

# The Inflation Targeting Policy in Tunisia? Between Perception and Reality

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## Abstract

In this paper, we tried to examine and provide a clear answer on the possibility of the Central Bank of Tunisia to adopt the inflation targeting (IT) monetary policy. But the transition to the new optimum monetary framework remains a challenge in itself and requires the filling of certain pre-conditions. To do this, we first started by clarifying the conduct of monetary policy in Tunisia and the institutional and structural pre-requisites progress to make in adoption view of this new strategy, which allows more inflation mastering in a context of crisis and post-revolution. Regarding the transmission mechanisms, we conducted an empirical study of dynamic structural VAR models to conclude whether there is a stable and predictable relationship between monetary policy instruments and inflation, which is considered as a strong technical condition in favor of IT.

**JEL classification numbers:** E5, C3

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## **1 Introduction**

Certainly, New Zealand has been the first country to adopt the inflation targeting (hereafter IT) policy since 1990. Then, it became more industrialized and, like other emerging countries, it adopted IT as an anchor for the monetary policy, accompanied with a reaction function which, in addition to reacting to the output gap and inflation, partially responds to the movements of exchange rates.

Indeed, valuable theoretical research (see, e.g., Bernanke and Mishkin, 1997; Svenson, 1997; Bernanke et al., 1999) argues that the formal application of the IT policy by the emerging central banks makes the conduct of monetary policy more credible. In addition, on the forehead empirical evidences, Batini and Laxton (2007), Goncalves and Salles (2008), Lin and Ye (2009), Abo-Zaid and Tüzemen (2011), Kadria and Ben Aissa (2014), show that the IT is optimal on macroeconomic performance in developing countries and emerging inflation targeters in terms of reduction in the level and volatility of inflation, the decrease of budget deficit and the growth of production. Even in the face of shocks generated by the last size of the economic and financial crisis, the central banks of inflation targeters were better equipped than others to cope with difficulties.

Such arguments have made many other emerging countries to adopt the strategy of IT as a management system of their monetary policy. That being said, Tunisia, in a context of international economic crisis and a post-revolutionary phase sees its level of inflation increased substantially thereby mitigating unusual levels. This situation forced the monetary authorities to make efforts and make progress of time gradually in the conduct of its monetary policy, with the tracing of a final objective of price stability and through a strategy of choosing a growth rate of the money supply.

Therefore, it is interesting to study the possibility that Tunisia will make the transition to a new monetary policy framework, more flexible and effective in achieving its ultimate goal. But to adopt the IT policy, it is important to see if Tunisia has filled strict institutional, structural and technical preconditions setting it up. In this research, we will analyze and judge the degree of independence of the Central Bank of Tunisia (hereafter CBT), the level of transparency of the forecasting system, the inflationary expectations and other pre-requisites, and lead, in addition, an empirical study to validate the dynamic existence or not of a stable and predictable relationship between monetary policy instruments and inflation.

However, this paper is organized as follows. The second section presents an overview of the IT policy in emerging countries. A presentation of the conduct of the monetary policy part in Tunisia as well as the verification of the conditions of the IT implementation are advanced in the third section. In the fourth section, we will conduct an empirical analysis based on SVAR models to study the transmission channels of the monetary policy in Tunisia and in particular, verify the presence of a stable relationship between the monetary policy instruments and inflation as a necessary condition for the application of IT policy in Tunisia. We offer the conclusion and policy implications in the fifth section.

## **2 The Inflation Targeting Policy in Emerging Economies: A Challenge**

The IT policy makes monetary policy more effective in developing countries and emerging markets? This question open until today a theoretical and empirical debate among economists (see, e.g., Svensson, 1997; Bernanke et al., 1999; Ball and Sheridan, 2003; Bernanke and Woodford, 2005; Romer, 2006; IMF, 2006; Gonçalves and Carvalho, 2009), and to fulfill the implementation conditions of such a policy remains a challenge to overcome in these countries. Calvo and Mishkin (2003) identify five fundamental institutional weaknesses related to emerging countries namely: Weak financial and fiscal institutions including

prudential regulation and supervision of the government, currency substitution and liability dollarization, and vulnerability to sudden stops of capital inflows.

While one can debate what constitutes a minimum standard required for each of the conditions (see, e.g., Cukierman et al, 1992; Alesina and Summers, 1993; Croce and Khan, 2000; Batini and Laxton, 2007; Kurmann, 2008; Pétursson, 2009), it is clear that: the more a country is advanced in the implementation of these elements before the adoption of IT, the most part of its monetary policy will be credible and macroeconomic performance will likely to improve.

### **3 The Conduct of Monetary Policy in Tunisia**

#### **3.1 Becoming More Comprehensible...**

Since the amendment of its constitution in 1988, the CBT continues to make progress in its rule of conduct of the monetary policy, particularly in terms of transparency and continually minimizing the uncertainty factor. This new framework has a final goal, an intermediate objective and operational mechanisms and instruments for achieving these objectives. After the amendment of the Organic Law of the Central Bank (Law No. 2006-26 of May 15, 2006 amending and supplementing Law No. 58-90 of September 19, 1958 on the establishment and organization of the Central Bank of Tunisia), the ultimate and priority goal routed in the monetary policy aimed at preserving price or money value stability. Regarding the choice of the intermediate target, the CBT has chosen to correlate the money supply growth to nominal GDP. More specifically, the monetary aggregate target, since 1999, is the M3. This monetary policy framework is based, in addition to the monetary aggregates and credit, on a diverse range of indicators (import prices, the output gap, core inflation...) closely linked to inflation. Moreover, the money market has become the desired response of the CBT through a number of instruments (required reserves, operations at the initiative of the CBT, operations at the initiative of banks) to supervise the bank liquidity and steer interest rates in the short term according to the objective of price stability and after giving an opportunity for non-financial economic agents to intervene and close the discount window in 1986. More specifically, the CBT used the open Market operations in terms of bank liquidity regulation in order to contain the interest rate in a channel marked by the rate bidding (the minimum rate) and the reverse repurchase rate (the maximum rate). So, it is clear that this new policy privileges the action on the money market rate (MMR) which is used as a structural objective and also as the main instrument for the conduct of the monetary policy. But the CBT remains reticent to use interest rate as the main instrument for financial stability reasons. For the matter, the day to day MMR has remained for a good time very low volatile due to the high position or presence of the CBT on the market. Therefore, "*the monetary policy conducted by the CBT can be described as neutral with a certain rigidity of interest rates*".

#### **3.2 ... and Progress to Make in Adoption View of Inflation Targeting Policy**

The nature of the observed inflation in Tunisia is not only of an institutional type, to be more specific, it is not only monetary and the relationship between aggregate inflation target is no longer stable and solid (Boughrara and Smida, 2004). This therefore shows that monetary targeting is not the best strategy for mastering inflation in the country, which suggests Tunisian monetary authorities to adopt IT rule. But the transition to the new monetary policy framework is not as obvious regarding the above explained institutional and structural prerequisite and should be mostly completed. In fact, greater transparency and optimal information of both in quality that quantity would help to anchor inflation expectations of the economic agents and to avoid skidding. According to the IMF, almost all of the information

mass provided to the public by the CBT is published with a delay that is up to one semester, and there is no respect for a fixed periodicity of certain data and the lack of announcements about inflation rate and certain real variables (Minaoui and Smida, 2008). In addition, these authors compared announcements concerning the monetary aggregate target to the achievements during the period 1987-2006 and concluded that “*the TCB announced objectives were not always reached...These results should incite to install a dispositive which allows to better evaluate the authorities’ initiatives*”. Given the importance of forecasting inflation for the monetary policy framework and as specified by the CBT, great efforts are being made within the CBT to develop a device of analysis and inflation forecasting in the short and medium terms that will serve as reference for decision making in monetary policy and a means of communication with the public by providing a means to assess and strengthen its policy, therefore, its credibility. For a more flexible context, the CBT is expected to further clarify its strategy, to explain more frequently the slippages of intermediate targets and further clarify the role of interest rates.

In addition, Article 34 of Law No. 58-90 of September 19, 1958 regulating the operation of the CBT indicates that “*it is required to coordinate and lend its support for the economic policy of the state*”. Minaoui and Smida (2008) state that the independence of the CBT remains rather formal since it enjoyed *de facto* autonomy. With the revolution of January 2011 experienced by the country, we believe that the CBT will perform its function and will be independent in decision making. But, as stated by Diouf (1998), the recognition of the Governor in a central bank remains a guarantee of its autonomy. A signal that the rate of rotation of the CBT Governors, which is one of the criteria for evaluating the degree of independence of a central bank according to Cukierman (1992), is 0.21 i.e. 12 changes on 55 years. One must say that the term of office of the CBT’s Governor is six years renewable.

After analyzing the institutional framework of the CBT and the efforts made in this field and in order to ensure an optimal transition to an IT policy, we will focus on the progress to do at the structural level, economically and technically. Indeed, and as shared by most economists and experts mainly Tunisians, the crisis management post-revolutionary in Tunisia led to the assumption of a set of social and economic measures by the government to overcome various challenges such as employment, regional development, etc. and to ensure economic recovery, which is causing an increase in the budget deficit of 7-8% in 2013 with a rate of public indebtedness, which affects 49% of the same year. As part of the good coordination between fiscal and monetary policy, the State shall direct its efforts towards reducing its budget deficit, which must be maintained at a tolerable levels (3%) as well as the indebtedness rate. This will require the development of the financial system by creating a synergy between the stock market, which still plays a marginal role in the Tunisian economy, and the banking sector as well as a dynamic secondary market.

Concerning the exchange rates regime, the CBT claim it was following a flexible exchange rates policy. This opens the way to many questions among most specialists: Tunisia is not now floating *de jure* and manages *de facto*? Fear of floating there does not? As noted previously, one of the basic conditions for implementing the IT policy is to have a flexible exchange rate. If this is the case, it will be much better. Also, a conflict should be noted between the two objectives i.e. the fight against inflation and the protection of competitiveness that may arise, in certain circumstances, a relative inconsistency in the time of monetary policy conducted by the Central Bank (Chockri and Frikha, 2011).

In what follows, we will try to understand the transmission channels of the monetary policy in Tunisia and in particular to see empirically if there is a stable and predictable relationship between instruments, specifically the short-term interest rate, and inflation. This technical relation between inflation and monetary policy indicators is one of the main preconditions and one of the success key factors of the IT policy.

## 4 Empirical Analysis of the Relationship between Monetary Policy Instruments and Inflation in Tunisia

### 4.1 Data and Methodology

To clarify the relationship above mentioned, with a stability ensuring a better implementation of IT strategy, we were inspired by a variety of works (Cecchetti, 1999; Kim and Roubini, 2000; Gottschalk and Moore, 2001; Disyatat and Vongsinsirikul, 2003; Elbourne and De Haan, 2004; Qin et al., 2005; Chockri and Frikha, 2011) in this area and in particular, we used the structural vector autoregression model (SVAR<sup>1</sup>) in the manner of Blanchard and Quah (1989).

To do this within the framework of the Tunisian economy, we start from a set of quarterly data covering the period 1980Q1-2011Q2. Our basic model VAR is the following:

$$Z_t = \Gamma(L) Z_t + v_t \quad (1)$$

Where  $Z_t$  is a column vector of stationary variables including the following variables: Industrial production index<sup>2</sup> (IPI), monetary aggregate (M3), the consumer price index (CPI), the real effective exchange rate (REER) and the money market rate (MMR). Note that all variables are expressed in a logarithmic form except MMR. The data are drawn from the database of IMF (International Financial Statistics, IFS) and the CBT. Otherwise,  $\Gamma(L) = \Gamma_1 L^1 + \Gamma_2 L^2 + \dots + \Gamma_p L^p$  is a lag operator in the form of polynomial matrix and  $v_t$  is a vector of idiosyncratic errors, where  $v_t = (\mu^1_t, \dots, \mu^5_t)'$ . These errors are not autocorrelated and are homoscedastic.

The representation (1) can be written in the form of a moving average of infinite order VMA ( $\infty$ ) (representation theorem of Wald):

$$Z_t = C(L) V_t \quad (2)$$

$$\text{Where } C(L) = [I - \Gamma(L)]^{-1}$$

The structural form (SF) of the model (1) can be written as follows:

$$Z_t = A(L) \varepsilon_t \quad (3)$$

Where  $A(L) = C(L) H$  is the coefficient matrix ( $a_{ij}$ ) of (5×5) size, and more precisely it represents the impulse response functions of the elements of  $Z_t$  following the various shocks. Moreover,  $H$  is the transition matrix and  $\varepsilon$  is the vector of structural shocks where  $E(\varepsilon_t \varepsilon_t') = I_N$ .

The precise econometric objective of our study is to get information on the size of the impact of different variables including the MMR on inflation which is reflected by the CPI. In addition and concerning the identification of some structural shocks, the change in the IPI variable is included to identify the supply shock, the inclusion of M3 and MMR in the VAR reflects the impact of monetary policy. As for the impact of exchange policy, it is represented by the REER variable. But, the identification of these shocks requires the imposition of the long-term identifying structural constraints to Blanchard-Quah (1989) based on economic

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<sup>1</sup> The SVAR model is defined by Sims (2002).

<sup>2</sup> We use the Industrial Production index instead the real GDP quarterly series due to the unavailability of the corresponding series.

theories that will be included in the matrix  $A(L)$ . It is in fact introducing the resulting economic effects of various shocks  $i$  is the nature of each shock  $j$ . In our case, the number of constraints is equal to 10 i.e.  $n \times (n-1) / 2$  where  $n = 5$  variables. Therefore and in order to build the matrix  $A(L)$  which embodied the different structural shocks to be imposed on our VAR model, we relied on the economic theories of real business cycles (RBC current) and Fisher effect. From these theories of real economic cycles, we accept the nullity of  $a_{ij}$  such that  $a_{12} = a_{13} = a_{14} = a_{15} = 0$ ,  $a_{21} = a_{31} = a_{41} = a_{51} = 0$ ,  $a_{24} = 0$  and  $a_{54} = 0$ . Thus, we reject the nullity of  $a_{23}$ ,  $a_{25}$ ,  $a_{52}$  and  $a_{53}$ . And also consider the Fisher effect, the non nullity of  $a_{32}$ ,  $a_{34}$  and  $a_{35}$  is affirmed. As for the representation of the structural exchange rate shock, we will  $a_{4j} = 0 / \{j=4\}$ . In addition, we will have  $a_{ij} = 1$  such that  $i = j$ .

$$A(L) = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & a_{23} & 0 & a_{25} \\ 0 & a_{32} & 1 & a_{34} & a_{35} \\ 0 & 0 & 0 & 1 & 0 \\ 0 & a_{52} & a_{53} & 0 & 1 \end{pmatrix}$$

Furthermore, our methodology consists, in the first place, to study the stationarity of all variables using the Phillips-Perron test (1988) particularly applicable in the case of time series. The second step is to determine the order  $p$  of the VAR process to remember. To this end, we consider various processes for VAR lag orders  $p$  ranging from 1 to 4. For each model, we calculate the Akaike information criteria (AIC) and Schwarz (SC) and hold the  $p$  lag that minimizes these criteria. Based on the results of this test and after the estimation via the structural factorization (with 500 iterations) of the model (3), we detect and analyze the impulse response functions (IRFs) of the CPI response to other variables shocks and precisely the MMR. Saw that the impulse response gives us information only on the magnitude of the degree of transmission of MMR variations on the CPI and in order to assess the importance of the impact of monetary policy instruments in the fluctuation of inflation, we perform variance decomposition for the CPI.

## 4.2 Empirical Results

### 4.2.1 Stationarity of Variables and Choice of the Lag Number of VAR Process

The results of the stationarity tests summarized in Table 1 show that all variables are integrated of order 1 (I(1)) in level and are stationary in first difference.

Moreover and based on the results given in Table 2, we will add a watchlist added a number of lag  $p = 4$  (according to the information criteria AIC, SIC and log-likelihood).

Table 1: Unit root test of Phillips-Perron

Series	In level	In 1 <sup>st</sup> difference
IPI	0.3506	0.0001*
M3	0.9841	0.0001*
CPI	1.0000	0.0000*
REER	0.5772	0.0000*
MMR	0.8688	0.0000*

Note: The null hypothesis for the Phillips-Perron test is that the series are non-stationary i.e. there is presence of unit root. The values in the table indicate the p-values of this test. Using the ADF test, the results were the same.

\* denotes that the null hypothesis of unit root is rejected at the 5% level.

Table 2: Choice of the lag number of VAR(p) process

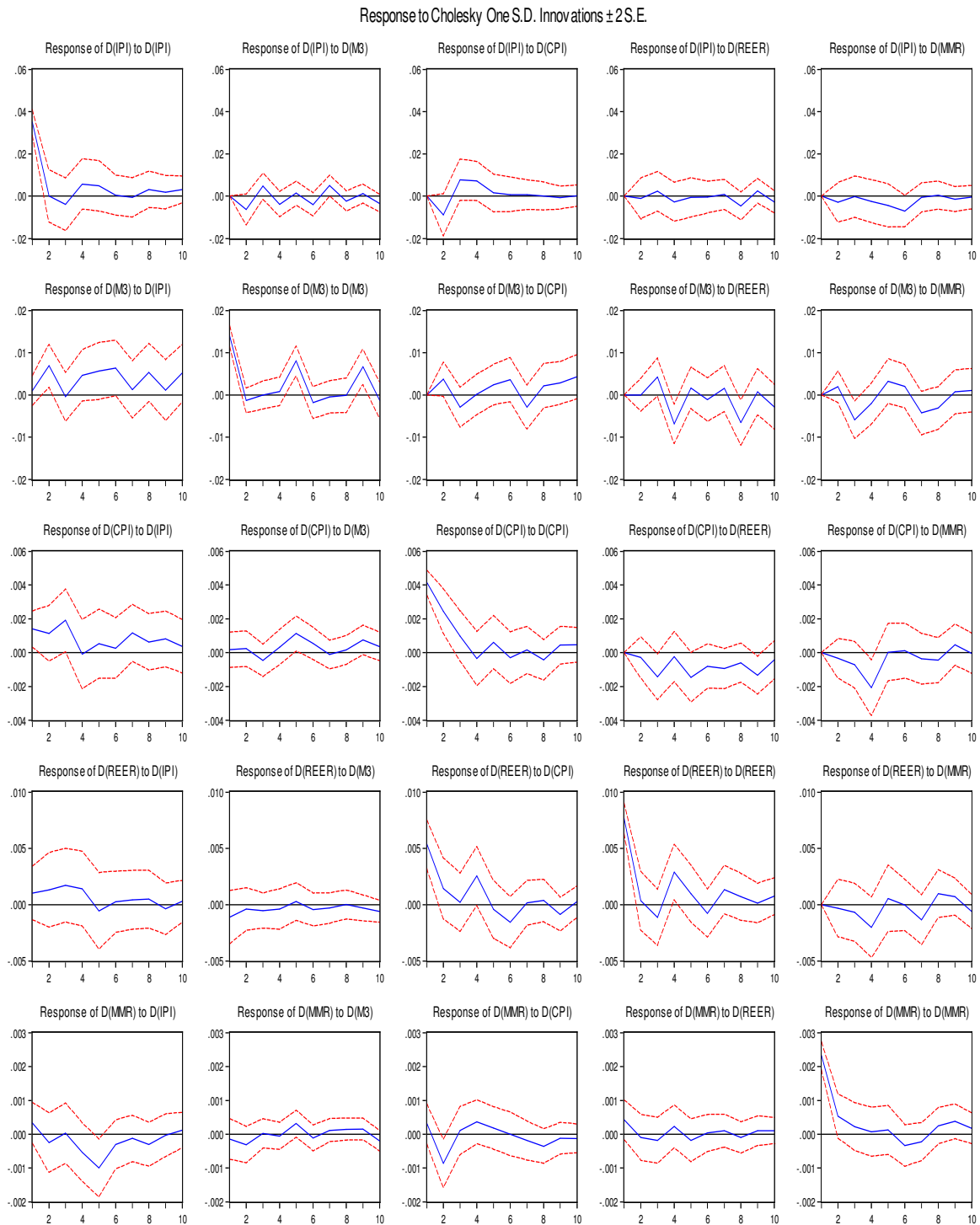
The lag number p	AIC	SC	LV
1	-31.11032	-30.28767*	1067.196
2	-31.40915	-29.75032	1086.502
3	-31.72516	-29.21625	1106.068
4	-32.63583*	-29.26258	1144.347*

Note: LV denotes the log-likelihood; the asterisk indicates P order to retain according to the criterion used.

#### 4.2.2 Impulse Response Functions Analysis

Certainly, the study of the dynamic of the model, via the IRFs, helps us to judge and appreciate the channel(s) of the Tunisian monetary policy high transmission and more specifically to see if there is really a robust, stable and predictable relationship between instruments (especially MMR) and inflation with a view to adopt the IT policy. In this respect, we will identify the different responses of all variables in the model in response to various shocks. It should be noted that we focused on the effects of the shock on 10 periods (that is to say 10 quarters) and that errors are generated by Monte Carlo with 100 repetitions. Figure 1 present the results of impulse responses. Different graphs and in particular those relating to CPI responses to different shocks indicate that prices respond quickly, after two quarters, but weakly to the shock of the real effective exchange rate and money market rates innovations with attenuation of these shocks on the long term. Concerning the prices response due to industrial production index shock, it can be judged as significant with a return to equilibrium in the long term. It can be noted, moreover, that the CPI response to money supply innovations is slow and limited.

Figure 1: The impulse response functions



### 4.2.3 Variance Decomposition

This study, based on the impulse response functions, can be completed as we have indicated by an analysis of the variance decomposition of the forecast error. The purpose to it is to appreciate the contribution of the various shocks of monetary policy leading indicators (particularly the interest rate instrument) in explaining the fluctuations of the consumer price



index for the Tunisian case which is reported in Table 3. The results indicate that the variance of the forecast error of CPI is due at a rate of 49.27% to its own innovation after 10 quarters and the IPI, REER and MMR shocks are respectively and relatively low in explaining fluctuations in the CPI while the error variance percentage of the price index attributed to the money supply shock is very small. More specifically, the shocks of the industrial production index, real effective exchange rate, interest rate and money supply explain, in order, (after 10 quarters) at a rate of 19.01%, 15.86%, 10.64% and 5.19% the consumer prices variance. So, we can say that the analysis of variance decomposition corroborates impulse response functions and confirms that the CPI is explained at half by its own innovation and the relationship between monetary policy instruments and inflation is not as robust except the IPI.

Table 3: Variance decomposition of CPI

Period	S.E.	D(IPI)	D(M3)	D(CPI)	D(REER)	D(MMR)
1	0.004385	10.16804	0.158549	89.67341	0.000000	0.000000
2	0.005176	12.12237	0.324332	86.83440	0.287237	0.431664
3	0.005849	20.17660	0.875243	70.84538	6.237597	1.865175
4	0.006228	17.81339	1.037171	62.79688	5.635597	12.71697
5	0.006547	16.77591	3.916937	57.72558	10.07097	11.51061
6	0.006630	16.51252	4.476555	56.47944	11.28164	11.24985
7	0.006812	18.60296	4.272567	53.56355	12.62329	10.93763
8	0.006897	18.97343	4.214418	52.64813	13.06723	11.09679
9	0.007140	18.99921	5.021014	49.49457	15.70280	10.78241
10	0.007187	19.01647	5.198316	49.27265	15.86680	10.64578

## 5 Conclusion and Policy Implications

In this paper, we tried to give a clear answer to the possibility that the CBT adopts the IT monetary policy. After analyzing the institutional and structural pre-conditions for a future implementation of this monetary regime and advanced to do the progress towards the achievement of this objective, we were also verify the technical pre-required condition using the SVAR modeling. The results indicates that the usual determinants of inflation are not sufficient (in themselves) to explain the inflation dynamic in Tunisia. However, the impact of supply shocks has been persistent, notably during the post-revolution period. In addition, the direct links between the money supply, exchange rate, interest rate and inflation in the short term have little effect. So we can assert the existence of an instable and less predictable relationship between the monetary policy instruments and inflation in the Tunisian case, although the interest rate of short-term began to be more active and flexible in recent years, starting from 2009. This can be cited as an optimist argument for a future implementation of the IT policy in Tunisia given that the interest rate instrument begins to contain more predictable information on the future evolution of inflation.

Therefore, we can say that Tunisia is in the process of achieving progress in the fight against inflation and is also aware of the importance of IT as a framework for optimal inflation controlling. But the CBT is not a good candidate for the adoption of this strategy in the short term and in this transitional phase. This does not eliminate the possibility and capacity of Tunisia to apply IT over the medium and long term, if it continues to fill and satisfy the conditions of its implementation in the sense that can be evoked, proposed and suggested by this paper.

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