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Requirements for Using Interest Rates as an Operating Target for Monetary Policy: The Case of Tunisia

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IMF Working Paper

Monetary and Capital Markets Department

**Requirements for Using Interest Rates as an Operating Target for Monetary Policy:
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Abstract

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This paper discusses the use of interest rates as the operating target for monetary policy in Tunisia and the roadmap for establishing the other building blocks of an inflation targeting framework. It argues that strengthening the effectiveness of the current monetary policy framework will facilitate the adoption of inflation targeting over time.

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I. INTRODUCTION

Over the last two decades, Tunisia has undertaken economic reforms which have allowed access to international capital markets on favorable terms: a good macroeconomic policy track record was established; the prudential framework for the financial sector was strengthened; the foreign exchange system was liberalized; and the Central Bank of Tunisia (BCT) has developed monetary instruments in line with best practices.² Building on these achievements the authorities wish to strengthen Tunisia's integration into the global economy and the BCT is contemplating a move to an inflation targeting (IT) framework in the medium term. The 11th Economic Plan outlines the key areas in which reforms are needed to pave the way for adopting IT (Box 1). Attainment of these goals would mark the culmination of the program of economic reforms aimed at scaling back direct government intervention and enhancing the role of market forces in the allocation of financial resources. In moving toward this goal, the authorities intend to ensure that reforms take full account of their economic and social dimensions.

This paper discusses the requirements for using interest rates as the operating target for monetary policy, as well as the roadmap for establishing the other building blocks of an IT framework. Section II summarizes Tunisia's program of economic reforms. Section III focuses on the use of interest rates as the operating target for monetary policy. Section IV looks at the transmission channels of monetary policy and offers empirical evidence for the interest rate channel in Tunisia. Section V analyses Tunisia's

Box 1. Tunisia: Objectives of the 11th Economic Plan

The objectives of the 11th Economic Plan covering the period 2007–2016 are to double per capita income and reduce unemployment by four percentage points. Hence, overall productivity must increase, which requires enhancing the effectiveness of economic policies. A key pillar of this strategy is enhancing the efficiency of the financial sector.

Full convertibility of the currency is expected to facilitate foreign investment. It calls for a sound and efficient financial sector so as to facilitate long-term saving mobilization; a strong external position in order to ensure the stability of the dinar; and availability of hedging instruments against financial market risks.

Adoption of a floating exchange rate regime will help Tunisia's integration into the global economy. It calls for enhanced financial intermediation; reliance on market mechanisms in the conduct of monetary policy; and adoption of an exchange rate policy aimed at enhancing competitiveness and mitigating external vulnerability.

A monetary policy focused on inflation control is the last pillar of the strategy. It requires optimizing the utilization of economic information; enhancing the transparency of monetary and fiscal policy; and promoting financial stability

² Tunisia has been issuing debt on international capital markets since 1994, starting with issues on the Japanese market for maturities between 5 and 30 years. As of 1997, Tunisia began issuing debt on the European and American markets. On April 17, 2003, Moody's raised Tunisia's foreign currency bond rating to Baa2. Standard & Poor's and the IBCA have agreed on a BBB rating since 2000.

compliance with the building blocks of an IT framework, in light of the example of other emerging countries having moved towards IT. Section VI concludes.

II. OVERVIEW OF TUNISIA'S PROGRAM OF ECONOMIC REFORMS

During the 1970s and much of the 1980s, Tunisia pursued inward-looking development strategies emphasizing the key role of the state in accelerating economic development and ensuring national control over strategic sectors.³ These objectives were achieved through direct government involvement in key sectors, including subsidies to private investments in priority sectors, and a system of tariffs and exchange controls designed to protect infant industries and control foreign exchange allocation. The main function of the heavily controlled financial sector was to collect savings at low cost and redirect them to government and public enterprises as well as to priority business sectors, interest rates were set administratively and were usually negative in real terms; monetary policy was conducted primarily through direct allocation of credit and refinancing; money markets were underdeveloped; and bond and equity markets were virtually nonexistent. In order to tackle the macroeconomic imbalances and mounting financial inefficiencies that ensued, in the mid-1980s Tunisia embarked on comprehensive stabilization and structural reform programs aimed at establishing a market-based and private-sector-driven economy.

A. Financial Sector Reforms

In the mid-1980s, the authorities embarked on wide-ranging financial reforms aimed at correcting the serious imbalances that had emerged in the banking sector. The objective was to curtail direct government intervention in the sector, strengthen the role of market forces in the allocation of savings, enhance the capacity of financial institutions to mobilize savings, and increase competition and the financial soundness of banks. The initial phase (1987–1993) aimed at a gradual dismantling of direct monetary policy controls. It culminated with current account convertibility when Tunisia accepted the obligations of Article VIII of the IMF's Articles of Agreement in 1993.⁴ The liberalization of lending rates started early on in the process, and the regulatory constraints imposed on banks' balance sheets were relaxed gradually, and they were allowed greater freedom in undertaking foreign currency operations. Concomitantly, prudential regulations for the banking sector were introduced and strengthened in several stages with a view to enhance consistency with international best

³ Appendix 1 summarizes the measures adopted in the monetary, financial, and external sectors.

⁴ At the time of acceptance of Article VIII obligations, lending rates had been almost fully liberalized, the prudential framework for the banking sector had been significantly strengthened, and progress had been made in liberalizing trade. However, capital controls were pervasive; banks were still required to lend to priority sectors and their ability to undertake foreign currency denominated transactions was limited.

practices, and action was taken to restructure public enterprises. These measures resulted in a strengthening of the soundness of the banks and the privatization of most state-owned banks. In parallel, the stock market was modernized; foreign investors were allowed to participate in the government securities market; and banks and firms benefiting from ratings or listed on the stock exchange were allowed greater leeway for foreign borrowing.

Following acceptance by Tunisia of the obligations of Article VIII, financial reforms aimed at paving the way for the development of financial markets. In 1994, the authorities introduced a spot interbank foreign exchange market. The legal framework for the banking and securities sectors was strengthened and prudential rules were further enhanced. Following the lifting of restrictions on lending rates and the elimination of lending requirements to priority sectors (late 1996), money market operations became the main monetary policy instrument (early 1997).

B. External Sector and Policies

During the past decade or so, monetary policy in Tunisia has been implemented in the context of a managed floating exchange regime whereby the BCT intervenes in the market with a view to achieve a slight pace of depreciation of the real exchange rate against a basket of currencies weighted according to the country's main trading partners and competitors. This policy aimed at adjusting periodically the nominal exchange rate so as to support the competitiveness of the Tunisian economy vis-à-vis its main trading partners. This approach has allowed the main exporting sectors to record good performances. In the most recent period, the BCT has also begun to take into account a broader set of indicators to gauge the competitive position of producers and guide its exchange rate policy.⁵

At the same time, extensive restrictions on capital inflows and outflows were maintained, allowing the authorities to pursue an independent monetary policy that has been prudent over the period. The BCT focused on setting the target rate of expansion in credit to the economy around the rate of nominal GDP growth, in effect targeting growth in broad money. Capital controls were utilized to ensure that domestic savings would be used to finance domestic investment (rather than the acquisition of foreign assets), and to limit reliance on short-term external financing. Good progress was made in liberalizing capital transactions for nonresidents: inward foreign direct investments are now to a great extent liberalized and nonresidents are allowed to bring foreign exchange into the country and keep it in bank accounts denominated in foreign currency or in convertible dinar. However, nonresidents are not allowed to invest in domestic money- or capital market-debt instruments, except through

⁵ For a review of Tunisia's experience with real exchange rate targeting, see IMF (2002b).

mutual funds shares invested in such securities, and through the purchase of bonds listed in the stock exchange or the purchase of government securities (up to 20 percent of each issue). In addition, the regulatory framework for outward capital transactions is still fairly restrictive except for export-oriented activities (Box 2).

Box 2. Tunisia: Summary of Exchange Arrangements

(Position as of end-2007)

Exchange rate structure and market. Since 1994, the exchange rate of the dinar is determined in the interbank market, with BCT intervention aimed at keeping it at its targeted level. Banks are allowed to provide forward contracts to exporters, importers, and service providers, and for financial operations.

Foreign currency bank accounts. Residents are allowed to open: (i) *comptes spéciaux*: open to new or returning residents who wish to repatriate assets from abroad and keep the proceeds in foreign currency; (ii) *comptes professionnels*: open to exporters. Accounts holders may keep up to 100 percent of export proceeds without BCT authorization; and (iii) *comptes devises bénéfiques exports*: open to individuals and businesses with income in foreign currency other than export proceeds. Account holders may keep 15 percent of foreign currency earnings without BCT authorization. Nonresidents may bring foreign exchange into the country and keep it in bank accounts denominated in foreign currency, and take it out at any time; 50 percent of earnings from work must be deposited in nonconvertible dinar-denominated accounts.

Capital transactions. Stock purchases in Tunisian companies by nonresidents do not require prior approval unless a controlling share or voting rights are acquired, in which case prior approval is required; investment proceeds can be freely repatriated. Investments by nonresidents in domestic debt instruments are restricted except through the purchase of shares issued by mutual funds, the purchase of bonds listed in the stock exchange and the purchase of government securities (up to 20 percent of each issue). The accumulation of assets abroad by residents requires prior authorization, however exporters may transfer limited amounts annually to finance business related expenses. Commercial credits to nonresidents by residents require BCT approval. Corporations may freely contract foreign currency loans from nonresidents up to an annual limit, and limits were further liberalized for credit institutions and firms which have a rating or which are listed in the stock exchange.

Provisions specific to financial institutions. Commercial banks may (i) borrow abroad up to the equivalent of TD 10 million equivalent per year; (ii) open correspondent accounts with foreign banks but are required to transfer 80 percent of their foreign currency holdings to BCT foreign correspondents [*nivellement*] at the end of the day; (iii) provide forward cover for trade-related and financial operations (up to 12 months)^{1/}; (iv) engage in foreign currency/dinar swap operations and in forward rate agreements to hedge against interest rate risk. BCT authorization is required to grant loans to nonresidents. Institutional investors are not allowed to purchase assets abroad. Offshore banks are not subject to exchange controls.

^{1/} At the end of 2007 the BCT announced that the limit will be extended beyond 12 months.

The trade regime was also significantly liberalized: Tunisia joined the WTO in 1994, and a far-reaching liberalization of trade and services is under way. The Association agreement

with the European Union will result in the elimination of tariffs imposed on European goods by 2008. Regional and bilateral trade agreements have been signed with Middle Eastern countries; they are expected to lead to the creation of a regional free-trade zone.

C. Monetary Policy Framework

Tunisia operates monetary policy in the context of a managed float based on an undisclosed basket of currencies with no preannounced path for the exchange rate. The value of the dinar is determined on the interbank market which, in turn, is guided by daily indicative buying and selling exchange rates against major currencies in a 1 percent range. The BCT also publishes the weighted-average rate for interbank transactions for the previous day, and it may intervene in the spot foreign exchange market at levels that do not necessarily correspond to the published mid-point range.⁶

Under Article 33 of the May 2006 Central Bank Law, the priority objective of monetary policy is to safeguard price stability. This amendment removed the ambiguity regarding whether the domestic stability of the currency had priority over its external stability.⁷ The May 2006 BCT law amendments⁷ also eliminated all forms of monetary financing. These changes laid two key features of an IT framework. The BCT also intends to adopt interest rates as the operational target of monetary policy. In the interim, monetary policy has been anchored on a monetary program (Appendix I): the BCT derives annual targets for M3 from the government's financial program, as well as monthly targets for M3 and base money growth. Finally, it calibrates monetary operations based on liquidity forecasts, and aims at keeping short-term interbank rates within a desired range.⁸

Monetary targeting has *de facto* been used rather as a reference value than as a normative path for the monetary base. For instance, in 2006 outturn figures generally surpassed monthly targets (Figure 1) and overruns of the target did not necessarily trigger a correction the following month, even in an inflationary environment. The degree to which monetary base targets are a credible constraint—particularly in an inflationary period—would have been enhanced by the monitoring of contemporaneous and leading inflation indicators, leading to appropriate action. Furthermore, the BCT does not proceed to a critical analysis of the macroeconomic forecasts provided by the *Institut d'Études Quantitatives* (IEQ). Finally, the fact that the BCT manages liquidity on the basis of its liquidity forecasts means that it

⁶ The intervention policy is guided by the behavior of the real effective exchange rate (TCER). Since 2001, the BCT has been targeting a depreciation of the TCER in order to support export competitiveness and growth.

⁷ The former Article 33 stated that: “*The ultimate objective of monetary policy is to safeguard the value of the currency by keeping inflation down to a rate close to the rate observed in partner and competitor countries.*”

⁸ See Appendix I for a detailed description of the monetary programming framework.

implicitly provides banks with all the liquidity they need to comply with their required reserves and at no penal cost.

III. USING INTEREST RATES AS THE OPERATING TARGET: MONEY MARKET DEEPENING

Effectively using interest rates as the operating target for monetary policy assumes a set of pre-requisites. First, the money market has to operate smoothly so that changes in the central bank's policy rate (typically a short-term rate) can have an effect on the yield curve. In this context, it is expected that the money market is liquid and deep across maturities. Second, commercial banks' liquidity management and funding policies must allow a gradual adjustment of lending rates to money market conditions. Third, monetary management has to ensure that money market conditions remain in line with the monetary policy stance, whilst allowing the market to develop the risk management instruments that a more active use of an interest rate would warrant. Meeting these conditions in Tunisia will most likely take some time as it will require some adjustments to strengthen financial markets.

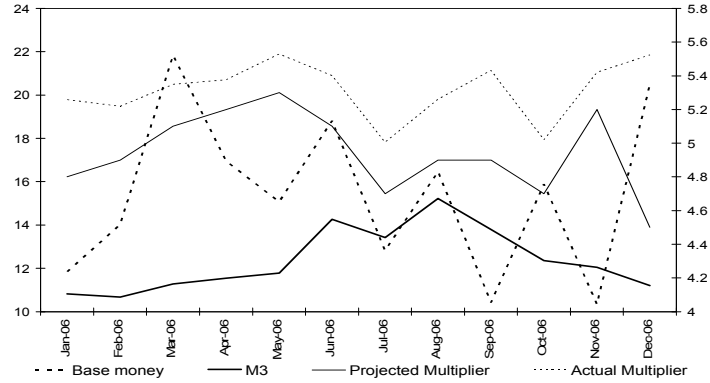
A. Interbank Money Market and Liquidity Management in Tunisia

The Tunisian overnight interbank market has the technical characteristics of an advanced market. The introduction in 2006 of a Real-Time Gross Settlement System (RTGS) made it possible to modernize liquidity management through real-time knowledge of account balances at the BCT. The smooth functioning of the market was enhanced by the introduction of an intraday repo facility, permitted by the integration of the securities settlement system and the RTGS. However, the tight management of the overnight interbank market rate by the BCT (see below) has limited the development of term transactions: 95 percent of interbank transactions are overnight or for maturities of less than one month (Figure 1). Term transactions beyond one month and short-term swaps are virtually nonexistent.

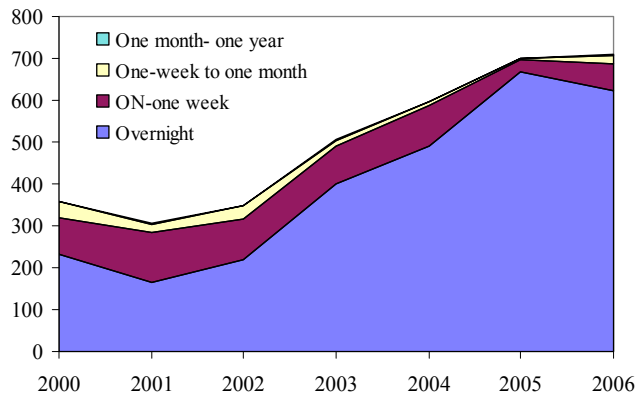
The lack of volatility of the overnight rate (TMM⁹) (Figure 1) has been a deterrent to active liquidity management by banks treasurers, which typically roll-over their positions in the overnight market. It has also prevented the development of an interest risk management function of bank treasuries. They have become mere funding centers for the bank, rather than risk management units *per se*. A consequence of the lack of risk management is the transfer of the interest rate risk to their customers, as reflected by the fact that 80 percent of banks' loans, irrespectively of their duration, are indexed on the TMM. Consequently, an increase in the central bank's policy rate has an immediate impact on the cost of most loans (i.e., not only on new ones).

⁹ Taux Moyen du Marché Monétaire.

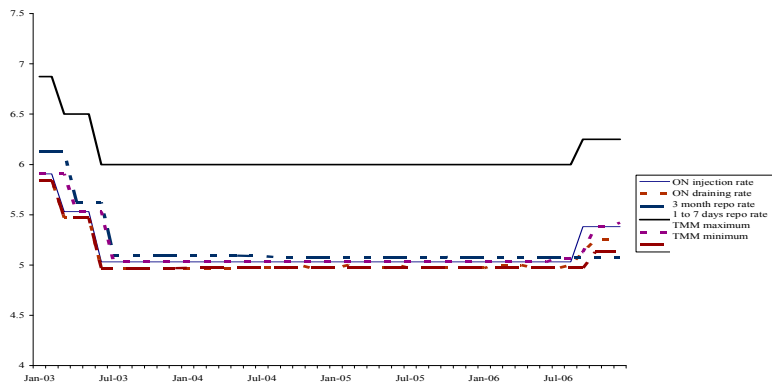
Figure 1. Key Monetary Indicators
Monetary targeting has de facto been used rather as a reference value than a normative path for the monetary base



The tight management of the overnight interbank market rate by the BCT has limited the development of term transactions



The lack of volatility of the overnight rate (TMM) has been a deterrent to active liquidity management by banks treasurers (money market rate and BCT key rates from 2003 to 2006)



Source: BCP.

This excessive sensitivity of commercial banks to TMM changes' may pose a problem for the use of interest rate as the operational target of monetary policy, and hence, affect the feasibility of IT, because of a potential overreaction of lending conditions to changes in key policy rates. Furthermore, while a Master Repo Contract is in place since 2006, the repo market has not really gotten off the ground: repo transactions are only used by the BCT for its liquidity provision operations. In turn, the limited use of repos, in the context of a heterogeneous banking sector and some commercial banks' reluctance to work with certain state-owned banks, hampers the development of the interbank market and in particular term transactions.

The shallowness of the interbank market for term operations has resulted at times in pricing aberrations and anti-competitive behavior. In particular, large institutional customers which enjoy strong bargaining power have been able to secure above-market remuneration for large deposits from banks with a tight liquidity position. The weakness of the interbank market has implications for the feasibility of IT as it results in poor integration between the money and foreign exchange markets.¹⁰ Currently, forward exchange transactions generate sizeable foreign exchange open positions for the banks which cannot be hedged on the money market. This segmentation is also reflected in the internal organization of banks, where foreign exchange trading rooms are very often physically separated from money market trading rooms.

Tunisia's increased reliance on domestic debt has helped strengthen the primary market and facilitated the supply of good quality collateral for money market transactions.¹¹ The secondary market is nonetheless virtually nonexistent and active management of banks' portfolios is hampered by the lack of a genuine repo market. Banks may engage in short-term repo-type operations ("*ventes à réméré*": sale on a deferred payment basis, or with option for repurchase) which sometimes carry rates above those in the money market. These transactions present two main shortcomings: they offer no legal certainty regarding ownership of the collateral, and they encourage market segmentation. The similarity between bond market rates (e.g., for medium-term transactions) and the rates prevailing on these short-term operations reflects inconsistencies in deposit mobilization at the banks and the inefficiency of the various market segments which complicate monetary policy signaling.

¹⁰ This view is also confirmed by the findings of Boughrara et al. (2007).

¹¹ Government securities (Treasury bonds at 2, 5, and 10 years account for 2/3 of negotiable domestic debt instruments) are auctioned to primary dealers, and the bid cover ratio has been in the 300 percent region.

B. Monetary Management: Assessment and Way Forward

The BCT has in place a set of monetary instruments in line with international best practices (Box 3) but monetary policy implementation suffers from several weaknesses, stemming largely from a simultaneous focus on quantities and prices. The BCT is able to implement monetary policy in a context of structural surpluses or deficits of liquidity. Its monetary operations are based on efficient infrastructures (RTGS, securities Delivery versus Payment—DVP system). “Window guidance”¹² and fine-tuning operations have made possible for the

Box 3. Tunisia: Monetary Policy Instruments

Required reserves ranging from 0 to 5 percent based on maturity of deposits. They are non-interest-bearing, and full averaging during the monthly reserve maintenance period is allowed. **Standing lending facility** involves 1–7 day reverse repo operations at the policy rate + 100 basis points. **Discretionary operations** include: (i) 7-day deposit/credit auctions; (ii) three-month tenders for repos; (iii) outright sales/purchases of government securities; and (iv) overnight fine-tuning operations.

BCT to keep the overnight interbank market rate within a range of +/- 12 basis points around the policy rate. However, such practices have undermined the effectiveness of market signals in the conduct of monetary policy, leading to a limited role of interest rates in monetary policy implementation. The effectiveness of the liquidity forecasting framework is weakened by the volatility of the Treasury’s end-of-the day balances with the BCT. Other autonomous factors contribute only marginally to forecasting errors and greater exchange rate flexibility going forward will further reduce the uncertainty of the projections associated with foreign assets. These difficulties limit the effectiveness of short-term liquidity management but they would not prevent the adoption of a framework giving a greater role for interest rates.

The introduction of open-market and fine-tuning operations is an important step in the modernization of monetary policy implementation. There is now a need to ensure that monetary policy implementation allows flexibility in the overnight interbank rate. To that end, liquidity management should focus on achieving a small given amount of excess reserves at the end of the reserve maintenance period: regular monetary operations should aim at adjusting the provision of reserves to changes in autonomous factors over the reserve period; fine-tuning monetary operations aim at smoothing out short-term unanticipated changes in liquidity conditions through volume adjustments; standing facilities should only aim at correcting discrepancies in the liquidity situation from forecasts which could not be corrected by fine-tuning operations. Operating under the above environment would require several adjustments to the current operational framework:

¹² “Window Guidance” operations allow the central bank to steer interest rates using small operations through which key market participants are advised of the central bank’s intention, and adjust subsequently their quotations. Such operations correspond to a soft form of moral suasion.

- First, establishing a corridor for short-term interbank market rates by allowing banks to have access to an unconditional overnight deposit and lending facility at the BCT would foster market development provided the corridor is wide enough.
- Second, conducting fine-tuning operations on market terms (using variable rate auctions for instance, with a minimum or maximum rate if deemed necessary), so that a balanced amount of central bank reserves ultimately make it possible for market rates to converge toward the BCT policy rate.
- Third, using purchases/sales of government securities on the secondary market for structural liquidity management via the setting-up of an outright open-market portfolio, for example by ensuring that these assets are backed by a stable monetary liability (currency in circulation or required reserves), and using repo operations for fine-tuning operations.

C. Money Market Deepening

Strengthening the money market calls for establishing economic incentives, in close coordination with the banking community, rather than regulatory measures. The indexation to the TMM rate of most of banks' operations is the main obstacle to money market development beyond the overnight market. Because of such indexation, bank treasurers have no incentives to mobilize longer-term funding, since they are not exposed to interest rate risks. The indexation of longer-term resources, such as the administered saving (*Taux Réglementaire de l'Épargne-TRE*) remunerated at TMM minus 200 basis points adds to the current situation. Reducing the degree of indexation of banks' balance sheets and offering banks additional options to price their operations would help to develop the interbank money market and as risk management instruments. The following measures can be considered:

- Give the TRE the role of a floor rate and develop benchmark rates (BOR-type)¹³ which would allow banks to mobilize term deposits at a fixed rate, and price their loans using these benchmark references.
- Encourage the creation of money market mutual funds to boost competition for resources, encourage enhanced asset/liability management,¹⁴ diversify the market, and stimulate the use of repo-based money market operations.

¹³ Similar, for instance, to the London LIBOR or the EURIBOR.

¹⁴ In France, the development of money market mutual funds (SICAVs) has helped strengthen the redistributive role of the money market, and the diversification of interbank instruments, while diminishing the importance of
(continued...)

- Allow greater variability in short-term interest rates in order to encourage banks to manage their overall asset-liability positions in a more market-oriented perspective.
- Rely on repo operations in the management of government cash balances so as to encourage banks to expedite the required preparations for using repo operations.
- Develop interest rate risk hedging instruments such as short-term interest rate swaps, so that banks can provide hedging instruments should interest rates become flexible.¹⁵

IV. EMPIRICAL EVIDENCE FOR THE INTEREST RATE CHANNEL IN TUNISIA

Given the evolving economic environment in Tunisia, as discussed in Section II of the paper, the estimation of relationships between monetary, financial, and real economy variables is a difficult exercise since they are expected to be subject to a high degree of statistical instability. In that context, this exercise may simply detect what kind of changes are currently operating in the economy in order to enrich the economic and policy discussion, without establishing stable relationships in the long run.

A. Theoretical Background to Assessing the Transmission Mechanisms

The study of monetary policy transmission mechanisms aims at assessing to what extent, according to what time scale, and through which economic variables, monetary policy decisions influence the economic cycle and inflation. Irrespective of the objectives pursued by a central bank, it is important for it to be familiar with these mechanisms so as to be able to assess the time lag between a policy decision and its influence on economic variables. In addition, ongoing assessment should make it possible to detect over time any new channels through which the central bank could expect to influence economic activity and prices.

The literature on transmission mechanisms generally shows that a change in the monetary policy stance, if temporary and unanticipated, has a transitory but small-scale impact on real activity.¹⁶ Conversely, the impact on price levels seems permanent but takes a longer time to materialize. Furthermore, the results frequently reveal a mismatch in the effects of monetary policy depending on the state of the economic cycle, with the monetary policy decision

captive sources of funding for banks. The transparency and competitive practices obligations (ban on having business dealings channeled predominantly through the bank promoting SICAVs), and the use of repos had stimulated the market's development by the end-1980s.

¹⁵ Swaps of variable rate against EONIA are the main interest rate risk management instruments in the euro area.

¹⁶ See for instance Deutsche Bundesbank (2001) and Angeloni et al. (2003).

having a more pronounced impact in periods of economic slowdown than during growth periods. In some countries, in the industrial countries in particular, it also appears that the effect of monetary policy is linked to the long-term outlook and capital intensiveness of production. Accordingly, the impact of a monetary policy action appears more substantial in sectors such as fabricated metal products or transport equipment than in agricultural products.

Depending on the structure and characteristics of the economy, the effects of monetary policy on real activity and price levels may manifest themselves in theory through various channels:

- **Interest rate channel:** a modification of the real interest rate in the economy will affect the decisions of economic agents through increases in the cost of financing their consumption and their investment.
- **Exchange rate channel:** a modification in the monetary policy instrument affecting interest rates may result in a reallocation of financial portfolios which will impact the exchange rate in an economy that is open, integrated, and with ample capital movements. The subsequent change in the exchange rate will have an impact on foreign trade by modifying the relative value of exports and imports.
- **Bank credit channel:** a monetary policy decision may affect the potential volume of credit offered by financial intermediaries by modifying the size of bank deposits and reserves. This channel will be especially powerful to the extent the economy relies primarily on bank institutions for financing expenditures and investments.
- **Balance sheet channel:** the channel whereby the volume of credit may be reduced in the wake of an impairment of the net worth position of economic agents attributable to a change in the monetary policy instrument. By affecting the value of the collateral required for borrowing operations, the monetary policy decision will modify the profitability of firms and the solvency of consumers which may in turn lead banks to adjust their volume of credit. An implication of this channel is that these potential repercussions are liable to be more significant for small-scale enterprises than for large ones which have access to other forms of financing.
- **Financial asset price channel:** a modification of the monetary policy instrument may modify the price of financial assets, particularly by affecting the relative price of shares vis-à-vis bonds. This may encourage firms to modify their investment plans financed by venture capital (Tobin's q ratio) and/or encourage households to modify their consumption by means of a wealth and/or liquidity effect.

In practice, these transmission channels are generally estimated by means of structural macro-econometric or short-term econometric models. Macro-econometric models impose a relationship that is stable over the long term between the economic variables and thus take a long time to detect any structural shift that may alter the relationships between economic variables. Short-term econometric models (such as vector autoregression (VAR) models) rest primarily on a short-term dynamic among variables, which are more sensitive to any shift in the ground rules, while leaving open the possibility of a longer-term relationship among the variables. In emerging or developing countries, the economic structures are subject to shifts over the course of time and one should only expect to find a limited number of relationships that are stable over the long term.

In emerging countries like Tunisia, it seems therefore more appropriate to test the reaction of economic variables to a monetary policy shock in the context of a benchmarked vector autoregression (VAR) model, so as to ensure maximum flexibility in the dynamics of the variables.¹⁷ Nevertheless, it is worth bearing in mind that the type of transmission channels in an economy is a short-term phenomenon, inherently likely to undergo change.¹⁸ They offer no assurances as to what transmission channels will be like in a changed economic environment.

B. Review of the Literature on Tunisia

Given the limited availability of statistical data, relatively few research papers have focused on an assessment of the transmission channels for Tunisia. Recently, however, several articles have discussed the BCT's monetary policy strategy and transmission channels.

Several articles point to the need to modify the monetary target to more closely reflect the reforms and changes unfolding within the Tunisian economy. Treichel (1997) finds that the preconditions for a monetary base targeting framework were in place in its sample as far back as 1995. However, he stresses the importance of re-assessing money functions in light of the reforms undertaken. Analyzing the period 1987–2000, Boughrara (2002) finds an inverse causal relationship between narrow aggregates (M2) and inflation. He shows that M2 is not perfectly controllable in the short term. This argument is also supported by Benbouziane and Benamar (2004). Daly (2003) shows that the variations in the monetary base account for only a minimal portion of fluctuations in M3.

¹⁷ See among others Mahadeva and Sinclair (2002) and Kandil (2006).

¹⁸ This explains why, generally speaking, the VARs estimated for this purpose are unconstrained, particularly for economies in transition (see e.g., Favero (2001)).

Boughrara (2003) carries out a comparative analysis between the Moroccan economy and Tunisian economy over the period 1988–2001. He shows that the monetary channel is the most important channel in Tunisia, while noting the low degree of exogeneity of base money. In contrast to Morocco, the exchange rate channel seems minimally significant in Tunisia, although this conclusion is called into question by the exchange rate policy stance during this period. This result, in line with the conclusions of the foregoing studies, raises the question of the sustainability of a base money targeting strategy. The study also shows that the exchange rate and base money are leading indicators of inflation.

By contrast, Boughrara et al. (2007) seems to suggest that the nominal exchange rate may be an important transmission channel and a significant determinant of the dynamics of the nonperforming loans (NPLs) in the recent period. Within a simplified (theoretical) setting, they emphasize the sensitivity of IT effectiveness to the state of the banking system. In particular, given the current weakness of the banking system (characterized by a significant amount of NPLs), the effectiveness of IT could be strongly dampened, if not completely wiped out, when the rise in the policy interest rate is associated with a negative supply shock.

C. Assessment of the Transmission Mechanisms in Tunisia

Methodology

Given the specific features described above for the Tunisian economy and in order to detect the impact of a monetary policy shock on economic activity and prices, two benchmark vector autoregression (VAR) models are used. VAR models are to some extent a-theoretical, in the sense that their structure does not depend on precise economic relationships. Hence, we need to impose some restrictions on the estimated coefficients to reconstruct the underlying structural model. In this paper, we consider a VAR(p) model of the following type¹⁹:

$$(1) Y_t = A(L)Y_{t-1} + B(L)X_t + \eta_t$$

where Y_t is the vector for Tunisian endogenous variables, X_t is the vector for exogenous foreign variables and η_t is the vector for residuals.

Given the BCT's simultaneous monitoring of money supply and the overnight interest rate, two models are used. The estimation focuses on the period January 2001–September 2006,

¹⁹ Each estimated VAR model contains a constant and a deterministic trend.

with a monthly frequency.²⁰ Given the limited number of years and the temporary nature of economic developments in Tunisia (primarily on account of the reforms), the analysis of long-term relationships in the economy has been neither adopted nor imposed in the estimations.²¹ Nonetheless, each VAR model is estimated in levels, allowing for the introduction of implicit cointegration relationships among the data. The structure of the lags in the VAR models has been chosen in accordance with the Akaike and Schwartz Information Criteria, which suggested a two-lag VAR(2) in each case.²² The data were expressed in natural logarithms and seasonally adjusted,²³ except for (Tunisian and European) interest rates which were expressed solely in terms of levels and not seasonally adjusted.

In the first model, the Tunisian endogenous variables model is comprised of real GDP (at constant 1990 prices), y^{TUN}_t , the consumer price index, p^{TUN}_t , a monetary aggregate, m^{TUN}_t , and the nominal effective exchange rate²⁴, x^{TUN}_t . With respect to the monetary aggregate, two versions are tested, one with the money base, h^{TUN}_t , and the other with the broad aggregate $m3^{TUN}_t$:

$$\begin{aligned} (2) \text{ Model 1: } & Y'_t = [y^{TUN}_t \quad p^{TUN}_t \quad m^{TUN}_t \quad x^{TUN}_t] \\ (2a) \text{ Model 1': } & Y'_t = [y^{TUN}_t \quad p^{TUN}_t \quad h^{TUN}_t \quad x^{TUN}_t] \\ (2b) \text{ Model 1'': } & Y'_t = [y^{TUN}_t \quad p^{TUN}_t \quad m3^{TUN}_t \quad x^{TUN}_t] \end{aligned}$$

²⁰ Given the constraints set forth above setting the starting date at 2001, it is preferable to work with a monthly frequency. All data are available at this frequency, except for GDP, only available at annual and quarterly intervals. Given the high degree of correlation (nearly 60 percent) between the annual GDP growth rate and the growth rate in industrial output, this latter variable is used to establish a monthly frequency for quarterly GDP in accordance with the method proposed in Chow and Lin (1971).

²¹ Imposing long-term restrictions (cointegration) may undoubtedly improve the quality of the VAR estimation, but it may also introduce inconsistencies in the estimate when the number of observations is limited.

²² The standard tests for specifications for data and estimate quality have also been carried out. In particular, the LM and White tests suggest that, in all cases, the residuals of the VAR models are not correlated and are homoskedastic.

²³ In order to limit rigidities in estimating seasonal coefficients, the X11 method was used to convert gross series into seasonally adjusted series. We cannot rule out the possibility that seasonal factors inherent in the Tunisian economy (Islamic holidays) have not been totally corrected for by the standard seasonal adjustment methods. See for example the discussion in Mongardini and Saadi-Sedik (2003).

²⁴ In the literature, the exchange rate variable is generally the real effective exchange rate taking into account the presence of the price index. However, in using the nominal (not real) effective exchange rate, we are better able to isolate the exchange rate channel.

In the second model, the money market overnight interest rate, tmm^{TUN}_t is added into the endogenous variables vector to take account of the BCT's interventions on the interbank market:

$$(3) \text{ Model 2: } Y'_t = [y^{TUN}_t \quad p^{TUN}_t \quad m3^{TUN}_t \quad tmm^{TUN}_t \quad x^{TUN}_t]$$

For each of these models, the exogenous foreign variables vector is the same and comprises the Brent price, oil_t , real activity in the European Union,²⁵ y_t^{EU} and the short-term interest rate in the European Union, s_t^{EU} : $X'_t = [oil_{t-1} \quad y_{t-1}^{EU} \quad s_t^{EU} \quad s_{t-1}^{EU}]$.

These exogenous variables are used to take account of any shifts in global inflation and demand. That also serves to avoid the price dilemma whereby prices have a tendency to increase in VAR estimations in the wake of a monetary tightening. Lastly, by imposing these variables as exogenous variables, we assume that there is no feedback effect of the Tunisian variables on the European Union economy.²⁶

Using a Cholesky decomposition, we further decompose the residuals η_t to get a structural model:

$$(4) Y_t = \sum_{i=1}^{\infty} C_i e_{t-i}$$

This decomposition ensures that the individual shocks are orthogonal, i.e. that the variance-covariance matrix $V(e_t)$ is diagonal. It also allows the system analysis of the impact of a one-period shock to a given variable, also called impulse response functions. We compute the 20-lag (roughly four weeks of trading days) impulse response functions for the estimated VAR models for each sample. One main issue with this type of exercise is related to the question of ordering of variables in VAR models. It may happen that the results depend strongly on the choice of ordering. In that case, the impulse responses exhibit remarkably

²⁵ The industrial production index is used for the real activity of the euro area in order to reduce the number of lags of the exogenous variable. This can also be explained by the nature of the commercial transactions between Tunisia and the European Union.

²⁶ Preliminary tests were conducted with some US economy macro variables. As the significance of these variables seemed weaker in the regressions than with the EU variables, the later were adopted. Furthermore, this is consistent in light of the alignment of the Tunisian economy with the European Union economy. Given the limited number of observations, the introduction of both set of exogenous variables would have excessively reduced the degrees of freedom.

different shapes conditional to the ordering, which means the correlation between the individual shocks e_{jt} (where j denotes the j -th variable) is high.²⁷

In model 1, the implicit assumption is that the monetary shocks do not simultaneously influence activity and prices but may affect the exchange rate. Conversely, in model 2, the implicit assumption is that the interest rate responds simultaneously to activity, price, and monetary shocks but not to shocks affecting the exchange rate, although the exchange rate is immediately affected by all types of shocks.²⁸

Results

The results of the two VAR models are summarized below. For model 1, Figures 2 and 3 represent the effect of a domestic monetary policy shock (equivalent to one standard deviation) on real activity and the level of domestic prices as well as on the exchange rate, with the confidence interval at 95 percent. Figure 4 shows the response of these same variables but under model 2, i.e., including the money market interest rate.²⁹

As displayed in Figures 2 and 3, in the case of model 1, a temporary and unanticipated increase in money supply triggers a temporary increase in activity and a depreciation of the exchange rate while the (inflationary) impact on prices takes longer to manifest itself. In the case of Tunisia, all these reactions to the monetary shock nonetheless remain muted, albeit consistent with theory. The main difference between the two versions of model 1 concerns the impact of the expansionary monetary shock on the exchange rate: the transitory related depreciation is weakly significant only with the money base (i.e., model 1' in Figure 2).

²⁷ The main argument as to why cross-correlations between shocks are large in macroeconomic models is that the data is typically monthly/quarterly and thus lagged response to a single shock within the month are aggregated and consequently treated as a contemporaneous impact when dealing with monthly data.

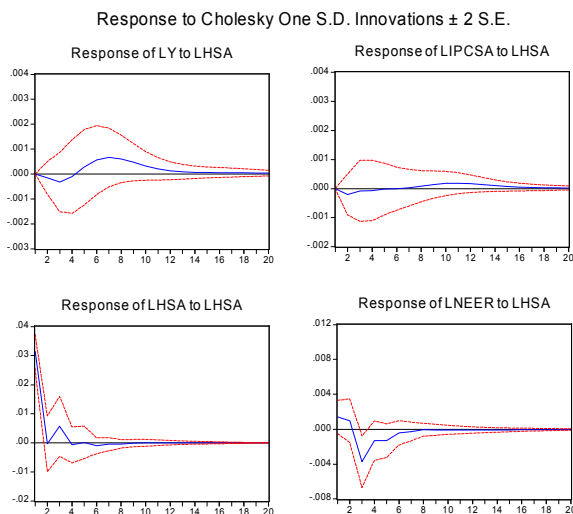
²⁸ Although the order we have chosen is in line with the literature and seems suitable for an economy in transition like Tunisia, other sequences of variables have been tested. Although the results show a degree of sensitivity to the sequence chosen (in line with previous remarks), the overall picture of the transmission channels remains unchanged. For additional details regarding the impact of the sequence of variables on estimation results in VAR models, see Enders (1995).

²⁹ From Figures 2 to 4, the variable LY denotes the logarithm of the Tunisian real GDP in level (y^{TUN}_t), LIPCSA is the logarithm of the Tunisian consumer price index in level (p^{TUN}_t) and LNEER is the logarithm of the Tunisian nominal effective exchange rate (x^{TUN}_t). Concerning the policy instrument, LHSA is the logarithm of the level of the Tunisian money base or high-power money (h^{TUN}_t) while LM3 is the logarithm of the level of the Tunisian monetary aggregate M3 ($m3^{TUN}_t$), whereas TMM is the Tunisian overnight interest rate (TMM^{TUN}_t). As mentioned earlier, with the exception of the overnight interest rate, (TMM^{TUN}_t), all these variables are seasonally adjusted.

Although not significant, the impact of the expansionary monetary shock on the other variables is short-lived, with a return to the equilibrium within twelve months.

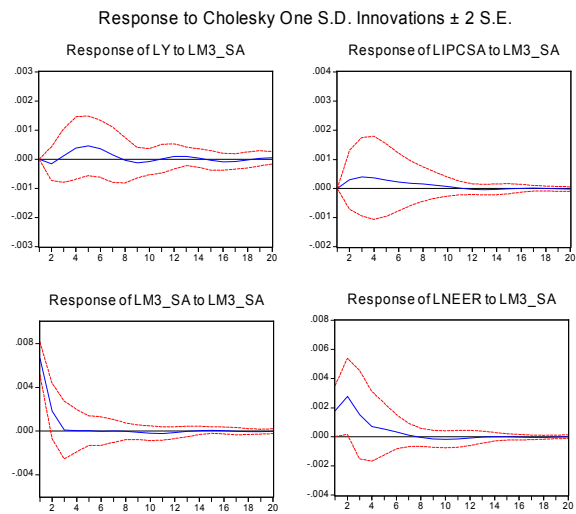
With respect to model 2, considering the monetary shock, its impact on activity is rapid but temporary, whereas it appears more persistent on prices, although not significant, as shown by Figure 4.³⁰ By contrast, a temporary and unanticipated interest rate shock triggers a decline in activity whose effects have a tendency to dissipate after nine months. The (deflationary) impact of a temporary and unexpected increase in the interest rate on prices begins to manifest itself after six months but is long-lasting, in contrast to the impact on activity. With regard to the exchange rate, the impact is rapid and temporary irrespective of the instrument variable (M3 or interest rate), but weakly significant with the interest rate as policy instrument.

Figure 2. Tunisia: Response Functions for Model 1' (With money base as policy instrument)



Source: IMF staff estimates.

Figure 3. Tunisia: Response Functions for Model 1'' (With M3 as policy instrument)



Source: IMF staff estimates.

These results are in line with expectations: an increase in interest rate as the monetary policy instrument triggers a decline in activity in the short term, which is necessary in order to stabilize prices in the longer term (the so-called “sacrifice ratio” in the literature). However, certain differences relative to results generally obtained for industrial countries may be

³⁰ It should be noted that if we replace the monetary aggregate M3 by the money base in the estimation for model 2, the lagged variables for the latter appear to be insignificant in most of the equations of the system.

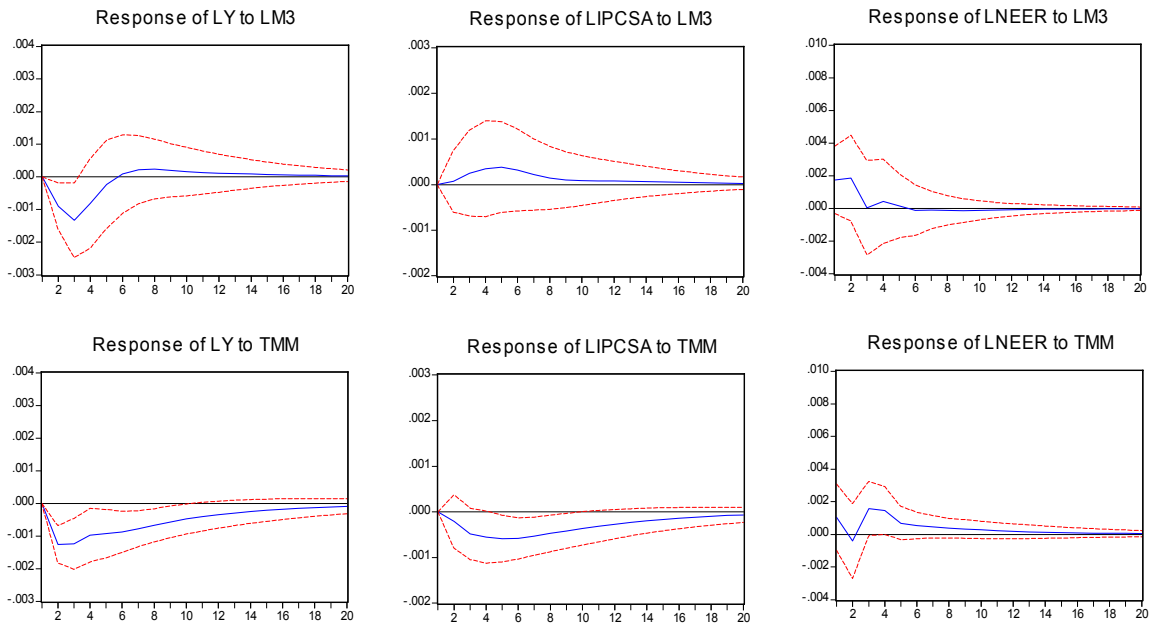
perceived: (i) the amplitude of the responses is more moderate; (ii) the price responses are clearly weaker, or even insignificant in some cases; (iii) the response by the variables is stronger in the case of an interest rate shock than in the case of a monetary shock; and (iv) the impact on the exchange rate is usually weak and often insignificant.

Regarding other potential channels, the balance sheet channel may already be in place at this time, but this cannot be verified in the absence of data; it may manifest itself through the volume of collateral required by banks (and through the revaluation of collateral, as ought to be the case). According to the survey conducted by the *IEQ* on the competitiveness of Tunisian enterprises in 2005, it appears that Tunisian firms regard the required volume of collateral as one of the main impediments to investment.³¹

Figure 4. Tunisia: Response Functions for Model 2

(With M3 and money market rate)

Response to Cholesky One S.D. Innovations ± 2 S.E.



Source: IMF staff estimates.

³¹ The effect of the balance sheet channel as manifested through the volume (and not the value) of collateral may tend to endogeneize money supply through a more pronounced bank credit impact than generally observed. Given the constraints through collateral required by banks, the logical conclusion is that this channel, if it exists at all, functions poorly. This assumption cannot be ruled out in light of the discussions in Fatma (2001).

These results may be accounted for by the lingering impact of administered prices which tend to smooth out real price increases. Exchange rate controls may also be a factor in explaining why the exchange rate channel plays a minor role in the estimations. Furthermore, it is likely that the combined importance of M3 (more pronounced than for base money) and the short-term interest rate primarily reflects a subtle dynamic between shallow financial markets and fundamentally bank-oriented investment financing (95 percent of investment financed by bank credit). Furthermore, it appears that the correlation between the annual increase in the money base and inflation has declined over time whereas it increased in the case of M3.³²

It is also interesting to note that the estimation of an equilibrium relationship between the demand for money in real terms, real GDP, and inflation significantly underscores each of these variables with the expected sign when an attempt is made to explain the money supply M3.³³ Conversely, in the same estimation for the monetary base, the inflation variable no longer appears to be significant. Furthermore, each of these relationships records a structural change (during the years 2003 and 2004, respectively for the equation with the monetary base and the money supply M3) introducing instability into the long-term relationship between real money, real GDP, and inflation.

These results confirm the findings of previous empirical studies which point to a more important role for the monetary aggregate M3 in the inflation targeting policy described in the previous section.

D. What do Reaction Functions Tell Us in Tunisia?

Despite the criticisms against monetary policy rules that has emerged in the literature (Box 4), the estimation of an interest rate reaction function in a descriptive way remains

³² At the end of the year 2000, the 12-month rolling correlation between the annual inflation rate and the annual growth of the money base was 0.45 against 0.35 with the monetary aggregate M3. At the end of 2006, this correlation with the money base was only 0.29 against 0.52 with M3. Several additional factors also argue in favor of M3 as a leading indicator of inflation. The correlation between the money base (year on year) and M3 moved from 58 percent over the period 1996–2001 to 51 percent over the period 2001–06. The correlation between the year on year figures for total credit and for credit to the private sector and annual money growth is stronger with M3 (of the order of 34 percent and 33 percent respectively as against 24 percent and 18 percent for the money base). Finally, the correlation between the annual growth in credit and inflation is of the order of 18 percent and 7 percent respectively for total credit to the economy and credit to the private sector.

³³ The estimation focuses on a classic long-term demand for money establishing a relationship between money in real terms (m_t-p_t), real GDP (y_t), and annual inflation (π_t), each expressed in natural logarithms in terms of levels and seasonally adjusted, with a monthly frequency over the period 2001:01-2006:12. With the standard error in parentheses, the results for when m_t-p_t =monetary base are: $y_t=0.22$ (0.02) and $\pi_t=-0.20$ (0.20). Conversely, when m_t-p_t =M3, the results are: $y_t=0.10$ (0.005) and $\pi_t=-0.15$ (0.06).

helpful and informative.³⁴ In case of Tunisia, the empirical estimation of such rule may help for instance to detect the link between changes in the main money-market interest rate (close to the monetary policy instrument) and fluctuations of macroeconomic variables. To some extent, such estimation may also be informative regarding the structural changes in those relationships.

In line with the standard specification of reaction function described in Box 4, a simple reaction function is estimated for the BCT using the TMM variable as the dependent and policy instrument variable. In a first step (i.e., estimation 1 in Table 1 below), a reaction function in a pure inflation targeting environment is estimated (with annual inflation rate as unique explanatory variable). In a second step, a more standard specification is estimated (with both the annual inflation rate and the output gap). Not surprisingly, over a long period (i.e., starting before 2003), the quality of the estimation is really poor and highly unstable, which could be easily understood by the various economic changes that occurred in the Tunisian economy. The instability problem remains true after 2003, but of less magnitude, whereas the parameters have the expected sign (which is not the case beforehand).

From Table 1, several elements can also be pointed out. First, the parameters have the expected sign (with the exception of the coefficient for the output gap albeit not significantly different from zero) over the recent period. As a matter of fact, no major differences can be spotted between both estimations (i.e., respectively with (estimation 1) or without (estimation 2) the output gap). Second, the coefficient of inflation, while greater than one as expected, is only marginally significant in both estimations. Third, a gradual adjustment process seems to be in place (with the coefficient ρ being significantly different from zero). However, the value of the correction mechanism parameter (characterized by the coefficient γ) is low and of weak significance. This could also be explained by the high stability of the TMM over the regression period, independently of the fast economic growth.

Although these results should be interpreted with caution given the limited number of observations, they broadly support the view that the use of the interest rate has become more active in the recent past while still reacting to other (omitted in the models above) variables.

This conclusion is confirmed by the stability tests for the estimated coefficients (which are rejected even in the recent period) and by the misspecification tests which reveal a poor explanatory power of the standard specification of the rule and heteroskedastic residuals.³⁵

³⁴ See for example Gerlach (2007).

³⁵ Both results may reflect the omission of important variables in the regression which could explain part of the determination of the TMM.

Box 4. Reaction Function of Central Banks: Between Theory and Practice

Background

For a long time researchers in monetary economics and practitioners have tried to detect the main economic variables that drive monetary policy decisions. In early 1990s, this research topic has received a renewed interest with the simple rule proposed by Taylor (1993). Indeed, he showed that the behavior of the Fed funds rate (considered as representative of monetary policy decisions) could be summarized only by two elements, i.e., the stabilization of the output gap and of the inflation rate around its target. By imposing arbitrarily the relative weights for each element, Taylor (1993) finds that such a specification is sufficient to represent the behavior of the Fed funds rate, especially for the Chairmanship of Alan Greenspan. Since then, all the discussions on monetary policy reaction function turn on this specification. In particular, most of empirical studies tend to estimate empirically the Taylor rule for different periods of time. The main conclusion of these empirical studies is that the relative weight of each element changes over time, suggesting an adjustment of the conduct of monetary policy to a changing environment. However, as notably suggested by Judd and Rudesbusch (1998) and Clarida et al. (2000), it seems that it is still possible to find a stable estimation of the Taylor rule when it is estimated on sub-periods corresponding mainly to the presidency of each different chairman. Although some criticisms emerged against such rules (see for instance Svensson (2003)), most researchers still use this type of reaction function both from descriptive and prescriptive perspectives.

Model specification: the standard approach

The representative rule of monetary policy decisions as suggested by Taylor (1993) for the United States has the following form:

$$(1) \quad ff_t^* = rr^* + \pi_t + \beta_1(\pi_t - \pi^*) + \beta_2 gap_t$$

where ff_t^* is the nominal of the Federal funds rate (recommended by the rule), rr^* the equilibrium real Federal funds rate, π_t and π^* denote respectively the current annual inflation rate and its target while gap_t is the difference between the real gross domestic product (GDP) and the potential GDP, i.e. commonly called the output gap. According to Taylor (1993), equation 1 fits relatively well the behavior of the overnight Fed funds rate over the period 87-92 on quarterly basis when imposing arbitrarily rr^* and π^* both equal to 2% and $\beta_1 = \beta_2 = 0.5$. However, as pointed out by Goodhart (1999), any attempt to estimate empirically such rule requires the addition of lagged dependent variables in order to fit well. In addition, with monthly or quarterly data the sum of the coefficients of the lagged dependent variables is generally close to, or greater than, one, suggesting that “central banks have historically changed rates by only a small fraction of their ultimate cumulative reaction in response to an inflationary shock or to a deviation of output from potential” (Goodhart, 1999). In the same vein, authors like Judd and Rudebusch (1998) proposed the following adjustment of the monetary policy interest rate:

$$(2) \quad \Delta ff_t = \gamma(ff_t^* - ff_{t-1}) + \rho \Delta ff_{t-1} + \varepsilon_t$$

which, when replacing in the previous equation ff_t^* by its value defined in equation (1), consists in estimating empirically the policy rule with the following form of an error correction mechanism (ECM) model:

$$(3) \quad \Delta ff_t = \alpha + \lambda \pi_t + \delta gap_t + \gamma ff_{t-1} + \rho \Delta ff_{t-1} + \varepsilon_t$$

where the constant term α is equal to $\gamma(rr^* - \beta_1 \pi^*)$. In the same vein, the parameter $\lambda = \gamma(1 + \beta_1)$ and $\delta = \beta_2 \gamma$ while ε_t are white noise errors. From the estimation of equation (3), it is expected that the parameters λ and δ are positive.

Table 1. Tunisia: Estimates of an Interest Rate Reaction Function 1/

Sample period	λ	δ	γ	ρ
Estimation 1	1.64 (1.37)	-	-0.01 (0.00)	0.29 (0.14)
Estimation 2	1.89 (1.27)	-0.16 (0.17)	-0.01 (0.00)	0.26 (0.15)
Misspecifications tests	R ² =0.15	Breusch-Godfrey LM test: F-stat=1.16		ARCH test: F-stat= 22.55

Source: IMF staff estimates.

Note: Heteroskedasticity and autocorrelation consistent estimators (Andrews (1991)). Standard errors are reported in parentheses. Given the limited number of observations and the non rejection of the null hypothesis, the intercept α has been removed from the estimation in order to improve the dynamics.

1/ Equation (3) in Box 4 for BCT (2003:1-2006:8).

V. THE WAY FORWARD FOR TUNISIA'S MONETARY POLICY FRAMEWORK

Against the background of the discussion in Section IV, it appears that, not surprisingly, the Tunisian economy is impacted by ongoing structural changes. Although the role played by the monetary aggregate still remains predominant in many respects, the very short-term interest rate (i.e., the TMM) has been gaining in importance over the recent period. By contrast, the importance of base money has decreased. In the current situation, the money market in Tunisia, which is of paramount importance in a monetary policy decision process based on interest rate setting, is too concentrated on the short-end segment and lack depth on the term. While this complicates the assessment of the monetary policy transmission mechanisms in Tunisia, it is necessary to take stock of Tunisia's compliance with the building blocks of IT.

A. Tunisia's Compliance with the Building Blocks of Inflation Targeting

The building blocks of an IT framework can be divided into four groups, including institutional, operational, technical, and organizational features.³⁶ Regarding the *institutional building blocks*, first and foremost is a mandate to pursue an inflation objective and accountability of the central bank in meeting this objective: (1) price stability should be the primary *de facto* mandate of monetary policy; (2) the central bank should have sufficient instruments discretion and autonomy; and (3) it should be transparent and accountable. The

operational building blocks consider the need to ensure that the inflation target will not be subordinated to other objectives: (4) a stable macroeconomic framework (4a. absence of fiscal dominance and 4b. robust external position); (5) an efficient and stable financial sector (5a. the financial markets, 5b. the money market, 5c. the foreign exchange market, and 5d. the banking sector); (6) monetary and foreign exchange operations should be efficient, and (7) there is a reasonably well-functioning interest-rate transmission channel. The *technical requirements* for an IT framework include: (8) availability of the proper infrastructure for IT (8a. availability of an inflation measurement for targeting; 8b. a process for setting the inflation target and its maturity, 8c. the availability of inflation indices on a timely basis, including leading and lagged indices; 8d. availability of the statistical tools for the production of inflation forecasts; 8e. and good understanding of the channels of transmission of monetary policy); (9) the publication of inflation reports; and (10) a robust analytical capacity at the central bank. Finally, the *organizational features* include (11) a transparent decision-making process; and (12) an organization of the central bank that fits the needs of an IT framework.

The building blocks are not meant to constitute strict prerequisites; the absence of some of these conditions should not stand in the way of the adoption of IT, especially when policies are being introduced to establish them in the short and medium term. Ultimately, the decision to adopt IT must be based on a careful weighing of the costs and benefits of IT against the alternatives. The decision entails necessarily a measure of judgment.

Tunisia exhibits a relatively low degree of compliance with the building blocks of an IT framework identified above (Table 2). Compliance is high for three primary building blocks only; intermediate in the case of five primary features, and three secondary features; and compliance is low in the case of four primary features and eight secondary features. Compliance with regard to the institutional building blocks (fairly high) benefited from the May 2006 amendment of the Central Bank Law which has established price stability as the primary objective of monetary policy. With regard to operational features, the BCT has developed robust operational frameworks for its monetary and foreign exchange operations, and the interest rate transmission channel is potentially strong due to the indexation of most banks' lending activities on money market rates.³⁷

³⁶ This section is based on A. Carare, M. Stone, A. Schaechter and M. Zelmer, IMF Working Paper WP/02/102 "Establishing Initial Conditions in Support of Inflation Targeting."

³⁷ Indexation may however deter dynamic use of the interest rate and, hence, affect the feasibility of IT.

However, relatively low compliance with regard to the absence of fiscal dominance may take time to overcome. In particular the weight of administered prices in the CPI, and the mechanisms for adjusting them, create a tradeoff between inflation and fiscal policy which introduces a fiscal bias into the control of inflation. In addition, the implementation of the monetary program may lead to an implicit accommodation of budgetary slippages. Compliance is also rather weak with regard to the technical and organizational building blocks, as well as with regard to the robustness of the external position. Technical capacity can be strengthened relatively rapidly in Tunisia. However, strengthening the external position and liberalizing the exchange rate may take time and is not under the full control of the BCT.

Table 2. Tunisia: Compliance with the Building Blocks of an IT Framework

Building Blocks	Compliance
Institutional features	
1. Price stability is the primary objective	High
2. Sufficient autonomy of the CB	Intermediate
3. CB is transparent and accountable	Intermediate
Operational features	
4. Stable macroeconomic framework	Intermediate
4a. Absence of fiscal dominance	Intermediate
4b. Robust external position	Low
5. Efficient and stable financial sector	Intermediate
5a. Efficient financial market	Low
5b. Efficient money market	Low
5c. Efficient exchange market	Intermediate
5d. Efficient and stable banking sector	Intermediate
6. Efficient monetary/forex operations	High
7. Strong interest rate channel	High
Technical features	
8. Infrastructure required for IT	Low
8a. Good measure of inflation	Low
8b. Process for setting the target	Low
8c. Good Inflation indices	Low
8d. Forecasting tools	Low
8e. Understand transmission channels	Low
9. Publication of inflation reports	Low
10. Robust analytical capacities	Intermediate
Organizational features	
11. Transparent decision-making	Low
12. CB organization suited to IT needs	Low

Source: Authors' evaluation and Appendix Table 4.

B. Strengthening Compliance with the Building Blocks of Inflation Targeting

Strengthening the effectiveness of the current monetary policy framework will facilitate the adoption of IT framework over time. In particular, liquidity management by the central bank should allow interbank market rates to be flexible, as well as ensure that technical factors (i.e., government cash flow) do not create noise in the market. In the case of Tunisia, based on our previous empirical analysis of transmission channels, the following areas deserve examination:

- **Transparency of the monetary programming process.** The public should know the methodology used for setting current monetary targets, as well as the rationale for the choice of monetary base and broad money as leading indicators of inflation.

- **Choice of leading inflation indicator.** Several factors argue in favor of retaining M3: the correlation between inflation and base money declined over the period 2001–06, but the correlation between inflation and M3 remained strong and relatively stable.
- **Future operating target of monetary policy.** The declining correlation between inflation and base money over the period 2001-2006 argues in favor of dropping base money as the operating target in the future, and adopting instead a short-term interest rate.
- **Liquidity management.** With a monetary framework based on M3 as an intermediate target, and a short-term interest rate as the operational target, liquidity should be managed “neutrally,” i.e., in such a way as to allow the overnight market rate to reach its equilibrium around the policy rate. Monetary operations should aim at compensating in real time the impact of changes in the autonomous factors.

Furthermore, as emphasized at a discussion at the IMF Executive Board, a number of preconditions must be met if IT is to succeed (Appendix II), and it is important that firm commitment by the monetary and fiscal authorities and the public vis-à-vis the inflation target be in place, which makes transparency even more important than for any other monetary framework.³⁸ In the case of Tunisia, two areas require particular attention.

First, the current pervasive indexation of bank transactions to the TMM can potentially complicate the use of a short-term interest rate as the operating target of monetary policy. The lack of data on private institutions’ credit conditions does not allow a quantification of corporate balance sheets’ sensitivity to changes in interest rates. However, anecdotal observations—and in particular a recent IEQ study—suggest that firms cite access to bank credit and its associated costs as the most serious constraint to their activity. Therefore, one

³⁸ As recalled by Woodford (2001), the importance of a responsible fiscal stance for price stability outcomes stem from the fact that monetary policy has significant effects on the level of the state’s outstanding debt in real terms. In his fiscal theory of price level, Woodford demonstrates that fiscal policy design matters for monetary policy (even in the absence of explicit dependence upon fiscal variables) in rational expectations equilibria associated with “non-Ricardian” policy regimes. In presence of rational expectations and frictionless financial market, this could happen when the state does not adjust its budget to neutralize, in present value, the effects of fiscal disturbances upon private sector budget constraints and hence aggregate demand. As a result, even in case of strong commitment of monetary policy to deliver price stability, Woodford (2001) shows that: “*On the one hand, (non-Ricardian) fiscal expectations inconsistent with a stable price level may frustrate this outcome, even when monetary policy is itself consistent with price stability. Indeed, the combination of a Taylor rule with certain kinds of fiscal policy may result in an inflationary or deflationary spiral. And on the other hand, even when fiscal policy is consistent with stable prices, the policy regime (including the commitment to a Taylor rule) may not preclude other equally possible rational expectations equilibria, such as equilibria involving self-fulfilling deflationary spirals.*” See Woodford, M. (2001), “Fiscal Requirements for Price Stability,” *Journal of Money, Credit and Banking*, Vol. 33, pp. 669–728.

would need to assess the vulnerability of corporates to interest rate fluctuations before moving on that front, as well as the to identify measures to reduce the practice of indexation.

Second, adopting IT requires defining the role of the exchange rate in the monetary strategy. Some countries have attempted to combine IT and exchange rate targeting. However, in nearly all of these countries (Chile, Israel, Poland, and Hungary) a conflict of objectives emerged which eventually led to a substantial widening of the exchange rate fluctuation band or its discontinuation.³⁹ Therefore, there is a need for an assessment of the potential impact on the economy of a liberalization of the exchange rate to be in a position to determine a rule for a policy of foreign exchange intervention consistent with the IT framework.

VI. CONCLUDING REMARKS

In order to adopt an IT framework relying on short term-interest rates as key policy rates, it is necessary to verify the compliance of economic framework with key elements. Efficient money and capital markets are of particular interest. Indeed, an orderly functioning of the money market is of the utmost importance for the transmission of the key policy rates to the economy in general and the price level in particular. Market participants form expectations about the future path of very short-term rates based on anticipated monetary policy decisions. These expectations are the basis for the determination of longer maturity interest rates and yields that are relevant for spending and saving decisions and which ultimately influence economic and monetary developments and the price level.

From this perspective, the primary objective of price stability entrusted to the BCT in 2006 marks a turning point in modernizing monetary policy in Tunisia. The strengthening of the building blocks of an IT framework will require progress towards *de facto* central bank autonomy, to enable full reliance on interest rates as the operational target of monetary policy. A clarification on the role of the exchange rate within the current policy framework, including the determination of a rule for official intervention that would be consistent with the future IT framework would also be most useful. The analysis and forecasting of coincident and prospective inflation and other macroeconomic developments will also need to be strengthened in Tunisia.

The actions to strengthen the building blocks for an IT framework could be staged as follows:

³⁹ The adoption of an IT framework does not prevent utilization of exchange market interventions as a way to ease volatility to the extent that such volatility might jeopardize price stability.

- *Immediately*, strengthen the monetary policy framework, and intensify cooperation among the public agencies involved in macroeconomic policy and research, in order to capitalize on the pool of research and analytical skills available.⁴⁰
- *In the short term* (1–2 years), strengthen the building blocks of the IT framework: (i) develop an autonomous central bank research capability in monetary, financial, and inflation forecasting issues; (ii) establish an action plan for eliminating administered prices; and (iii) de-index banking transactions from the TMM (through appropriate incentives).
- *In the medium term* (3–5 years), complete the strengthening of the building blocks: (i) the BCT has the capacity to forecast inflation and growth; (ii) the exchange rate is flexible; (iii) administered prices are eliminated; (iv) markets are more efficient; and (v) the capital account is liberalized, subject to the retention of prudential measures. Significant advances in the liberalization of the capital account, however, should await strengthening of the banking sector—through a significant reduction in nonperforming loans—and a reduction in external debt.

Some of the building blocks for an inflation targeting framework fall beyond the central bank’s direct sphere of responsibilities. However, it can play a catalytic role among all the potential stakeholders, particularly the other government entities performing economic functions. Strengthening inter-agency technical cooperation will not only lay the groundwork for introducing an IT framework, but also strengthen monetary policy in the context of the existing monetary framework. This will accordingly help to strengthen the consensus regarding the role of monetary policy—a prerequisite for the success of an IT framework.

Finally, it is worth bearing in mind that the transmission channels are inherently likely to undergo changes as the economic environment itself evolves. Given the current characteristics of the Tunisian economy, it is possible to anticipate the following changes:

- Given the importance of bank credit and the high level of business indebtedness, it is likely that the interest-rate channel will strengthen and become the main transmission channel. Capital-intensive sectors (petrochemicals, production of durable goods, etc.) can be expected to be the most sensitive to changes in interest rates. Conversely, large enterprises showing a high degree of self-financing can be expected to be less sensitive. It is also possible that the importance of the balance sheet channel may increase.

⁴⁰ The agencies include the *Institut d’Économie Quantitative* (IEQ), the *Observatoire de Conjoncture Économique* (OCE), and the *Conseil National de la Statistique* (CNS).

- With the full liberalization of the capital account, the exchange rate channel can also be expected to strengthen given the degree of openness of the Tunisian economy and its integration into the European economy. One of the adjustment variables in this new system will be the exchange rate which in certain situations may put pressure on the monetary authorities. Capital account liberalization in the context of an IT framework could trigger a real appreciation of the dinar, harmful to Tunisian exports and favoring imports. Unless all sectors are prepared for this kind of pressure, there is a risk that certain industrial sectors may suffer. Nevertheless, the monetary authorities must abide by their inflation target without trying to steer the exchange rate (nominal or real) lest they trigger a destabilizing dynamic.
- Conversely, in moving to an inflation target in which the main monetary policy instrument becomes a short-term interest rate, the importance of the monetary channel can be expected to steadily diminish. Therefore, the current credit channel (characterized inter alia by the impact of M3 on other economic variables) can be expected to weaken, as a consequence of the development of financial markets. M3 should nonetheless continue to furnish meaningful substantive information regarding inflationary developments in the medium and long term.

Appendix I. Tunisia: Monetary Targeting Framework

The monetary programming exercise aims at setting a target for M3 as follows:

- Determining an annual target for M3 on the basis of the macro framework received from the *Institut d'Économie Quantitative* (IEQ), which is integrated into a money demand function prepared by the BCT⁴¹. The macroeconomic forecasts by the IEQ are obtained by means of the macro econometric model used for preparing the Plan. In tandem with the publication of the economic budget, the annual target for M3 for the following year is disseminated through the dispatch of summary economic indicators sent to financial transactors.⁴²
- Based on this annual target, a monthly profile is determined for M3 on the basis of estimates of its cyclical trends and seasonal components, as well as of an irregular component (residuals).
- Based on the monthly profile for M3, a monthly profile for the monetary base is estimated at the end of the month of December by applying the monthly multipliers observed between M3 and the monetary base throughout the current year.⁴³
- Thereafter, this monthly target for the monetary base serves as a control variable, throughout the year, to assess any overshooting of the target.
- If macroeconomic forecasts are revised in the course of the year in connection with the financial programming for the budget, a new estimation of optimal growth for M3 and the monetary base is carried out in order to determine their anticipated growth and evaluate any overshooting of the target previously set for M3. This estimation does not mean a revision of the initial target announced at the end of the preceding year. It serves as an information tool within the BCT to determine the magnitude of the overshooting attributable to the revision of the macroeconomic framework.

⁴¹ The annual target for the monetary aggregate M3 consists in a target to be achieved at year-end, i.e., a year-on-year figure for the month of December for each year.

⁴² Apart from the target increase in M3 and the macroeconomic projections (for GDP and its internal components), these indicators also contain likely outturn figures for the current year and the anticipated annual growth in other monetary aggregates (except for monetary base), credit, national saving, foreign debt, and government finance.

⁴³ In the month of December in year t , the monthly target for the monetary base for year $t+1$ is determined on the basis of the monthly increase computed for M3 to which the monthly money multiplier observed between the two money aggregates during year t is applied. As the exercise is conducted at end-December of year t , it is thus talking about the money multipliers observed during the eleven months of year t and one provisional multiplier for the month of December. Accordingly, a re-estimation of the monthly profile of the target for the monetary base for year $t+1$ is carried out at the end of the month of January in year $t+1$ once the money multiplier for the month of December in year t is available.

Appendix II. Inflation Targeting in Emerging Economies

A paper prepared by the staff of the IMF and discussed on February 17, 2006 at a seminar held at the Executive Board of the IMF, examined the experience of nonindustrial inflation-targeting countries. The key findings and conclusions of the paper, as well as the views of the Executive Board of the IMF are summarized below.

Key findings and conclusions

A nonindustrial IT country faces challenges that differ in character or in degree from those faced in industrial economies, including: (i) weak public sector financial management; (ii) weak financial sector institutions and markets; (iii) low monetary policy credibility; (iv) extensive dollarization of financial liabilities; and (v) vulnerability to sharp changes in capital flows and international investor sentiment. In addition, many of these countries face greater uncertainty about the structure of their economies, the transmission of monetary policy, and the cyclical position of the economy than is typical of an industrial country.

The credibility of any systematic monetary policy framework requires bringing public sector finances under control. However, a possible added benefit of IT is that it may help reinforce support for putting public sector finances onto a path precisely by highlighting the inconsistency of the goal of stable, low inflation with lack of fiscal discipline.

Weak financial sector institutions and markets need to be taken into account in formulating and implementing IT. Such weaknesses alter the relative efficiency and speed of monetary policy transmission through different channels, and these need to be taken into consideration in policy formulation, on a country-by-country basis. Weak or incomplete financial markets may also limit the scope for reliance on market-based monetary policy instruments, but this is not essential. What is essential is for the central bank to be able to move the interest rates faced by households and businesses, and to do so in a manner that is clearly linked to the inflation objective. Weaknesses in the financial system itself may complicate the conduct of IT, as with any other monetary policy. In such circumstances, development of the IT framework will usually entail reforms to strengthen the financial system.

Although the credibility of the shift to IT is likely to be enhanced if it is adopted as part of a more comprehensive package of economic reforms, such reforms can also complicate the conduct of monetary policy under IT. A comprehensive package of reforms could entail both an initial period of disinflation and large shifts in relative prices associated with tariff, subsidy, and tax reforms. These are difficult challenges for IT, but ones that can be tackled through the choice of the measure of inflation to be targeted, the level of the target, the acceptable range of variation of outcomes around the target, and the pace of disinflation toward a longer-term objective.

Extensive dollarization poses a significant challenge in formulating and implementing IT. In particular, it can substantially alter the transmission of monetary policy: high dollarization of the financial system will tend to amplify the importance of exchange rate changes relative to domestic interest rate movements in policy transmission, and may generate aggregate demand effects opposite to those in industrial countries. In such circumstances, the central bank will typically pay greater attention to balance sheet effects of exchange rate movements on the economic outlook and place greater weight on a relatively smooth evolution of the exchange rate than otherwise.

A number of nonindustrial IT countries have also had to deal with strong capital flows, raising questions about the appropriate response, including the role of foreign exchange intervention. Some countries have tried to combine inflation targeting with exchange rate bands. In virtually all such countries, including Chile, Hungary, Israel and Poland, however, conflicts between achievement of the inflation target and the exchange rate target have eventually arisen, and normally resulted in a widening of the exchange rate band and then abandonment of the band altogether. Indeed, the dating of when such countries have effectively started IT is usually based on when they abandoned or greatly widened exchange rate bands.

In other cases, countries may opt for a gradual transition from an exchange rate peg to a more conventional IT framework, based on a managed float together with an informal inflation target. Such regimes may be in place for an extended period, and may provide a useful period in which to develop some key elements of an IT framework.

Data limitations and uncertainty regarding economic structure and monetary policy transmission can complicate the conduct of IT. In many nonindustrial countries, data availability and quality is weaker than in more developed economies. In addition, although the general characteristics of the economy and financial system may be understood, more detailed knowledge of the structure and parameters describing the economy may be more uncertain and less stable than in more developed economies. Implementing IT in such circumstances will tend to result in greater variability of inflation and output than would be possible with better information. However, when data are missing or of poor quality, other indicators, including anecdotal information, can be used to supplement the information set.

Views of the Executive Board of the IMF⁴⁴

Directors noted that some important caveats should be borne in mind in drawing conclusions about the potential benefits of IT relative to other regimes. In particular, and as indicated in the staff paper, they pointed to the short experience with IT and the relatively small sample

⁴⁴ See IMF, Public Information Notice (PIN) No. 06/40, April 18, 2006.

of countries studied. Further, while acknowledging that all countries had benefited from benign global conditions and the accompanying general decline in inflation.

A number of Directors considered that success with IT may reflect a broader shift in country preferences toward price stability, as, in many cases, IT coincided with a range of reforms consistent with a shift in preference toward greater macroeconomic stability. Therefore, overall, Directors agreed that it is difficult to infer causality from IT to the observed outcomes, and that the evidence outlined in the paper should be seen as suggestive rather than definitive.

Directors agreed that technical and institutional conditions needed for IT are important for a successful implementation of any monetary policy regime. While seeing some scope for the necessary conditions to be developed after a country adopts IT, and for a somewhat less mechanical view on the preconditions for IT, Directors, nevertheless, generally underscored that a number of preconditions remain important for success (i.e., institutional autonomy of the central bank, fiscal consolidation, and adequate financial market development). Directors also highlighted the need for establishing a clear ex ante commitment to the IT framework, by both the monetary and fiscal authorities. Effective communication and outreach of policy intentions were also seen as essential.

Directors considered that the adoption of IT should not be seen as a macroeconomic panacea, and substantial operational and capacity constraints would need to be overcome in many of the countries contemplating the adoption of IT. Moreover, in some countries, capacity constraints and other structural features of their economies might make IT unsuitable for the foreseeable future. More generally, Directors considered that, while the IT framework can offer significant benefits for a number of countries, it should be recognized that it may not be appropriate in all cases.

With regard to the Fund's technical cooperation programs, Directors saw a key role for the Fund in helping countries to develop or strengthen their capacity to conduct effective monetary policy generally. Some Directors suggested that Fund TC should give priority to advice on how to improve policy credibility and establish a commitment to stability, with less focus on sophisticated modeling.

Appendix Table 3. Tunisia: Reforms in the Monetary, Financial and External Sectors (1987–2007)

Year	Monetary Sector	Financial Sector	External Sector
1987	Most lending rates are liberalized within ceiling of 3 percentage point above TMM. Rates for deposits > 3 months are free.	Introduction of comprehensive bank prudential regulations.	Launching of a program of trade liberalization.
1988	Rediscount operations limited to priority sector loans. BCT introduces credit auction; refinance standing facility; and end of day repo operations.	Merger of Banque Nationale de Tunisie (BNT) and Banque Nationale de Développement Agricole (BNDA) into Banque National Agricole (BNA). Reform of legislation on investment and collective investment institutions and funds. BCT prior approval for granting bank loans is eliminated. Introduction of interbank transactions, CDs and CP.	
1989	Reactivation of non-remunerated reserve requirement.	Introduction of treasury bill auctions.	Creation of the forex money market.
1990			Accession to the GATT. Offshore bank (banks licensed to carry out non-dinar operations exclusively) allowed setting up onshore bank.
1991		Relaxation of mandatory bank holdings of government securities. Minimum term for CDs raised to 90 days. Introduction of treasury bills (T-bills) with maturity up to 1 year.	
1992	Ceiling on lending rates replaced by ceiling on average rate per bank. Reduction of scope of credits at preferential rates.	Strengthening of prudential regulations. New financial instruments are introduced (investment trusts, priority shares).	Extension of operations in the forex money market.
1993		Adoption of new auditing standards for the financial statements of banks.	Acceptance of obligations of Article VIII of the IMF's Articles of Agreement. Participation in Uruguay Round. Current account convertibility. Exporters can open accounts in forex and retain up to 40% of export proceeds. Banks/firms allowed to borrow abroad up to TD10/TD3 million.
1994		New banking law sets a framework for a more market-oriented system. New stock exchange legislation sets private stock market and creates independent supervisory body. Audits of all banks are completed; restructuring plans are implemented. Introduction of negotiable t-bills and investment trusts (<i>OPCVM</i>).	Membership in WTO. Creation of interbank forex market: BCT continues to announce a central rate; banks can hold open forex positions within prudential limits. Liberalization of outward FDI for exporters within an annual ceiling.
1995		Venture capital companies are authorized.	Free trade agreement with EU. Inward portfolio investment partially liberalized.
1996	Lifting of all restrictions on lending rates. Elimination of lending requirements to priority sectors.		
1997	BCT intervention in money market becomes main monetary instrument.	Implementation of a plan to restructure NPLs on public enterprises. Implementation of <i>mise à niveau program</i> .	Forward covers introduced for trade related transactions. Maximum buying/selling spread for

Year	Monetary Sector	Financial Sector	External Sector
		Adoption of general regulations of the Bourse des Valeurs Mobilières de Tunis (BVMT). Creation of Maghreb Rating.	spot transactions eliminated. Domestic banks can perform cross transactions with foreign banks. Inward portfolio investment in shares liberalized up to 50 percent of voting rights.
1998		Issue of fungible t-notes (BTA).	
1999		Capital adequacy ratio raised to 8 per cent. Exposure to a single group reduced to 25 percent of capital. Adoption of rules on public offer of securities.	Surrender requirement reduced to 50 percent.
2000		Merger of the Banque de Développement Économique de la Tunisie and the Banque Nationale de Développement Touristique with the Société Tunisienne de Banque. Enactment of new Business Corporation Code.	
2001	Introduction of 3-month t-bond repo auctions. Change to end-of-day repo operations, by electing for maturities going from 1 to 7 days in contrast to a maturity set uniformly at 7 days in the past.	Enactment of a new banking law and law on collective investment institutions. Electronic clearing system for checks. Tightening of limits to large exposures. Establishment of a permanent minimum 100 percent liquidity ratio. Requirement to publish the lending and deposit interest rates of banks and level of commissions.	Onshore banks allowed to offer forward cover for financial operations up to 12 months and engage in foreign currency/dinar swap. Banks and nonbanks allowed to hedge against interest rate risk in foreign exchange through FRAs.
2002	Modification of RR base.	Privatization of the Union Internationale de Banque. Initiation of process of converting development banks into multiservice banks.	
2003	Introduction of open market operations and establishment of the regulatory framework for repos. Reform of regulations governing the special saving accounts and establishment of a fidelity premium.	Introduction of remote clearing of standard bill of exchange (completion of reform of electronic clearing). Establishment of Tunisian Financial Analysis Commission at the BCT.	Foreign investors may acquire Treasury securities up to 5 percent of each line. Individuals serving as the sub-agency may open accounts in convertible dinars. Up to 70 percent of receipts from exports and borrowing denominated in foreign exchange can be credited to professional accounts.
2004	Change in procedures for the BCT intervention on the money market (adoption of a composite method for the apportionment of the credit auction). Adoption of the standard framework agreement setting the terms and conditions for repos.	Creation of a bank for financing SMEs. Rate of deductible provisions of banks and leasing companies raised from 75 percent to 85 percent of taxable profit.	Modification of the limits on foreign borrowing: credit institutions may borrow unlimited amounts for maturities up to 12 months. Other firms may borrow up to TND10 million subject to a rating requirement.
2005	Money market: (i) opening up to individuals as subscribers; (ii) CPs and CDs converted to book-entry form and entered in accounts in the name of the holder.	Privatization of Banque du Sud. Enactment of law on strengthening financial security. Rate of deductible provisions of banks and leasing companies raised to 100 percent of taxable profit. Establishment of regulatory framework for electronic funds transfers. Reorganization of BVMT: first and second market merged into a single market. Creation of startup funds and mutual venture capital funds.	Foreign investors may acquire t-bonds up to 10 percent of issues. Nonresident may subscribe for/buy bonds issued by resident firms listed on stock exchange or which have obtained a rating. Freedom of purchase among foreigners of shares in Tunisian firms. Creation of "service provider accounts" in forex and convertible dinars.
2006	Amendment of the BCT law: its main responsibility is to safeguard price stability; enhanced transparency of	Amendment of banking law: increase in minimum capital, and definition of the concept of reference shareholder;	Rate for acquisition by nonresident foreigners of bonds listed on stock exchange or rated raised to

Year	Monetary Sector	Financial Sector	External Sector
	monetary policy; elimination of BCT advances to the Treasury. Launching of RTGS system	governance rules strengthened. Launching of Zero Coupon bonds and amendment of procedures for issuance/redemption of bonds in order to enhance standardization.	10 percent. Relaxation of conditions on access to the capital of SMEs by nonresidents.
2007			Relaxation of conditions imposed on credit institutions and firms on foreign borrowing (obtain prior rating or stock exchange listing).

Source: BCT, Ministry of Economic Development; and IMF Annual Report on Exchange Arrangements and Exchange Restrictions.

Appendix Table 4. Tunisia: Detailed Compliance with the Building Blocks of an IT Framework

Building Blocks	Description	Compliance
Institutional features		
1. Price stability as primary objective	The general goal of the BCT is to safeguard price stability. This amendment provides the institutional basis for adopting IT.	High
2. <i>De facto</i> and <i>de jure</i> autonomy of the central bank (CB)	The <i>de jure</i> autonomy of the BCT is high, but has not been fully utilized so far. It is not clear that active interest rate management would be properly understood and accepted by the government and the public.1/ Public sector officials account for a sizable share of the BCT Board (4 out of 8 members, not including the governor). 2/	Intermediate
3. CB is transparent and accountable	The rules in place at the BCT are generally less stringent than those in place at IT central banks.3/	Intermediate
Operational features		
4. Stable macro framework	The stability of the macroeconomic framework benefits from capital controls.	Intermediate
4a. Absence of fiscal dominance	The mechanisms for adjusting administered prices introduce a fiscal bias into the control of inflation and the implementation of the monetary program may lead to an implicit accommodation of budgetary slippages.	Intermediate
4b. Robust external position	The external position benefits from capital controls, and external indebtedness is high.	Low
5. Efficient and stable financial sector	The institutional framework is broadly adequate, yet financial markets lack depth.	Intermediate
5a. Financial market	The financial market infrastructure appears adequate but the market is shallow.	Low
5b. Money market	The development of the money market has been hampered by the BCT's daily interventions through mid-2006 as well as by the fragile financial performance of certain state-owned banks.	Low
5c. Forex market	The development of the exchange market has been impeded by capital controls and the underdevelopment of the money market.	Intermediate
5e. Efficient and stable banking sector	The volume of NPLs is high and the performance of certain state-owned banks needs to be significantly strengthened.	Intermediate
6. Monetary and forex operations are efficient.	The BCT has monetary instruments and infrastructures in line with best international practices. Their implementation is well in hand.	High
7. Efficient interest rate transmission channel	Potentially high given the indexation of interest rates. However, indexation may deter dynamic use of the interest rate and, hence, affect the feasibility of IT.	High
Technical features		
8. Infrastructure required for IT	A core infrastructure is in place but it is not optimally used by the BCT, and certain tools essential for IT need to be established.	Low
8a. Have an	The weight of administered prices in the CPI is high (which creates a	Low

Building Blocks	Description	Compliance
inflation measurement for targeting	tradeoff between inflation and fiscal policy) and the basket does not reflect the composition of household expenditures.	
8b. Set the inflation target and its maturity	Discussions are at a preliminary stage. 4/	Low
8c. Inflation indices that are rapid, leading and lagged	Such indices are being developed.	Low
8d. Statistical tools for producing inflation forecasts	Such tools are being developed.	Low
8e. Good understanding of transmission channels	The assessment of transmission channels has not been the focus of in-depth studies.	Low
9. Publication of inflation reports	Given the current status of the economic and analytical capacity at the BCT, the preparation of such a report is not yet possible.	Low
10. Well-established analytical capacities	Potential exists in some public agencies but it is poorly utilized by the BCT. It is therefore advisable to: (i) strengthen technical cooperation with agencies that have analytical capacities; and (ii) recruit at least two econometricians and two economists to strengthen the capacity of the Research Unit.	Intermediate
Organizational features		
11. Transparent decision-making process	The annual targets of the monetary program are published; however, neither the monthly targets nor the factors accounting for deviations and revisions throughout the year are disseminated to the public.	Low
12. Organization of the CB's work units suited to the needs of an IT framework	In the short term, a higher degree of cooperation between the BCT units involved is essential in the preparation of the monetary policy meetings and in the setting of research priorities on IT. In the longer term, changes in the BCT organization chart should be considered).	Low
<p>Notes:</p> <p>1/ The BCT has high <i>de jure</i> indices of autonomy: its index of political autonomy was 0.63 compared to 0.45 for MCD countries; the index of operational autonomy was 0.75, against 0.63 for MCD countries (see IMF Working Paper No. 06/228).</p> <p>2/ Of the 24 IT central banks, the government is not represented on the monetary policy decision-making bodies for 10 of them; when represented, it is involved in the voting on monetary policy decisions in only four of them.</p> <p>3/ The BCT is required to inform the President of the Republic of any fact which could prove harmful to monetary stability (Article 34). The governor reports to the President of the Republic (Article 70) and is required to publish the BCT's annual balance sheet in the official journal. The BCT is required to send a statement of its accounts to the Minister of Finance every ten days. Of the 24 IT central banks, only seven are not required to account for their performance to Parliament; all publish an inflation report, most often quarterly and at least semiannually.</p> <p>4/ In nearly all of the countries which have adopted IT, the chosen target is the CPI, even if the indices of underlying inflation are also calculated. This choice reflects a desire for clarity in communication with the general public. Initially, the Czech Republic and South Korea had adopted an underlying inflation index; subsequently these countries adopted the CPI. Currently, Thailand is the only country to target an underlying inflation index.</p>		

Appendix Table 5. Unit Root Tests

Variables	Level		1 st Difference	
	c	c+t	c	c+t
Ly^{TUN}_t	0.99	0.22	0	0
Lp^{TUN}_t	0.07	0.29	0	0
Lx^{TUN}_t	0.99	0.91	0	0
Lh^{TUN}_t	0.94	0.05	0	0
$Lm3^{TUN}_t$	0.97	0.72	0	0
tmm^{TUN}_t	0.15	0.42	0	0
$Loil_t$	0.99	0.96	0	0
Ly_t^{EU}	0.66	0.46	0	0
s_t^{EU}	0.25	0.64	0	0

Note: IMF staff estimates.

P-values for the ADF unit root tests for the log of the following Tunisian variables: real GDP (L^{TUN}_t), consumer price index (L^{TUN}_t), nominal effective exchange rate level (Lx^{TUN}_t), money base (Lh^{TUN}_t), monetary aggregate M3 ($Lm3^{TUN}_t$), the overnight interest rate (tmm^{TUN}_t); and for following exogenous variables: the log of the oil price ($Loil_t$), the log of the European industrial production (Ly_t^{EU}), and the short-term (overnight) interest rate in Europe (s_t^{EU}). The P-values reported in the table refer to the null hypothesis of a unit root in the given series. The time period is 2001:01–2006:12 (monthly data). Column c indicates that a constant was included in the unit root test, while the column c+t indicates that both a constant and a time trend were included in the ADF test. Results for both the given series in level and in 1st difference are reported.

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