known since Akerlof and his "lemon market" theory. In the opinion of most bankers, the ongoing reforms are actually making the situation worse because the new legislation raises the amount of bad loans (17% of banks



total assets in Morocco, 20% in Tunisia), and interest rates are still high, especially in Morocco.

A more competitive market could help to lower those interest rates and risk premium. Monetary authorities are in the process of liberalizing the banking domestic sector, enhancing the quality of its supervision and progressively making this market segment more competitive. Furthermore, they are preparing an environment favorable to reduce the hazard moral problem. For example, the central banks in Morocco and Tunisia are important elements of the supervision authorities and at the same time board members for several private banks. This situation does not discourage banks from taking some risks, for example by granting some loans to important customers (a large share of bad loans have been contracted by this category of clients), for projects with a low return on economic growth. The Moroccan and Tunisian authorities are modernizing their supervision and control entities (bank activities, check quality, borrower's information, compensation mechanisms and so forth) and encouraging mergers and acquisitions to strengthen the banking system, before taking new steps towards further liberalization. The same modernization process is ongoing for the stock market and for the market for Treasury bonds. Foreign participation is also welcomed. Indeed, foreign direct investment has proved to be crucial for economic development, and it is urgent for Morocco and Tunisia to rely on the vast sources of funds abroad.

In terms of monetary policy, a strict credit control was enforced in both countries until the mid-1990s, but this strategy was too rigid in the context of openness and globalization. The central bank developed a new toolbox based on open-market interventions, guidance of the credit conditions via interest rate management, required reserve ratios and so forth. An annual growth target has been set up for M3 in Morocco, and for M4 in Tunisia. In a financial environment that was characterized by capital controls, which guaranteed the stability of the money demand, the monetary policy consisting in targeting a broad money aggregate was efficient. However, this could dramatically change with the liberalization of the capital account, and with the full convertibility of the local currency. Indeed, the money demand relationship could become unstable, and make monetary policy less effective and its effects on inflation more uncertain.

Already, Morocco has received large capital inflows related to worker remittances, which have allowed the financing of an increasing large number of bank activities. The central bank has raised required reserve ratios, but this has not been sufficient, and the growth of the monetary aggregate M3 has reached about 14%, well above the 8 to 10% target. The worrisome implication is the subsequent weakening of the central bank's ability to control inflation. Inversely, Tunisia has had to cope with a loss in foreign exchange reserves, which hampered its trade expansion and put a huge pressure on the central bank, which had to deal with the constraints implied by debt servicing and exchange rate stabilization. On average over the last few years, the central bank's foreign exchange reserves could cover 5 months of imports for Morocco, but only 2 months for Tunisia. An improvement in currency convertibility and measures towards the liberalization of the capital account could lead to some period of instability in the foreign exchange market and speculative attacks that could induce a balance of payment crisis and a devaluation of the Dinar, given Tunisia's low amount of foreign exchange reserves.

Although recent reforms have enhanced the flexibility of monetary policy, a new framework for exchange rate and monetary policies could be necessary to take into account a new liberalized financial environment, where new macro-economic relationships are increasingly based on expectations.

#### ***D. Inflation Targeting as an Alternative Monetary Policy***

A policy of inflation targeting combined with a compatible regime of flexible exchange rates has been adopted by many industrial and emerging countries as an alternative to a more traditional monetary policy based on a broad money target and often associated with an exchange rate policy based on real exchange rate targeting. The prerequisite foundations to successfully implement this kind of policy are now well known (Carare et al, 2002).

Morocco and Tunisia seem to be well positioned in that regard, in particular, relatively to its improved fiscal position, which is a crucial pre-condition for success. They have already long abandoned their fixed exchange rate regime for a real exchange rate targeting policy, and they are getting ready to gradually reduce foreign exchange intervention so as to enhance the credibility of the new regime. A smooth transition process will indeed determine the viability of the inflation targeting policy and its degree of credibility. In the case of Morocco and Tunisia, the same factor that has produced the need for greater exchange rate flexibility, namely, the increased international integration of financial markets, has also served in the past to bring discipline to their macro-economic policies. These incentives will be likely stronger in the future, but the past acceptance of this discipline and short-term costs of tighter fiscal and monetary policies as a result of the financial liberalization is encouraging to consolidate their anti-inflationary reputation.

Another important issue for Morocco and Tunisia is the degree of inertia that characterizes their inflation process. Inflation targeting policies have shown their efficiency in guiding inflation expectations, limiting expectation errors, dealing better with inflation shocks and reducing their persistence by strengthening forward-looking instead of backward-looking expectations (Corbo and al, 2000). But any inflation target has to be based on an adequate model of transmission channels and this model could include broad money (Altinkemer, 2004).

An inflation target also allows the authorities to focus on domestic considerations and to smooth out the negative effects of shocks on the economy. Nadal de Simone (2001) shows that inflation targeting has been associated with lower output variance in New-Zealand and Australia. Output volatility did not change before and after the inflation targeting policy setup in other countries, but this constant variance could be explained by less cost-push inflation during the late 1980s and the 1990s.

In the mid-1970s and early 1980s, the main sources of inflation and output volatility in Tunisia and Morocco were clearly the two oil shocks. Following the SAPs of 1983-84, both countries engineered a successful policy of disinflation despite an initial depreciation of their respective currency. In the 1990s, exogenous shocks (terms of trade shocks associated with a high concentration in exports, droughts, political uncertainties, and so forth) seem to have been the main sources of inflation and output volatility in Tunisia and Morocco, but at much lower level than in the past. It is interesting to note that Morocco experienced 1 to 2% lower economic growth than Tunisia during that decade, before catching up in 2003. Fiscal volatility declined sharply even if consumption and investment volatilities were still high (Yousef, Johansson and Silva-Jauregui, 2003). An inflation targeting policy could help Morocco and Tunisia reinforce the credibility of their commitment to macro-economic stability with a formal engagement to increase the central bank's independence, thereby raising fiscal discipline. At the same time, it could allow both country to smooth out the volatility of the agriculture sector for Morocco (with a 45% labor force absorbed in this sector) and the volatility of the service sector for Tunisia (with the same 45% share in labor force).

A priori, cost-push factors could be kept under control in Morocco and Tunisia because of the high level of unemployment, but the segmentation of the labor market, the weight of the public sector and the centralization of wage negotiations could become problematic. Clifton, Leon and Wong (2001) find evidence that the inflation-unemployment trade-off, that is the cost in terms of output and unemployment of a reduction of the inflation rate, is progressively reduced in an inflation targeting framework with the improvement of the central bank's credibility and the shift from a backward-looking to a forward-looking inflation expectation process. If agents believe that the central bank will fulfill its anti-inflationary commitment, then it will not be necessary to contract output and raise unemployment by as much as it was the case before to achieve a lower inflation rate. This possibility is crucial for Morocco and Tunisia, which have to cope with high unemployment rates and large cohorts of youth and newcomers in the labor market. If fighting against inflation means an unbearable sharp increase of the unemployment rate, the cost of this policy will not make it credible, and could result in crises, as was the case, for example, in Europe in 1992-93. The flexibility of the labor market will also become much more important in a context of inflation targets and floating exchange rates. Exchange rate fluctuations should adjust to differences in domestic and foreign economic conditions, but large currency movements could be detrimental due to the denomination of a large share of the external debt in dollars. External competitiveness will also depend on the authorities' ability to control wages and the flexibility of the labor market will determine the capacity of the economy to absorb external shocks and stabilize exchange rates.

### **Section III: Inflation Regime Changes and Methodology**

Berg and Lundkvist (1997) and Blix (1999) showed that major changes in monetary policy could cause shifts in the mean and/or the variance of inflation. The goal of this section is to identify the macroeconomic factors (economic fundamentals and policy instruments) that may have contributed to a change in inflation process in Morocco and Tunisia over the last three decades and in particular during liberalization phases. The progressive liberalization of the capital account and convertibility of the local currency, the development of domestic financial markets, the switch from credit control to a market-based instrumental monetary policy, the significant change in macroeconomic policies (SAPs) and commitments of the Moroccan and Tunisian authorities are likely to have modified the inflation process and its determinants.

The first part of this section exposes the potential sources of inflation. Theoretical research differentiates cost push factors (wage-price nexus, external shocks, exchange-rate pass-through) from demand pull factors (expansionary fiscal and monetary policies). Also relevant are liberalization factors, which are often omitted in the literature. The second part presents the methodology, which relies on a Markov switching model with time-varying transition probabilities to capture not only changes in inflation regimes, but also their determinants.

#### ***A. Determinants of Inflation in Morocco and Tunisia***

- **Wage-price nexus:** Productivity gains normally affect only real wages, not nominal wages when markets are free. However, both countries have used wage and price controls to keep inflation in check. Under these conditions, higher productivity tends to lower prices during periods of wage controls. However, the relaxation of these controls during a phase of market liberalization is likely to create inflationary pressures on labor markets. Productivity growth is therefore a possible factor driving inflation in the short run. Furthermore, productivity is usually (inversely) related to (un)employment, another source of (dis)inflation. The lack of reliable data on unemployment makes productivity a

good alternative indicator. The growth of per capita GDP is used to proxy these productivity gains.

- **External shocks:** International commodity price fluctuations, oil and wheat in particular, constitute the main source of imported inflation. Both countries are oil importing nations and have growing needs for petroleum. They are also dependent on food imports given the large effects of droughts on their agricultural production. Proxies for oil and food shocks should reflect not only the price fluctuations, but also the level of dependence on imported commodities. An appropriate indicator is the product of the commodity price and the ratio of the commodity import to merchandise imports. For example, the proxy of oil price shocks is the international price of petroleum times the ratio of fuel imports over merchandise imports.

- **Exchange rate pass-through:** Nominal exchange rate movements can substantially affect the amount of imported inflation, to the extent that domestic producers raise their prices by a proportion of the currency depreciation rate. Numerous developing countries have experienced a collapse in a fixed exchange rate regime and the resulting effect of higher inflation. Even countries, which have selected real exchange rate targets (e.g., crawling pegs) instead of fixed exchange rates, have had difficulty controlling inflation. Interestingly, Tunisia appears to be an exception, probably due to favorable conditions (no external shocks, coupled with price controls and reasonable fiscal/monetary policies), according to the latest IMF Country Report (2003). Lagged changes in the exchange rate are used as a proxy for the exchange rate pass-through effect. The one-year lag also eliminates the potential problem of simultaneity between the exchange rate and price changes.

- **Expansionary fiscal and monetary policies:** Increases in aggregate demand, which usually translate into higher prices, can be fueled by rises in government expenditures (fiscal policy) or looser credit conditions (monetary policy). Indeed, the Moroccan and Tunisian governments have used special funds for public consumption despite efforts to reduce their budget deficits, and eased credit controls to boost household consumption. Prices of non-traded goods could then rise when price controls are relaxed in the framework of market liberalization. Several proxies are available to capture the stance of fiscal and monetary policies. First, the ratio of government budget deficit (or expenditures) over GDP is a useful indicator of fiscal policy. Another important factor is the ratio of government domestic financing to GDP. Indeed, Morocco and Tunisia have preferred to rely more on domestic rather than external financing to reduce liquidity and exchange rate risks. This strategy tends to lower inflationary pressures due to the associated crowding out effect on investment and growth. Second, the difference between money supply growth and lagged inflation as well as the ratio of domestic credit provided by the banking sector to GDP are alternative indicators of monetary policy. Other proxies for public or private consumption are, respectively, the growth differential between government expenditures and GDP or the growth differential between household consumption and GDP.

- **Liberalization indicators:** Specific factors of inflation can be traced to liberalization programs. Trade liberalization tends to exert disinflationary pressures as domestic producers are increasingly forced to compete with cheaper foreign imports. A common proxy for trade openness is the ratio of exports and imports (of goods and services) to GDP. Financial liberalization is expected to lower prices of banking services, but can also result in credit booms and market bubbles, so its effect on inflation is ambiguous. It is often proxied by the ratio of money supply M2 to GDP, in the absence of better quantitative indicators. The liberalization of the investment regimes is captured by the ratio of foreign direct investment to GDP.

***B. Methodology: Markov Switching Models with Time-Varying Transition Probabilities (TVTP)***

As mentioned above, it is likely that the liberalization and modernization of financial markets as well as changes in stabilization policies have caused changes in the inflation process. Previous econometric studies that have attempted to test the presence of structural breaks or switches in inflation regimes have encountered several technical difficulties. Jacobson, Jansson, Vredin and Warne (1998) estimate an autoregressive process incorporating a dummy variable with Ordinary Least Squares (OLS). The predictive power of their inflation equation provides evidence of regime switches. The advantage of this method is that it offers an estimate of the statistical significance of the regime switch represented by the dummy variable. However, it is probable that the latter variable is dependent of the other variables, which enter the inflation process, and of the monetary policy change, making the OLS estimates biased and inefficient. To be relevant, this method also requires that the regime switch be observed, dated and the one and only switch in the period. Christiano (1989), Pallardo and Esteve (2000) estimate a co-integration relationship and build an Error Correction Model (ECM) to investigate the predictive capacity of their model. However, their study faces the same problem regarding the choice of the regime switching date. Furthermore, their results are not conclusive in terms of inflation regime change because of the aggregation of too many factors in their model. Groeneveld (1998) uses a Kalman filter to estimate the pattern of change in inflation. This method emphasizes the learning process of Bayesian agents, where the value of the coefficient estimated is revised with each new observation. In this case, it is possible to obtain evidence of the time-evolving role played by explanatory variable, but the hypotheses on the type of evolution of the coefficients can be too strong. Evans and Wachtel (1993), Evans and Lewis (1995), Bleaney (1997) and Blix (1999) estimate a Switching VAR model and obtain time-varying probabilities of inflation regimes. Their results can be interpreted as a measurement of the degree of credibility of the inflation target policy. The limitation of this approach comes from fixing transition probabilities from a regime to another for the whole period considered. Indeed, significant economic shocks can modify the way in which movements of the explanatory variables will be taken into account by agents in evaluating the inflation regime switching probabilities.

The approach used in this paper overcomes these challenges by estimating the shifts from a high inflation regime to a low inflation regime (and vice versa) simultaneously with their transition probabilities. This methodology is based on a Markov-switching model with fixed transition probabilities that Hamilton (1989) initially developed, and that Filardo (1994, 1998) later extended by allowing the transition probabilities to change over time with the fluctuations of an information variable. The objective of the empirical study is to investigate the determinants of the time-varying probabilities of inflation regime switches for Morocco and Tunisia, based on the available annual data from 1966 to 2000.

First, inflation is assumed to follow the following process:

$$\pi_t - \mu(s_t) = \sum_{j=1}^m \phi_j \pi_{t-j} - \mu(s_{t-j}) + \sigma(s_t) \varepsilon_t \quad \text{with } t = 1, \dots, T \quad (1)$$

where  $\pi_t$  is the inflation rate.

Equation (1) states that the mean,  $\mu$ , and the variance of inflation,  $\sigma$ , depend on the state of the economy, namely  $s_t$ . The model distinguishes between one high inflation regime ( $s_t = 0$ ) and one low inflation regime ( $s_t = 1$ ). The former is also characterized by higher inflation

volatility than the latter. So, the inflation variance,  $\sigma$ , can vary with the state of the economy, depending on the degree of heteroskedasticity of the endogenous variable. Hamilton (1989) assumed that the regime variable,  $s_t$ , followed a first order Markov process.

He defined the transition matrix:

$$P = \begin{bmatrix} p^{11} & 1 - q^{00} \\ 1 - p^{11} & q^{00} \end{bmatrix} \quad (2)$$

where the transition probabilities are defined as follows :

$$\begin{aligned} p^{11} &= \Pr[S_t = 1 / S_{t-1} = 1] \\ p^{01} &= 1 - p^{11} = \Pr[S_t = 0 / S_{t-1} = 1] \\ q^{00} &= \Pr[S_t = 0 / S_{t-1} = 0] \\ q^{10} &= 1 - q^{00} = \Pr[S_t = 1 / S_{t-1} = 0] \end{aligned} \quad (3)$$

The probability of being in either one of two states in period t depends only on the state in period t-1. A limitation of Hamilton's model is that the probability of being in a particular state, given the state in the previous period, is constant over time. Filardo (1994, 1998) extends Hamilton's (1989) Markov-switching model by allowing the transition probabilities to change over time with the fluctuations of an indicator variable,  $Z_t$ . The transition probabilities are defined in logistic form as follows:

$$P(S_t = s_t / S_{t-1} = s_{t-1}, Z_t) = \begin{bmatrix} p(Z_t) & 1 - q(Z_t) \\ 1 - p(Z_t) & q(Z_t) \end{bmatrix} \quad (4)$$

$$\text{where } p(Z_t) = \frac{\exp(c_1 + \beta_{1,i}Z_t)}{1 + \exp(c_1 + \beta_{1,i}Z_t)}, \quad q(Z_t) = \frac{\exp(c_0 + \beta_{0,i}Z_t)}{1 + \exp(c_0 + \beta_{0,i}Z_t)}$$

p is the probability of staying in a high inflation regime, q is the probability of remaining in a low inflation regime and  $Z_t = \{z_t, z_{t-1}, \dots\}$  is the set of exogenous variables considered to predict the future course of inflation. The transition probabilities p and the parameters of equation (1) are estimated simultaneously.

If  $\beta_{0,i} = \beta_{1,i} = 0$ , then the transition probabilities are fixed as in Hamilton's model. The models with fixed transition probabilities and with time varying transition probabilities are respectively called FTP and TVTP. By allowing transition probabilities to vary over time, we can analyze the mechanisms underlying shifts from a high inflation regime ( $S_t=0$ ) to a low inflation regime ( $S_t=1$ ) and vice versa. In particular, we will use this econometric framework to determine whether economic fundamentals and policy instruments have significant effects in bringing about shifts in inflation regime in Morocco and Tunisia.

We will also carry out Granger causality tests on all variables to ascertain their effects on inflation. It should be noted that preliminary Augmented Dickey-Fuller and Phillips-Perron tests reveal unit roots for the majority of the variables in levels, but not in differences. The original Granger causality test is improved by adding a mean-reversion term (that is, a one-year lag in the inflation rate and in the other variable considered in the causal relationship) to correct for the potential econometric bias due to possible co-integration. The test itself remains the same, but the underlying relationship estimated becomes an error-correction model rather than an unconstrained VAR model. This Granger causality test could provide evidence of the robustness of the TVTP estimation, although the goals of the two econometric procedures are different.

#### **SECTION IV: Empirical Results for Morocco and Tunisia**

The goal of our empirical investigation is to identify the macro-economic factors (economic fundamentals and policy instruments) that have affected the dynamics of inflation in Morocco and Tunisia over the last three decades and, in particular, during phases of market liberalization. The results will also be useful to answer such questions as: What has been the impact on the inflation process of the Structural Adjustment Policies and the increase in central bank independence? Did some new determinants of inflation emerge after the change in monetary policy and what is its current degree of credibility? Which is the influence of the international prices of goods like wheat and petroleum? To what extent could it be beneficial to target inflation instead of broad money given the ongoing financial and capital account liberalizations?

The results could also shed some light on the determinants of inflation in MENA nations similar to Morocco and Tunisia. So far, there are very few papers on inflation modeling for the MENA region. Loungani and Swagel (2001) use a VAR approach to find out that the main explanatory variables for current inflation in Mediterranean countries are past inflation, money growth, oil prices and exchange rates. The entire effect of fiscal imbalances is apparently captured by money growth or exchange rates depending on the hypotheses made on the causality (the order of the variables used in the variance decomposition analysis). These results seem to indicate that MENA countries are characterized by an inflation process driven by fiscal policy, which has produced a persistent inflation bias due to the frequent financing of the fiscal deficit by seigniorage, and a strong influence of the public sector on the economy. Another interesting aspect of this analysis is the strong inertia that the authors found in the inflation process, especially for countries with moderate inflation. This underlines the role of the labor market, in particular wage negotiations and the formation of expectations in the inflation process.

In this paper, time-varying transition probabilities (TVTP) and indicator coefficients are estimated for Morocco and Tunisia to provide important information concerning the mechanisms underlying shifts from a high inflation regime to a low inflation regime and vice versa. This Markov-switching methodology has also been motivated by the respective patterns of inflation for both countries. Figure 3 clearly shows that the first oil shock caused a peak in inflation in 1974, but there seems to be a major difference in the inflation dynamics between the two nations after this episode. In Morocco, inflation remained high until the mid-1980s, whereas in Tunisia, it came back down quickly until the second oil shock which caused a second transitory peak in inflation. Since the mid-1980s, following the SAPs, both countries successfully managed to gradually reduce their inflation rates to less than 3% in 2003. The preliminary estimation of the fixed transition probabilities (FTP) confirm the difference in inflation dynamics, since the probability of being in a high inflation regime remains very high between 1974 and 1986 for Morocco, whereas the same probability only briefly peaks in 1974 and 1980-82 for Tunisia. Therefore, it might be relevant to distinguish not only between two regimes of inflation levels (low and high inflation rates), in particular for Tunisia, but also between two regimes of inflationary trends (accelerating and decelerating inflation), in particular for Morocco. As a result, the TVTPs are estimated on both inflation levels and inflation trends (that is, differences in inflation rates). The same set of explanatory variables was also used for both countries to explain shifts in inflation regimes, but for the sake of conciseness, only the most significant variables are shown below. Tables 1a and 1b present the results of the TVTP estimation of inflation levels, while Tables 2a and 2b show the results of the TVTP estimation for inflation trends (respectively for

Morocco and Tunisia).

<INSERT TABLES 1A & 1B HERE>

<INSERT TABLES 2A & 2B HERE>

Using FTP analysis as a benchmark, we can first observe in Tables 1a and 1b that inflation inertia is significant as in the findings of Loungani and Swagel (2001), since their first-order autocorrelation coefficient is about 55% for both countries. The average rates in the “low inflation” regime are 3.4% in Morocco and 5.2% in Tunisia, while the average rates in the “high inflation” regime rise to 10.7% in Morocco and 14.3% in Tunisia. From the low to the high inflation regime, inflation volatility doubles for Morocco from 1.6 to 3.5%, and triples for Tunisia from 1.7 to 5.8%. Although these parameters vary a little in the TVTP estimations, depending on the explanatory variable selected, they are always highly significant and close to these FTP benchmark estimates. This is evidence of the robustness of the methodology used in this paper.

The fixed transition probabilities to stay in the low inflation regime are 93.4% in Morocco and 90.7% in Tunisia, while the probabilities to remain the high inflation regime are logically lower (given sound macro-economic policies), that is 88.5% in Morocco and 58.3% in Tunisia. This confirms our previous observation about the shorter duration of high inflation episodes in Tunisia than in Morocco. One of the explanations for that increased resistance to inflation is the stronger commitment to macro-economic stabilization and the smaller exposure to exogenous shocks (for example, Tunisia is a net oil exporter, whereas Morocco is a net oil importer).

Analyzing the FTP results in Tables 2a and 2b, relative to the acceleration or deceleration of inflation, we can first notice that the first-order autocorrelation coefficient is negative (-69% for Morocco and -29% for Tunisia), which implies strong reversal forces after an inflationary shock. Furthermore, the probabilities  $q$  ( $p$ ) to stay in a decelerating (accelerating) inflation regime are much smaller (28.2 and 19.5%) for Morocco and for Tunisia (95.5 and 92.8%). Also, the average rate of inflation acceleration is 3.6% in Morocco, but only 0.3% in Tunisia, whereas the average rates of disinflation are respectively -2.7% and -0.4%. These observations are consistent with the previous inference of persistent effects of inflationary shocks for Morocco, and temporary effects for Tunisia.

Overall, the TVTP results show that the fiscal and monetary policy indicators significantly affect transition probabilities for inflation levels and trends in Morocco, but only for inflation levels in Tunisia. Also relevant in the accelerating-decelerating inflation processes are external shocks for both countries, as well as exchange rate path-through and price-wage nexus variables for Morocco. Granger causality tests, which are not shown for the sake of concision, tend to confirm these results. More specifically, we reach the following conclusions from TVTP estimations and Granger causality tests:

- 1) External shocks play a crucial role in regime switches between decelerating to accelerating inflation.

Statistically, spikes in French inflation and food price shocks (weighted by the country’s net dependence on food imports) are significant factors in lowering the probability for Morocco to stay in a dis-inflationary regime (since their respective beta coefficients indexed by the state 0 are negative in Table 2a). Similarly, French inflation tend to shift Tunisia from a low



to a high inflation regime (Table 1b), while increases in world food prices tend to accelerate Tunisian inflation (Table 2b). Granger causality tests confirm that world inflation of food products has a significant effect on domestic inflation in both countries. Oil and food price shocks are also significant factors of inflation in Morocco, which is a net oil importer contrary to Tunisia. These results are consistent with the theory of imported inflation. In particular, the significance of French inflation is the consequence of the early Moroccan and Tunisian regimes of fixed exchange rates combined with oil and food price hikes in the 1970s. The higher French inflation levels (or increases), the lower the probability to stay in a low (or decelerating) inflation regime. Inversely, both countries could have taken advantage of French disinflation in the 1980s if they had not let their currency depreciate following the implementation of Structural Adjustment Policies. Arguably, other economic forces, such as lower oil and food prices were at play to allow Morocco and Tunisia to reduce their inflation in the 1980s. Indeed, Moroccan and Tunisian agricultural production is tied to erratic weather conditions, and frequent droughts force these nations to rely on imported food whose price fluctuations affect their domestic inflation. The stronger these world food price shocks, the lower the probability to pursue an inflation deceleration. On the other hand, both countries have implemented a policy of food and oil subsidies and price controls, so that higher food prices abroad do not always translate in additional domestic inflation. Few shocks occurred in the 1990s, but the continued declining inflation trend in France has probably played an important role, although exchange rate targets became real instead of nominal, thereby losing some of their anti-inflationary power.

2) Exchange rate pass-through effects on inflation are not meaningful.

The nominal exchange rate flexibility index, which rises when a currency regime goes from fixed to floating, as in Cartapanis and Dropsy (2004), is the only exchange rate variable that has a significant and positive effect on domestic inflation acceleration, in occurrence for Morocco. One would have expected Moroccan inflation to rise following the move from fixed nominal exchange rates to managed exchange rates and a sharp currency depreciation in the mid-1980s, but the opposite took place. As mentioned above, it is likely that price controls and tighter fiscal and monetary policies, as well as a return to a nominal peg in the 1990s, have exerted a counter-effect to these inflationary pressures due to the exchange rate pass-through effects. As a result, one should not be worry about the potential inflationary impact of a change of regime towards more flexible exchange rates, as long as it is accompanied by inflation targeting.

3) Fiscal and monetary policies perform a very important function in the dynamics of inflation.

Many indicators of stabilization policies are significant for inflation levels and trends in Morocco, but only for inflation levels in Tunisia. This first observation tends to confirm a previous conclusion concerning the different nature of regime shifts between both countries. Moroccan prices tend to be stickier than in Tunisia, and inflation is more persistent in the former than in the latter country. In terms of statistical results, the government budget balance to GDP ratio and the growth of money supply M2 are significantly affecting domestic inflation in Morocco. A decrease in the budget balance (that is a deterioration of the fiscal deficit) or an increase in money creation both lower the probability to stay in a low inflation regime (hence the respective positive and negative signs for the two beta coefficients indexed by the state 0, in Table 1a). Similarly, an increase in the money supply M2 or M3 to GDP ratio (or, more marginally, in the growth of domestic credit) raises the probability of switching from a low to a high inflation regime in Tunisia (cf. Table 1b). In terms of inflation

trends, a rise in the share of domestic financing of the government debt (to GDP ratio) increases the probabilities to stay in, or switch to, a dis-inflationary regime in Morocco (cf. Table 2a). This appears to have been a successful strategy for Morocco, to counteract against the planned depreciation of the Dinar relative to the French Franc in the mid-1980s. Indeed, holding a foreign-currency denominated debt would have potentially created a vicious circle of inflation/depreciation due to the higher costs of servicing the debt in local currency, as many Latin American nations have experienced. Monetary expansion in Morocco, proxied by either the ratio of money supply M1 to GDP, or the growth of money supply M2, logically raises the probability to switch to a regime of disinflation (cf. Table 2a). It can be inferred from these results that the sound fiscal and monetary policies implemented by both countries since the SAPs were effective in reducing inflation over the last 15 years. Granger causality tests tend to confirm the important role of monetary policy rather than fiscal policy.

However, Morocco had frequent difficulties in reaching its monetary target, in part because of external shocks (for example, in worker remittances). The corrections that have been made to limit inflation surges have had positive consequences on governance: new instruments and facilities have been created. It would be appropriate for Morocco to continue improving its monetary policy and switch to inflation targeting, while there are no shocks. This new framework could change the formation of expectations and focus them on forward-looking events and structural aspects of the inflation process rather than short-term and highly reversible events. Although, Tunisia does not yet suffer from the same difficulties, its liberalization of financial markets should probably weaken the efficiency of its current monetary policy. Inflation targeting combined with a more flexible exchange rate regime would remedy this issue and enhance the credibility of its monetary policy.

4) Productivity growth can be a significant factor for disinflation.

One of the main goals of financial liberalization is to improve resources allocation, which would ultimately raise productivity growth and standards of living, according to the theory. TVTP results show that an increase in any of the three selected indicators of productivity (or growth) significantly raises the probability of staying in a dis-inflationary regime in Morocco. In this country, national wage negotiations take place every three years and the authorities have so far succeeded to keep them from rising too fast and create a wage-inflation spiral. Actually, real wages fell in the 1980s, which played a key role in avoiding a spike in inflation after the sharp currency depreciation of the Dirham. Granger causality tests also show the strong link between productivity and disinflation in Morocco, contrary to what the Balassa-Samuelson effect predicts in emerging economies. Besides the effective downward pressure the government exerts on wages, the highly segmented labor market can also explain this phenomenon. However, the liberalization of markets may alter this conclusion in the future.

To summarize our empirical observations and results, there have been significant changes in inflation regimes in both countries over the last four decades. First, it is important to recall that Moroccan prices appear to be downward sticky, so that high inflation regimes are more persistent than in Tunisia. As a result, it is more appropriate to analyze regime changes for inflation trends in Morocco and inflation levels in Tunisia. That being said, shifts from low (decelerating) to high (accelerating) inflation regimes can be best explained by external shocks (such as in the 1970s and early 1980s), while switches from high (accelerating) to low (decelerating) inflation result from sound fiscal and monetary policies implemented following the SAPs of the mid-1980s. In the current low inflation regime, new factors related to the formation of expectations have appeared following the beginning of the liberalization process (that is the relaxation of price or wage controls). For example, monetary expansion affects

inflation via price and wage negotiations, which depend on inflation expectations.

In this context, it remains to be seen if Morocco and Tunisia can switch back from a high (accelerating) inflation regime following a hypothetical shock to a low (decelerating) inflation regime. First, the deep reforms that are still ongoing in Morocco and Tunisia have dramatically affected the channels of transmission of monetary and fiscal policies. The central role of expectations is still far from having reached its potential, especially in the highly centralized wage negotiations. The central bank is also adopting new instruments, and still learning how to use them efficiently. Second, in the new environment surrounding monetary and fiscal policies, the commitment of the government to stabilize prices after a shock has not yet been tested. The recent external economic shocks that followed September 11 have been a small test for Morocco and Tunisia, but future macro-economic challenges could be much more difficult, given the liberalization of the capital account, the full convertibility of the local currency, the changes in monetary and exchange rate policies.

## **SECTION V: Inflation Targeting: Achievements and Promises**

Several developed countries (New Zealand, Canada, United Kingdom, Sweden, Israel, and so forth), emerging countries (Chile, Brazil and Mexico) and transition countries (Czech Republic, Poland, Hungary) have adopted inflation targeting in the past decade. Few of them (Chile, Israel, Mexico) opted for this framework while they were moving from a fixed to a more flexible exchange rate regime in order to deal with the subsequent exogeneity introduced in the behavior of the monetary aggregates, which could potentially raise inflation expectations and fuel inflationary pressures.

Bernanke et al (1999) or Mishkin (2001) have shown that, even if inflation targeting did not reduce the long run inflation level to the level which industrialized countries reached while using another targeting framework, it was nevertheless very helpful because of the considerably stronger commitment in implying inflation reduction. The experiment of countries like Chile, Israel or Mexico, which started to implement inflation targeting with initial inflation rates about 15 to 20%, is conclusive. For Morocco and Tunisia, it appears to be just a matter of consolidating previous achievements. But the experiences of other developing countries could provide valuable lessons about prerequisites to maximize the credibility of an inflation targeting policy. Typically, basic institutional infrastructures with regard to the soundness of financial systems and fiscal policy have to be enhanced before setting up an inflation targeting framework, in order to preserve low and stable inflation levels. The latter conditions have been fulfilled by Morocco and Tunisia, but financial market reforms are still ongoing and could affect the credibility of their anti-inflationary commitment.

Routinely, countries report an inflation target as part of their government's economic plan for the next year, but this strategy should not be necessarily considered as inflation targeting, especially in the case of emerging countries. The objective of this section is to review several of the most important ingredients necessary to gradually implement a full-fledge inflation targeting policy, and to analyze the past accomplishments and future challenges for Morocco and Tunisia. These ingredients are: the choice of a numerical target for inflation, the communication strategy necessary to make the monetary policy more transparent and understandable to the economic agents, the framework for governance and accountability that will maximize the chances of success. Indeed, the success of inflation targeting depends crucially on a high degree of credibility of the central bank's commitment and its capacity to implement the appropriate policies to reach the target. The end of this section will expose

how the degree of credibility of this commitment is fostered by these institutional aspects of the inflation targeting framework.

### **A. The Choice of a Numerical Target for Inflation**

The first step in the definition of an inflation target is the choice of the target, which must be established as the key objective of the monetary policy. Should it be a point or a range? What should be the range's width? Should the range be upward or downward biased depending on the particular vulnerabilities of the economy, or should it be centered on the inflation rate targeted? Should it be a decreasing range? What is the optimal horizon? What is the more suitable index, the Consumer Price Index (CPI), or the underlying core inflation, and which goods should be removed from the inflation index? What should be the status of the goods benefiting from subsidized prices (wheat, gas and so forth)? What should be the time horizon to achieve the target? What kind of escape clauses need to be included?

Since 1995, the annual CPI inflation rate is around 2% for Morocco and 3% for Tunisia thanks to a 8 to 10% broad money growth target. The question is to know to which extent this target is relevant and reachable in the context of the liberalization of international capital flows, and of the current economic situation of the two countries. Morocco and Tunisia should probably target a midpoint of target ranges of 1-3% and 2-4% respectively. Two main arguments make this choice the most credible one: this target is in line with the annual inflation rates of the main trading partners, and it covers the inflation rates achieved by the two countries since 1995, even in years of unexpected exogenous shocks (for example, very large flows of workers' remittances to Morocco since 2001). Undershooting the target has occurred more often than overshooting in Morocco, so the authorities could plan a reduction of the hedges of the band after a while, although it could be counterproductive in the short run. Nevertheless, recent developments in the Moroccan and Tunisian economies have introduced some uncertainties.

In 2001, the Moroccan monetary authorities failed to soak up the liquidity due to the large flows of workers' remittances. The subsequent 14% broad money growth raised the domestic demand and the inflation rate surged from 0.6 to 2.8%. An unexpected event like this one could dramatically weaken the credibility of an inflation target, especially if the actual inflation rate is not in the range, and point to the difficulties of the central bank to control its economy and to the lack of efficiency of its tools. So, the range has to stay large until the central bank has enhanced the effectiveness of its interventions, developed new instruments and enhanced its communication with the public and with the markets to avoid a loss in credibility. In Tunisia, the last tightening of the fiscal and monetary policies in the context of the European slowdown has been very costly in terms of economic growth (which dropped from 6 to 1.8%). It is doubtful whether the authorities would like to implement again this kind of policy, which can be politically risky, and whether it would be suitable, given the stubbornly high unemployment level. In the future, the government could have to balance again the effects of tight macro-economic policies necessary to dampen strong domestic demand and inflation, against the adverse and wider than expected effects these policies could have on domestic economic growth, which could be even heavier under a lower inflation target range. Some explanations of the higher inflation rate for Tunisia than for Morocco could probably be found in analyzing the role of structural factors like wage negotiations and the power of anticipative mechanisms in a relatively more open economy.

To answer the first question, a range is easier to achieve, limits the risks of missing the target,

and alleviates the constraint on the inflation-unemployment trade-off. According to Cecchetti and Ehrmann (2000) output deviations appear in all inflation targeters' reaction function. Some authors argue that an inflation target allow a discretionary behavior of the central bank, which usually causes an inflation bias. The central bank is indeed tempted to create more inflation than announced in order to lower real wages and increase economic growth, or to decrease the real debt cost and so forth. These inflation "surprises", being not anticipated, have the expected result, but the agents anticipate the possibility for the central bank to renege its announcement, which is non optimal ex ante. In other words, the initial inflation rate announcement is temporally inconsistent. The central bank cannot systematically surprise the agents, who take into account the central bank opportunist temptation. Its reputation is revised and the credibility of its commitment is weakened. The official inflation target could then not be the one used in the anticipative processes of agents and the economy could suffer an inflationary bias.

Actually, if such a discretionary behavior is theoretically possible, the experiment shows that central bankers operating in an inflation targeting framework do not take this opportunity very often, because it is not a "free lunch" and because they are concerned by symmetrically positive and negative inflation shocks. It remains that Morocco and Tunisia face with very heavy constraints in terms of employment creation and economic growth. An excessively narrow inflation target width, which does not offer any possibility for the authorities to accommodate negative economic shocks, could waste some of its anti-inflation policy credibility if the cost in terms of unemployment becomes unbearable. What is seen in developed countries as opportunism, and has to be avoided to enhance credibility, appears here to be a matter of survival and has to be considered in the setting of inflation target. The communication policy and the transparency have then to be properly encouraged and developed to explain clearly to agents and to markets what are the set of constraints for the authorities, the necessity to limit the negative impacts of some shocks on economic growth and why it cannot be interpreted as a weaker willingness to fight inflation. The width of the range determines the future credibility of the inflation target. An excessively narrow target could also lead in instrumental instability. Exchange rate variations affect inflation more rapidly than monetary policy, and it could be difficult to control domestic inflation, especially for a small open economy exposed to several influences, which are sometimes exogenous. This explains why it could be well advised to target core inflation or to include escape clauses in the inflation target design.

Morocco and Tunisia have to be particularly cautious about this issue given the importance of the subsidized prices in the CPI index, for example for food and petroleum products. For Tunisia, the subsidies reach 19% of the CPI basket, according to IMF experts. If these subsidies need to be maintained, the central bank should then target an inflation index that excludes subsidized goods because of the distortions introduced in this index. The new index could reflect more exactly the underlying inflation evolution. It is rather common for inflation targeters to exclude from the index targeted items as food and energy that are especially subject to supply shocks, and on the price of which they have no control. Using a core inflation measure could limit the risks to miss the target, an undue loss of credibility and a potential punishment for the central banker.

Along the same idea, escape clauses could be very useful for small opened economies increasingly vulnerable to exogenous shocks, but the serious disadvantage of this option is that, in case of target missing, the agents could question the real willingness of the central bank to fulfill its commitment to reach the target. Eliminating from the index the goods that could suffer a supply shocks ex ante offers the benefit of transparency, which is crucial given

the time agents need to change their expectations and believe in the central bank and its commitment.

## **B. The Communication Strategy**

There is a consensus around the fact that the communication of the central bank with the public and with the markets is a key element of the success of inflation targeting. Most of the time, the inflation targeters have published inflation reports, monetary policy statements, central bank board meetings minutes, forecasting models used and inflation beliefs, the likelihood of target misses, the improvements made in central bank's underlying economic and econometric model and so forth. Communication policy is absolutely crucial because it conveys fundamental information, which can ease the coordination of agents' expectations, on one hand, and because accountability and communication are mutually reinforcing, on the other hand.

For Morocco and Tunisia, the transparency of the monetary policy must be significantly upgraded because monetary theory showed that multiple equilibrium paths are plausible for prices, so the policy framework should be transparent to avoid any misunderstanding with the public. Nor Morocco neither Tunisia give any information about the central bank's privileged information on the economic conditions and functioning, any inflation report, any inflation expectations; they release a few elements about the annual orientation of the monetary policy, but nothing on the reasons and motivations of that orientation, the risks and the changes occurred during the year in response to unexpected events. For example, the considerably high and unforeseeable flows of workers' remittances affected Moroccan broad monetary growth and inflation, but have not been the subject of any press release. The culture of market-based operations for the Moroccan and Tunisian central bank has not yet fully been acquired as well as the importance of agents' expectations. Furthermore, the underdevelopment of their financial, monetary and stock exchange markets dampens the effectiveness of the existing set of instruments, which need to be enlarged. Besides that, the effectiveness of a credible monetary policy depends on the power of expectations and will be enhanced with the general implementation of market-based price fixing mechanisms.

## **C. Governance and Accountability: Central Bank Independence and the Government**

In Morocco, the central bank governor is appointed by *dahir* (decree). Excluding the governor and the vice-governor of the central bank, the other members of the central bank board are appointed by the Prime Minister. The board includes 6 representatives of the main Ministries, which are chosen by their Minister (Finance, Economic Affairs, Industry, Agriculture, Local Authorities, Social and Economic Council) and 5 members, who must not work for a credit institution. The government commissioner, who is also a senior civil servant of the Ministry of Finance, is in charge of the supervision of the bank activities and especially of its relationships with the Treasury on behalf of the government. Two censors who are members of the Ministry of Finances control the central bank accounts.

In Tunisia, the governor is appointed by decree for 6 years. His advisor is required by the government for any monetary, credit or other issues that could affect the monetary situation. The vice-governor is appointed by decree and chosen on the proposal of the governor. The board is made up of 4 senior civil servants working in economic, financial or social governmental administrations or in public or semi-public institutions promoting the economic development of the country and of 4 deputies who are persons with proven experience with financial and economic issues. They cannot have any other legislative mandate or be a

member of the government. They have a 3 years renewable mandate. During their mandate, the deputies are independent of the institutions they come from. Their opinions cannot motivate any sort of retaliatory measure and they are free to express them. The censor, who is in charge of the bank's activities supervision, must be a member of the Ministry of Finance with at least the grade of director.

Nor Morocco neither Tunisia have an explicit contract specifying the respective roles of the different entities involved in setting the monetary policy. Four organisms are involved in the conduct of the Moroccan monetary policy (the central bank's governor, the Ministry of Finance, the government and the Office of Foreign Exchange) and there is nor a clear operational independence. Furthermore, democratic accountability processes lack in both countries. Several examples of binding contracts could help define the Moroccan and Tunisian governance and accountability framework of their monetary policy from the central banks of Canada and England, or from the one in New Zealand, which is probably the most severe and include explicit central banker firing clauses. It remains that the responsibility of each service within the central bank seems to be less crucial than the contract linking the central bank and the government and determining their respective responsibilities.

Among the political and administrative aspects of the inflation targeting credibility analysis, the nature of the interactions between the government and the monetary authorities is the third crucial factor in the inflation targeting design, given the impact the fiscal policy can have on central bank instruments fluctuations. Grand (2001) showed that the higher the government expenses, the higher the future fiscal pressure. The fiscal distortion implies a slowdown of the economic activity, which can be balanced by the central bank. Indeed, the central bank accepts a higher inflation rate while the inflation target is not changed if inflation and economic growth targets enter its objective function. In the same way, a rise in the national debt, which increases the domestic interest rates and depresses economic activity, could force the central bank to raise the level of inflation in order to lower the real interest rate. Another factor that could implicitly affect the instrumental independence of the central bank because of political pressures is the level of corruption. The higher the corruption, the higher the inflation target (Huang and Wei, 2003).

Because of the influence fiscal choices can have on the central bank's range of possible strategies, the degree of independence of the central bank is seen today as one of the key components of "best practices" in central banking, though studies made on developed countries often failed to establish a link between central bank independence measures and low inflation. One exception is Cukierman (1992), who uses the central banker turnover ratio as a proxy of political interference in monetary policy. The permanence of the central banker could reveal a lack of independence of the central bank and a probability of higher inflation. In the Moroccan and Tunisian cases, this measure would be irrelevant. Independence is a multidimensional concept. Literature distinguishes the instrument's independence, which is the ability of the central bank to adjust its instruments of monetary policy to achieve goals defined by the government, from the goal's independence, which refers to the ability of the central bank to choose its operational goals. The greater desirability of the former is now consensual. The tendency in the actual central banking favors an identification of the monetary policy goals by the government and a large flexibility is granted to the central bank in selecting the policies that will best achieve these goals. The Moroccan and Tunisian central banks have a clear unique goal, which is preserve the stability of the money value but it does not exist any law that enforces their freedom in choosing by themselves the most suitable policy even if their independence (also from the banking system) is progressively enhanced.

Recently the Moroccan central bank's status has been amended to grant it more independence. The Moroccan central bank is allowed to give its advice about the best policy to implement to the ministry of Finance, but the responsibility of the exchange rate liberalization process goes to the Office of Foreign Exchange. The central bank and the Office of Foreign Exchange are accountable to the Ministry of Finance, but this separation of powers does not ease the cohesion and coordination of each entity's actions. The 2003 First of April National Council for Money and Saving meeting predicts changes in the central bank status, granting it wider autonomy in implementing the monetary policy and clarifying the central bank's and government's respective roles in the purpose of exchange rate policy.

Instrumental independence means above all that the central bank is not forced to help the government finance its deficit. The government needs to tie its own hands and only rely on private markets for its financing requirements to enhance its anti-inflation credibility. Furthermore, this impossibility to influence central bank liabilities has to be enshrined in law in order to prevent the authorities to go back to old practices. This is clearly not the case in Morocco and Tunisia, even if the governments of the two countries avoid as much as possible to rely on to the central bank. This quasi-systematic sound practice of the Moroccan and Tunisian governments has to be explicitly announced and their commitment should be reinforced by a decree to allow them to draw the full benefits of their much more disciplined behavior and gain credibility. For Morocco, the next financial system reform plan should eliminate any possibility for the government to rely on the central bank in matters of deficit financing, except in the case of a major problem.

From this point of view, the Tunisian central bank's web site only gives very general information about activities, laws in force and organizational structure but not much information can be found on reform projects about the central bank status, potential new instruments, monetary and exchange rate strategies in the short and long run. In this framework, it is difficult to be knowledgeable about the ongoing reform. It would be a good idea to add a web link to the article IV consultation dealing with those aspects of the Tunisian institutional reform.

Increasing credibility also requires the central bank to be accountable, which means that the government can ask the central bank governor to explain and justify any aspect of the decisions made as part of the monetary policy. He could even fire the governor if the goals fixed are not reached. The modalities of the supervision of the central bank activities and achievements by the government and the costs the governor would have to pay have to be very clearly specified, so as to make obvious the system of incentives and punishments. It could help to improve further the quality of the communication policy in terms of information quality provided, inflation forecast model enhancing, decisions, procedures releasing, and so forth. This kind of formal procedure is not actually implemented in Morocco or Tunisia, though their central banks are accountable of the results they present to the Ministry of Finance and to the government.

## **SECTION VI: CONCLUSIONS**

The main objective of this paper was to examine why Morocco and Tunisia should progressively opt for greater exchange rate flexibility as well as a monetary policy based on inflation targeting rather than exchange rate targeting and money-growth rules, as their markets are increasingly liberalized. First, the sources of inflation (cost push and demand pull factors as well as factors due to financial liberalization) were theoretically identified. The goal of the empirical investigation was then to identify these macro-economic factors



(economic fundamentals and policy instruments) that have affected the dynamics of inflation in Morocco and Tunisia over the last four decades. A Markov switching model with time-varying transition probabilities was estimated and Granger causality tests were run for Morocco and Tunisia to provide important information concerning the mechanisms underlying shifts from a high inflation regime to a low inflation regime and vice versa. The empirical results provided evidence of significant changes in inflation regimes in both countries. In particular, it was demonstrated that Moroccan prices were more downward sticky, and thus the high inflation regimes were more persistent than in Tunisia. As a result, regime changes were analyzed in terms of inflation trends for Morocco and inflation levels for Tunisia. Shifts from low (decelerating) to high (accelerating) inflation regimes could be best explained by external shocks (such as in the 1970s and early 1980s), while switches from high (accelerating) to low (decelerating) inflation resulted from sound fiscal and monetary policies implemented following the SAPs of the mid-1980s. Finally the institutional and operational conditions for the success of an inflation-targeting framework were outlined.

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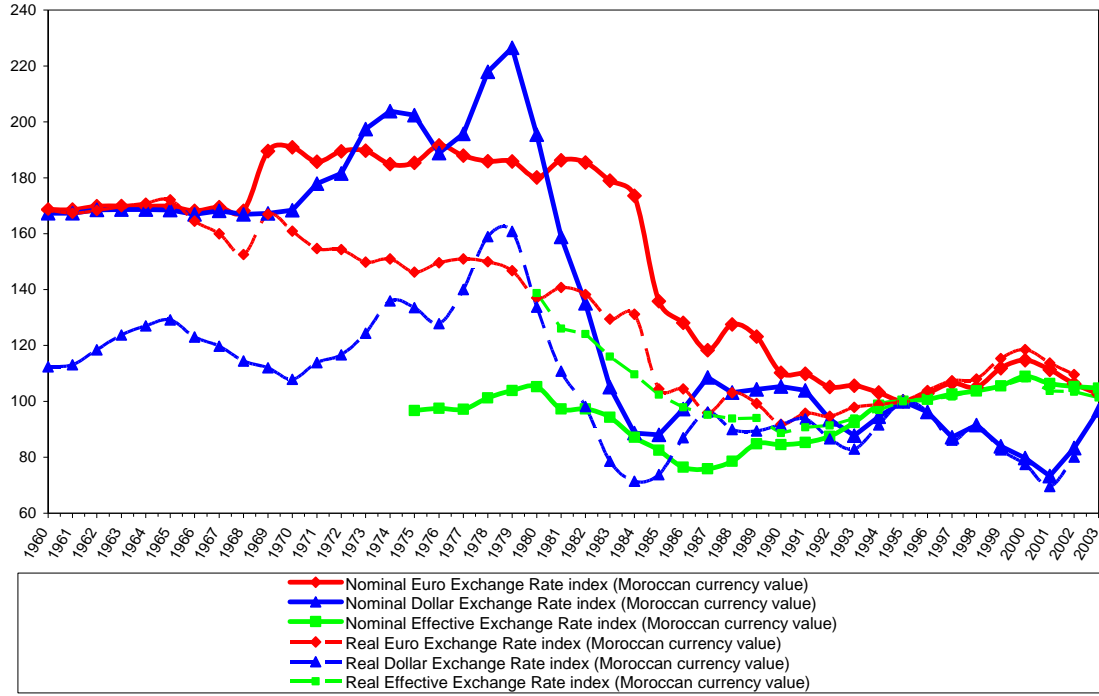
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**FIGURE 1: EXCHANGE RATES FOR MOROCCO**



**FIGURE 2: EXCHANGE RATES FOR TUNISIA**

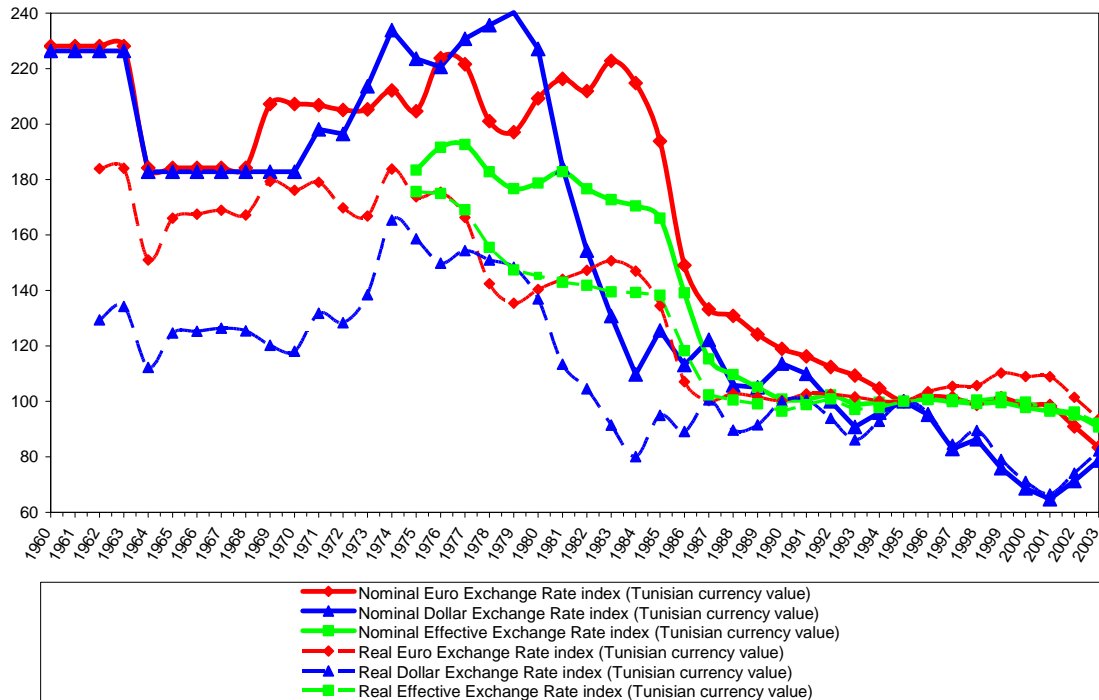


FIGURE 3: INFLATION RATES FOR MOROCCO, TUNISIA, FRANCE AND USA

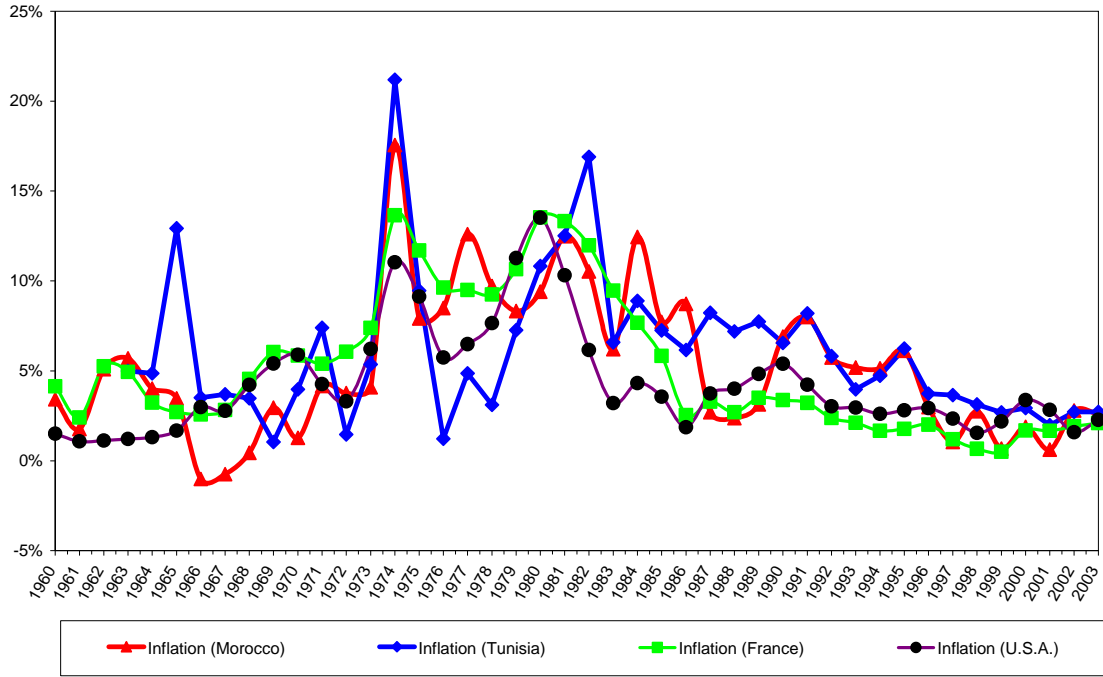
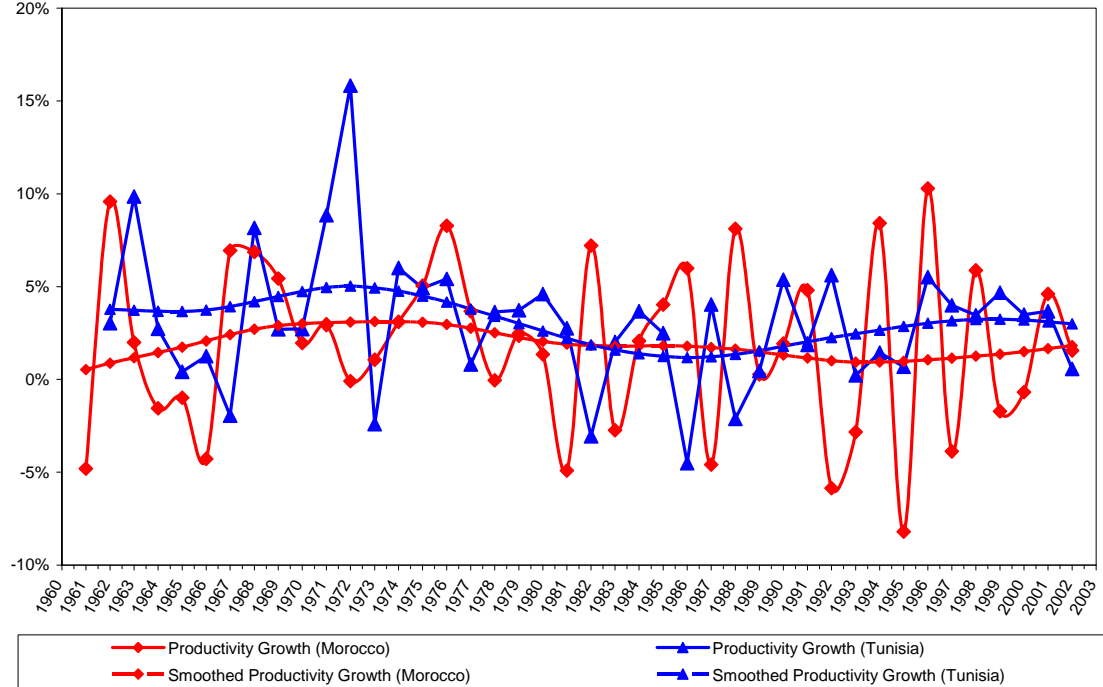


FIGURE 4: PRODUCTIVITY GROWTH RATES FOR MOROCCO AND TUNISIA



**Table 1a: Markov Switching Estimation of Inflation Levels for Morocco**

	$\phi_1$	$\mu_0$	$\mu_1$	$c_0$	$\beta_0$	$c_1$	$\beta_1$	$\sigma_0$	$\sigma_1$	q (0=>0)	p (1=>1)
FTP (no explanatory variable)	0.55	3.4%	10.7%	2.65 (5.5%)		2.04 (2.7%)		1.6%	3.5%	93.4%	88.5%
Government Budget Balance/GDP	0.64	4.0%	11.1%	3.96 (0.5%)	31.07 (10.3%)	-4.02 (33.1%)	-68.84 (21.8%)	1.6%	3.3%	84.0%	41.4%
Growth of M2	0.63	3.9%	11.1%	8.85 (2.0%)	-42.02 (5.1%)	6.43 (6.3%)	-27.88 (13.5%)	1.5%	3.4%	87.8%	88.2%

Note: in parentheses below the coefficient values are the significance levels

**Table 1b: Markov Switching Estimation of Inflation Levels for Tunisia**

	$\phi_1$	$\mu_0$	$\mu_1$	$c_0$	$\beta_0$	$c_1$	$\beta_1$	$\sigma_0$	$\sigma_1$	q (0=>0)	p (1=>1)
FTP (no explanatory variable)	0.54	5.2%	14.3%	2.28 (0.3%)		3.4 (73.0%)		1.7%	5.8%	90.7%	58.3%
French Inflation	0.51	5.3%	14.7%	5.03 (3.0%)	-45.61 (9.9%)	-343.83 (97.4%)	2706 (97.3%)	1.7%	5.7%	81.4%	8.8%
Change in M2/GDP	0.47	5.0%	14.5%	4.1 (2.8%)	-97.18 (2.3%)	3.07 (20.6%)	-233.63 (20.0%)	1.9%	5.3%	93.3%	65.6%
Change in M3/GDP	0.48	5.0%	14.5%	5.26 (3.4%)	-116.51 (10.1%)	2.77 (27.6%)	-143.53 (24.4%)	1.8%	5.3%	92.5%	69.0%
Growth of Domestic Credit	0.59	5.9%	16.1%	6.03 (4.6%)	-22.13 (13.5%)	-385.9 (97.9%)	1366 (98.0%)	2.1%	6.7%	89.0%	5.9%

Note: in parentheses below the coefficient values are the significance levels

**Table 2a: Markov Switching Estimation of Inflation Changes for Morocco**

	$\phi_1$	$\mu_0$	$\mu_1$	$c_0$	$\beta_0$	$c_1$	$\beta_1$	$\sigma_0$	$\sigma_1$	q (0=>0)	p (1=>1)
FTP	-0.69	-2.7%	3.6%	-0.94 (13.7%)		-1.42 (9.2%)		1.2%	3.5%	28.2%	19.5%
French Inflation	-0.70	-2.8%	3.7%	-2.93 (8.3%)	-152.57 (9.8%)	-1.77 (2.5%)	1.9 (95.5%)	1.1%	3.9%	16.2%	14.5%
Food Price Shock	-0.71	-2.6%	3.2%	-4.87 (10.6%)	-0.76 (9.9%)	-1.98 (8.2%)	-0.31 (16.3%)	1.1%	3.8%	18.9%	24.7%
Exchange Rate Nominal Flexibility (relative to the Dollar)	-0.68	-2.8%	3.7%	-1.4 (7.9%)	-3.27 (13.6%)	-2.31 (12.5%)	4.36 (27.6%)	1.2%	3.5%	25.0%	16.9%
Government financing (domestic)/GDP	-0.70	-2.9%	3.8%	-2.62 (9.9%)	108.7 (18.3%)	-2.69 (4.0%)	-71.35 (14.8%)	1.1%	3.9%	17.0%	11.4%
Money Supply M1/GDP	-0.69	-2.8%	3.7%	-0.92 (15.0%)	-47.7 (9.2%)	-3.79 (15.8%)	127.5 (31.0%)	1.1%	3.5%	26.8%	20.3%
Growth of Money Supply M2	-0.67	-2.4%	3.4%	-0.41 (51.1%)	-23.76 (8.3%)	-0.92 (20.8%)	-0.29 (98.0%)	1.2%	3.0%	41.9%	28.4%
Productivity growth (based on GDP per Capita)	-0.68	-2.8%	3.7%	-1.22 (8.9%)	21.87 (6.0%)	-1.71 (2.8%)	0.05 (96.9%)	1.1%	3.5%	30.8%	15.3%
Productivity Growth (based on Industrial Production)	-0.69	-2.8%	3.7%	-1.48 (4.5%)	45.13 (10.8%)	-2.88 (10.7%)	37.94 (16.2%)	1.2%	3.5%	27.5%	11.5%
Real GDP Growth	-0.68	-2.8%	3.7%	-1.22 (9.1%)	21.57 (6.0%)	-1.71 (2.8%)	0.01 (98.4%)	1.1%	3.5%	30.8%	15.3%

Note: in parentheses below the coefficient values are the significance levels

**Table 2b: Markov Switching Estimation of Inflation Changes for Tunisia**

	$\phi_1$	$\mu_0$	$\mu_1$	$c_0$	$\beta_0$	$c_1$	$\beta_1$	$\sigma_0$	$\sigma_1$	q (0=>0)	p (1=>1)
FTP	-0.29	-0.4%	0.3%	3.09 (1.0%)		2.56 (3.7%)		1.3%	6.7%	95.6%	92.8%
World Food Inflation	-0.37	-0.3%	0.4%	2.99 (1.4%)	-7.39 (12.5%)	1.17 (51.9%)	-1.44 (78.7%)	1.3%	7.6%	89.1%	75.8%

Note: in parentheses below the coefficient values are the significance levels