Science Journal of Economics
ISSN: 2276-6324
http://www.sjpub.org/sje.html

Published By
Science Journal Publication

Research Article

Inflation Targeting Policy: Pre-requisites and Opportunities for Tunisia

Olfa Manai Daboussi, Ali Chebbi, Asma Madouri

* manaolfa@yahoo.com
** ali.chebbi@iscae.rnu.tn
*** asma.madouri@isg.rnu.tn

Higher Institute of Management
University of Tunis

Accepted 27th November, 2013

Abstract

The objective of this paper is to explore the feasibility and the efficiency of a strategy of inflation targeting in Tunisia. We check whether the necessary conditions for a successful implementation of inflation targeting are fulfilled or not and we outline the pre-requisites for adopting this strategy in Tunisia. By developing a structural VAR model, we try to evaluate the transmission channels of monetary policy and to identify the conditions for successful adoption of the regime of inflation targeting.

Keywords: Inflation target, monetary policy, SVAR model, Tunisia.

JEL Classification: E47, E52, E58.

1.0. Introduction

Over the three past decades, monetary policy has known, in developed countries, important changes. During this period, there was questioning of the traditional conduct of monetary policy based on the intermediate target of monetary aggregate that is today the main context in developing countries.

Industrialized countries and emerging countries have faced disruption and economic crises to overcome the problem of inflation. This phenomenon has never been acceptable by decision makers of economic policies and economical agents; to the extent that inflation distorts the process of decision making, as it prevent economic growth stability. Rising prices increases uncertainty in the economy, which generates a disturbance in the distribution of income and increased unemployment rate.

The findings identified in the work of M. Friedman (1968-1975) followed by those of Lucas (1972-1976), attract the attention of economists, as they reflect the complexity of the evolution of monetary policy. Thus, empirical results remain inconclusive in the context of stability and reduced volatility of inflation. A new monetary environment related to changes and expectations, the effectiveness of monetary policy implementation is currently linked to the work of Kydland and Prescott (1977) and those of Barro and Gordon (1983). They believe that monetary policy faces time inconsistency which is based on the lack of Government credibility against discretionary policy. They believe that monetary policy faces time inconsistency which is based on the lack of Government credibility.

Policy of monetary aggregates was immersed in the work of the seventies and has been adopted by many countries. Monetary targeting relates to the announcement of a rule; the Central Bank uses its instruments such as interest rates to control monetary aggregates, which are the main determinants of long-term inflation. Its failure was attributed to the discretionary decisions of monetary authorities and the low credibility of monetary policy, which generates inflationary bias in the long term.

A new monetary policy emerged in the early nineties. It is the policy of inflation targeting which consists of an official announcement of a target interval for one or more horizons. It allows publishing inflation forecasts and adopting, by anticipation the necessary measures to control prices. One of the main characteristics of this policy is its significant effort to communicate with the public on the objectives of monetary policy. Croce and Khan (2000) explain that the policy of inflation targeting is based on a high degree of transparency. According to Svensson (2002), inflation targeting requires some institutional reform such as the independence of the Central Bank in the implementation of its instruments.

Unlike previous policies, inflation targeting has led to a considerable economic performance. During the 1990s, countries that adopted inflation targeting have experienced a period of stability characterized by a low level of inflation and sustainable economic growth. Tunisia is planning to adopt inflation targeting on medium term. This work attempts to study the relevance of such strategy in a small open economy like that of Tunisia.

The paper is organized as follows: Section 2 presents the theoretical foundations of inflation targeting policy. Section 3 provides the empirical methodology to be adopted in this work. Section 4 gives empirical results. Finally we conclude.

2.0. Theoretical foundations of inflation targeting policy

2.1. Emergence of the strategy of inflation targeting

During 1990's and 2000's, economists agree that the objective of price stability is an important pre-requisite for securing the good conduct of monetary policy.
There has been an emergence of literature consistent with the objective of implementing the role of monetary policy in the context of stability. A great debate has opposed the discretionary policies, which lack credibility in their actions to political rules that directly affect the inflation target.

Discussion begins with the work of two economists Kydland and Prescott (1977) who showed that to acting with a discretionary behavior creates distortions. Barro and Gordon (1983) support the same conclusions; they show that discretionary monetary policy generates inflation and time inconsistency problems.

2.2. Motivation for adopting inflation targeting

Inflation targeting depends on the degree of transparency. Its adoption allows the public to understand and interpret the inflation target set by the Government or Central Bank (Croce and Khan (2000)).

This monetary regime based on forecasts contributes to the implementation of monetary policy instruments, which also aims to price stability.

2.3. Pre-requisites for inflation targeting (IT)

Based on the work of Eichengreen and al (1999), Batini and Laxton (2006), Taylor (2000), Mishkin (2000), Siklos (2002), there was a consensus between economists and central bankers that there is an order to successfully implement the IT strategy. Therefore, the following institutional and economic conditions must be fulfilled:

2.3.1. Institutional conditions

The fundamental institutional requirement of inflation targeting is the Central Bank's independence. The Central Bank must be independent in order to freely adjust its instruments of monetary policy toward the objective of low inflation. The independence of the central bank does not exclude the communication of policy makers from the central bank with those of the government in fixing goals. However, independence excludes government intervention in the adjustment of the instruments of monetary policy.

The second institutional condition is accountability. The Central Bank should have reliable forecasts. It must have advanced techniques to be able to collect data and operate effectively in order to define models of conditional forecasts. The commitment of the central bank should not lack precision or legislation. The mandate of the central bank must be precise and clear. Accountability must be accompanied by the communication of the monetary policy decisions in a clear and regular manner to the financial market, to policy makers and to public. Accountability requires a greater transparency, materialized by the publication of Central Bank forecasts.

The development of the financial market is a necessary condition for financial stability and also for independence of Central Bank. To ensure financial stability, it would be appropriate to use indirect instruments responsible to act effectively on inflation. Miskin (2000) showed that the most serious economic contractions arise when there is financial instability.

2.3.2. Economic conditions

A developed financial system is seen as an institutional and economic condition. Other conditions are necessary for successful implementation of inflation targeting such as the fiscal dominance and control of the monetary transmission mechanism.

Fiscal dominance can hamper the conduct of an independent monetary policy. Although fiscal dominance means there is an excess of fiscal policy pressures on the monetary policy and a heavy reliance on seigniorage revenues.

Monetary authorities have to be able to forecast inflation and the Central Bank should have enough knowledge about the monetary transmission mechanisms.

2.4. Are conditions for the adoption of inflation targeting satisfied in Tunisia?

In Tunisia, the transition to a policy of inflation targeting is an interesting opportunity to win in term of price stability. In what follows, we analyze the most important conditions; then, we check whether they are met in Tunisia or not.

2.4.1. Are institutional conditions fulfilled?

- The Central Bank of Tunisia (BCT) is free to manage its monetary policy instruments, but it remains politically dependent on the government. The Central Bank uses mainly market-based refinancing procedures: bids for liquidity, open market operations and weekly liquidity auctions.

Corresponding Author: Olfa Manai Daboussi
Higher Institute of Management of Tunis University of Tunis. e-mail: manaolfa@yahoo.com

- The Central Bank of Tunisia is transparent in achieving its objectives. For publishing information, the BCT must respect the conditions of the IMF for Special Data Dissemination Standard.

- The reports of the BCT are devoid of any forecasting exercises that take into account the forecast of future inflation dynamics.

- To avoid the loss of competitiveness, Tunisia has followed a constant real exchange rate (CRERR) to index the nominal exchange rate to the domestic price level. This procedure allows the real exchange rate to deviate from the target so as to smooth movements in the nominal exchange rate. The Tunisian exchange regime is deemed akin to the crawling peg and it is technically for the floating variety.

- The Tunisian financial system is fragile and weakly developed. The capital market is dominated by the banking system. The situation of banks is grave and there is a lack of coordination between the Central Bank of Tunisia and the Ministry of Finance.

2.4.2. Are economic conditions fulfilled?

- Some countries have adopted inflation targeting, the recourse of the Seigniorage is low. In Tunisia, it is less than 1% of GDP due to political stability and stable tax revenue.

- The level of the public debt is close to 60%, it is high during the period 2000-2006.

- The fiscal deficit of Tunisia is moderate and the fiscal system is rather flexible.

- In the implementation of monetary policy, the BCT is aware that there is insufficient knowledge about the transmission mechanism issue.

3.0. Empirical methodology

3.1. The vector autoregression model

Understanding the monetary transmission system is necessary to evaluate the adoption of inflation targeting. Since 1980's, the vector autoregression (VAR) model became a useful tool in macroeconomic analysis. The VAR model expresses each variable in the system as a linear function of its own lagged value and the lagged value of all variables being considered. The error terms in these regressions are the `surprise movements' in the variables, taking past values into account.

A VAR (p) process is given by:

$$X_t = \varphi_0 + \varphi_1 X_{t-1} + \cdots + \varphi_p X_{t-p} + \varepsilon_t \quad (1)$$

With X_t denoting a (N×1) vector of times series variables, p is the number of lags included in the system, $\varphi_0 \in R^N$, φ_i are (N×N) coefficient matrices and ε_t is a (N×1) vector of errors terms with zero mean and variance covariance matrix $\sum_\varepsilon$.

In lag operator notation and omitting any exogenous variables in the system, VAR (p) can be written as:

$$\varphi(L)X_t=\varepsilon_t \quad (2)$$

Where:

$$\varphi(L) = I - \sum_{i=1}^{p} \varphi_i L^i$$

and I the identity matrix.

Given that the process is stationary, the model (2) may be written in its moving average form:

$$X_t = \varphi^{-1}(L)\varepsilon_t = \theta(L)\varepsilon_t = \sum_{j=0}^{\infty} \theta_j \varepsilon_{t-j} \quad (3)$$

Where:

$$\theta(L) = \sum_{j\geq 0}^{\infty} \theta_j L_j$$

and $\theta_0 = I$.

Under this form, ε_t represents the vector of the canonic innovations of the VAR process. These innovations represent the smallest component not observable of each variable that compose the VAR system. Canonic innovations are interpreted as shocks that the dynamic of the process characterize their propagation or equivalently by dynamic multipliers θ_j, through them one shock is propagated to the whole process. That is, we characterize the responses of different series X_{it} (i=1,…, N) to different innovation ε_{js} basing upon the dynamic multipliers as follow:

$$\theta_{ij,t-s} = \frac{\partial X_{it}}{\partial \varepsilon_{js}} \quad (4)$$

The multipliers $\theta_{ij,h}$ represent the effect of a shock j on a variable i, h periods before.

The number of parameters to be estimated in the VAR (p) model in equation (2) is respectively ((N (N +1))/2) in $\sum_\varepsilon$ and N^2p in φ. The lag length of a VAR (p) model can be determined using model selection criteria (AIC (p), BIC (p), HQ (p)). The general approach is to fit VAR (p) models with orders p=0,…,p_{max} and to choose the value of p which minimizes some model selection criteria.

3.2. The monetary transmission channels: A SVAR model

The success of the adoption of inflation targeting in Tunisia requires the comprehension of the monetary policy transmission systems. In this line, we try to identify the principal monetary transmission channels via a SVAR model. The model therefore includes four variables that are: production index (PI), consumer price index (CPI) monetary market rate (MMR) and exchange rate (SDR).

The PI reflects the economic activity or the level of economic development of the country. CPI, MMR and SDR give information about the monetary policies adopted by monetary authorities. That is, we consider the following vector:

$$X_t = \begin{bmatrix} PI_t \\ CPI_t \\ MMR_t \\ SDR_t \end{bmatrix}$$

In first differences, the vector X_t is covariance stationary. Therefore, it can be written as an infinite moving average process in the structural shocks as follow:

$$DX_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = A(l)\varepsilon_t$$

Where A(L) is a matrix whose elements are polynomials in the lag operator L and denoted as $a_{ij}(L)$. We consider that A(1) is the matrix of long-run effects whose elements and similarly, A_0 is the matrix of the contemporaneous impact effects.

In this system, each variable is explained by a structural equation that has an error term associated with it, interpreted as representing a particular innovation or shock and labeled according to the structural equation from which they derive. That is, ε^{DPI} is a supply shock, ε^{DCPI} is a monetary shock, ε^{DMMR} and ε^{DSDR} are respectively are the nominal shock and the exchange shock. We impose some restrictions on the long-run effects of the shocks on the endogenous variables in the SVAR model.

Therefore, the vector DX_t is given by:

$$\begin{bmatrix} DPI_t \\ DCPI_t \\ DMMR_t \\ DSDR_t \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & a_{23}(1) & a_{24}(1) \\ 0 & a_{32}(1) & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{DPI} \\ \varepsilon_t^{DCPI} \\ \varepsilon_t^{DMMR} \\ \varepsilon_t^{DSDR} \end{bmatrix} \quad (5)$$

Restrictions embedded on the system are driven from the Real Business Cycle Theory (RBC) and the Fisher effect. These theories were considered in determining the long-term constraints of the Blanchard-Quah (1989). Based on the RBC theory, we assume that only supply shocks have an impact on the long-term activity. This assumption implies that: $a_{12}(1)=a_{13}(1)=a_{14}(1)=0$. On the other hand and according to the same theories, shocks generated by consumer price index, monetary market rate and real exchange rate do not affect lasting the level of economic activity in the country, which lead to the nullity of the coefficients $a_{21}(1)=a_{31}(1)=a_{41}(1)$.

In the context of RBC Theory which suggest the neutrality of money in the short and long term, we assume furthermore that all coefficients $a_{3j}(1)$ are zero, with the exception of the coefficient $a_{33}(1)$ since the money acts only on itself. We also suppose, that supply and exchange shocks do not have direct impact on inflation, which implies: $a_{i3}(1)=0$. However and while referring to Fisher effect which describes the relation between the rate of interest and in particular long-term inflation, we reject the nullity of the coefficient $a_{24}(1)$. Indeed, Fisher effect explains the impact of the expected inflation on the level of the nominal interest rates. It suggests that any increase in the expected inflation rate will cause an equal increase in the interest rate. In a similar way, a decline in the expected inflation rate will cause decrease in interest rates.

4.0. Estimation results

4.1. Statistical properties of the data

The data used to estimate the model consist of quarterly and seasonally unadjusted observations that cover the period from 1995:Q1 to 2012:Q4. All variables are retrieved from the International Financial Statistics and considered in logarithms, exception the MMR.

ADF and KPSS tests results, reported in appendix, show that all variables are non stationary in level. Taking first differences, all variables are stationary where DCPI is the inflation rate. To define the number of lags to be included in the

model, we use three approaches that are: Log Likelihood and Akaike Information Criteria suggest that 2 is the appropriate lag length.

After imposing the identification restrictions implied by the model (5), we present the impulse response functions and the forecast error variance decomposition analysis.

4.2. Impulses responses function

A supply shock has a positive effect in the short run on the production index, of about 0.004989 in the first quarter. This shock affects positively the price level (0.032350) and the monetary interest rate (0.002851), this result is in agreement with theoretical predictions. The effect of this shock on the exchange rate is negative and weak (-0.001018). In the second quarter, the effect of the supply shock is positive on output, MMR and SDR, of about 0.001471, 0.001618 and 0.001054 respectively whereas the effect is negative on the price level (-0.064829).

In the medium run, this shock have a little effect of the production index, affects positively the price level, the monetary interest rate and the rate of exchange. The long-term effect of this shock becomes negligible and tends to be absorbed.

The effect of a monetary shock, via an increase in the price level, degrades the production level. The response of the CPI to this shock is positive and very significant, about (0.259106) and (0.058260) in the first and the second quarter respectively. This effect decreases significantly and becomes negative in the medium and long term.
In the short and medium term, the effect of inflation on the interest rate is positive whereas it becomes negative in the long-term. Indeed, the increase in prices, due to higher demand, reduces real money holdings and therefore leads to an increase in interest rates. The change in inflation and interest rate calls us the Fisher hypothesis who stipulated that in the medium term, the evolution of inflation should be reflected in the interest rate.

The effect of monetary shock shows an increasing trend in the exchange rate evolution. This results in an increased production, improved external competitiveness and a decline in inflation. Then the effect is neutralized in the long run.

Monetary contraction due to an unanticipated temporary increase in the domestic interest rate results in a deterioration of economic activity. This fact is clearly visible to Tunisia in the medium term (the effect is null for the first quarter, about (0.000486) for the second quarter and negative for other periods). The monetary restriction via the increase in the interest rate causes a decrease in the price level in the medium term and therefore a reduction in inflation. Over time, the effect on inflation is zero. The effects of the nominal shock on output, interest rates and exchange rates tend to disappear.

In the long run, the decrease of the money supply via the interest rate is reflected completely in a proportional fall of price levels, that is inflation is of monetary origin as said by Friedman. Therefore, it does not an effect on production level and interest rate. In absence of money effect in the long run, of the currency on the production and the interest rate which make us say that the currency is neutral long-term. It therefore has no effect on the level of production and interest rates.

The exchange rate shock has a positive effect on the exchange rate in the short term (0.018906) and (0.002854) respectively in the first and second quarter. It affects slightly production index in the medium run and the effect on the rate of exchange is too little.

The exchange shock stimulates the economic activity. Indeed, devaluation of the local currency increases external competitiveness and increases economic activity. This, consequently, leads to lower the prices which in turn reduce the level of inflation in the country. This effect tends to be absorbed in the long run.

4.3. Forecast error variance decomposition analysis

The decomposition of variance (Table 4 in the appendix) allows us to measure the relative importance of the four mention shocks on inflation rates' fluctuations over different time horizons. Variance decompositions light on the importance of monetary shocks when explaining inflation change at several horizons. At the two year horizon, about 87.57% of prices variance is accounted for by monetary shocks, while 9.29% is due to supply shocks. The impact of a nominal shock on prices seems to be weak (0.44 %) while the contribution of demand shocks in the variance of inflation forecast errors does not exceed 2.68%. In definitive, empirical results reveal the predominance of nominal shocks in explaining fluctuations of the inflation rates in Tunisia.

4.4. Economic interpretations and implications

Empirical results show the prevalence of the effect of the monetary and nominal shocks on Tunisian inflation rates. We conclude that an anti-inflation policy is evident. That is, to overcome the effects of demand inflation, monetary and fiscal policies appear as alternative solutions. Graphs and estimations have demonstrated the importance of the interest rate channel which is not a surprising result given that Tunisia target interest rate to stimulate exports and GDP.

The question that arises is about the possibility of transition to inflation targeting regime, with consideration of the implications on the rate GDP growth rate.

Due to prevailing economic conditions, it is questionable that Tunisia makes or not the transition. The institutional and economic conditions must be implemented for adopting inflation targeting in Tunisia. Tunisia could make the transition inflation targeting regime with minimizing costs in terms of GDP and employment. This transition must be accompanied by a tax adjustment.

Therefore, a more flexible exchange rate should be conducted to stimulate exports and to allow a less pressure on interest rates.

5.0. Conclusion

Theoretical study has shown that inflation targeting improves the effectiveness of the monetary policy. This paper has dealt with the issue of the implementation of inflation targeting in Tunisia. This work checked whether the necessary conditions for the successful implementation of inflation targeting are fulfilled or not. The study showed that some guidelines must be pursued if the Tunisian authorities are prepared to conduct monetary strategy of inflation targeting,

To evaluate the mechanisms transmission of policy monetary in Tunisia, we estimated a SVAR model. Results of our estimations outline the dominance of monetary shocks and, in the second round, supply shocks in inflation rates fluctuations.

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Appendix

Table1: ADF and KPSS test statistics

How to Cite this Article: Olfa Manai Daboussi, Ali Chebbi and Asma Madouri, "Inflation Targeting Policy: Pre-requisites and Opportunities for Tunisia", Science Journal of Economics, Volume 2013,Article ID sje-234, 5 Pages, 2013, doi: 10.7237/sje/234 Science Journal of Economics

	PI	CPI	MMR	SDR
ADF statistic				
Levels	-1.954387 (0)	-3.257834 (4)	-1.842300 (0)	-1.828653 (0)
First differences	-7.451770 (0)	-3.848613 (3)	-6.827560 (0)	-6.455917 (0)
KPSS statistic				
Levels	0.204036	0.205428	0.195758	0.152453
First differences	0.114962	0.142782	0.03663	0.069454
Critical value of the ADF test at the 5% level is -3.466966. The maximum lag for the ADF test is given in parenthesis. A critical value for the KPSS test at the 5% level is 0.146.				

Source: Authors' estimations.

Table 2: Model lag length selection

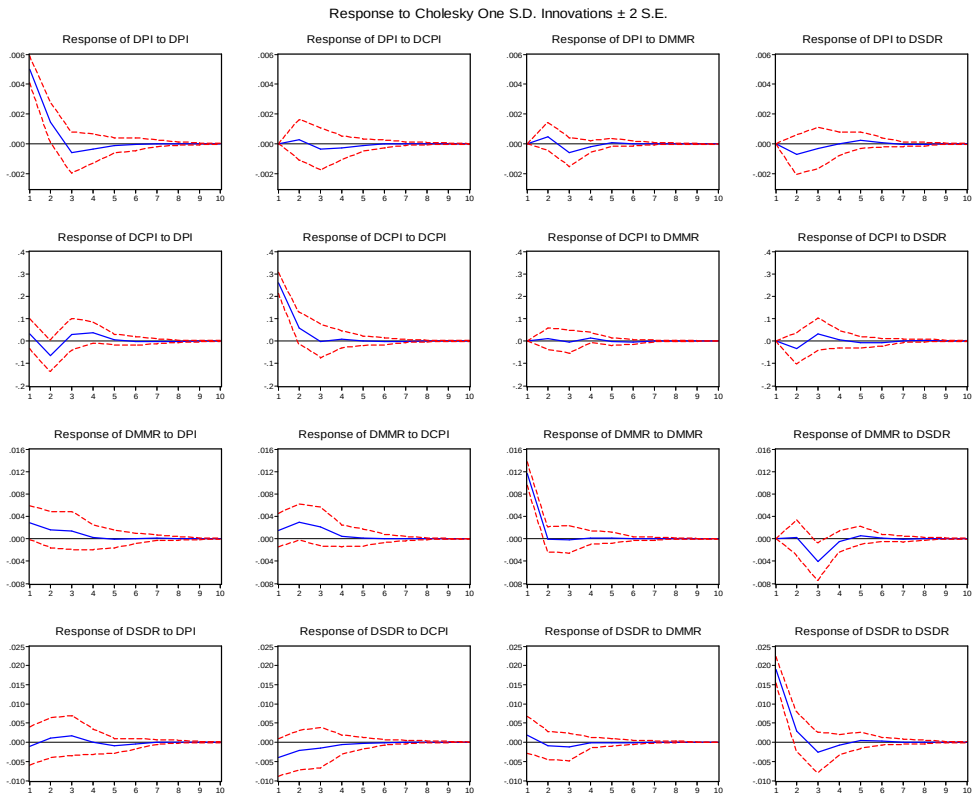
	Log Likelihood	Akaike Information Criteria	Schwarz Criteria
p=1	556.2366	-17.29795	-16.61178*
p=2	573.1301*	-17.61082*	-16.36506
p=3	565.7185	-17.12395	-15.30885
p=4	561.5758	-16.73138	-14.33693
p=5	551.2591	-16.11238	-13.12829
p=6	554.8480	-15.95958	-12.37528
The asterisk * denote the lag p to be hold			

Table 3: VAR (2) estimation results

	Dependent variable			
	DPI	DCPI	DMMR	DSDR
DPI_{t-1}	0.258670	-15.23176	0.259093	0.336288
DPI_{t-2}	-0.151346	13.54071	0.307487	0.217527
$DCPI_{t-1}$	0.000184	0.191641	0.011530	-0.005313
$DCPI_{t-2}$	-0.002080	-0.032593	0.002524	-0.004481
$DMMR_{t-1}$	0.047748	1.118116	-0.013302	-0.104562
$DMMR_{t-2}$	-0.061693	-0.223017	-0.003559	-0.082293
$DSDR_{t-1}$	-0.037387	-1.742426	0.009456	0.150948
$DSDR_{t-2}$	-0.000132	1.643095	-0.186009	-0.158858
Constant	0.007588	-0.051753	0.006861	0.004145

Source: Authors' estimations

Figure 1: Impulses responses function



Source: Authors' estimations.

Table 4: VAR variance decomposition

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k	S.E	ε^{DPI}	ε^{DCPI}	ε^{DMMR}	ε^{DSDR}
1	0.004989	1.534913	98.46509	0.000000	0.000000
4	0.005380	9.267244	87.75295	0.402341	2.577469
8	0.005389	9.299896	87.57550	0.443642	2.680965
12	0.005389	9.300172	87.57495	0.443663	2.681217
16	0.005389	9.300173	87.57495	0.443664	2.681217
20	0.005389	9.300173	87.57495	0.443664	2.681217
Cholesky Ordering : DPI DCPI DMMR DSDR					

Source: Authors' estimations

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