



The macroeconomic performance of the inflation targeting policy: An approach based on the evolutionary co-spectral analysis (extension for the case of a multivariate process)

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ABSTRACT

This paper proposes a new methodology to check the economic performance of a monetary policy and in particular the inflation targeting policy (ITP). The main idea of this work is to consider the ITP as economically efficient when it generates a stable monetary environment. The latter is considered as stable when a long-run equilibrium exists to which the paths of economic variables (inflation rate, interest rate and GDP growth) converge. The convergence of the variables' paths implies that these variables are more predictable and implies a less uncertainty in the economic environment. To measure the degree of convergence between economic variables, we propose, in this paper, a dynamic time-varying variable presented in the frequency approach named cohesion. This variable is estimated from the evolutionary co-spectral theory as defined by Priestley and Tong (1973) and Priestley (1969, 1981, 1988, 1996). We apply this theory to the measure of cohesion presented by Croux et al. (2001) to obtain a dynamic time-varying measure. In the last step of the study, we apply the Bai and Perron test (1998, 2003a,b) to determine the change in the cohesion path. The results show that the implementation of the ITP generates a high degree of convergence between economic series that implies less uncertainty into the monetary environment. We conclude that the inflation targeting generates a stable monetary environment. This result allows us to conclude that the ITP is relevant in the case of industrialized countries.

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1. Introduction

Since the early 1990s, a monetary policy strategy known as “inflation targeting (IT)” has been formally adopted by a number of industrialized countries. Under this approach, a monetary authority officially announces an inflation target level or target range, which is generally consistent with low or zero inflation, to be achieved within a specified time frame. This monetary policy was adopted without inherent theory. This lateness has attracted some debates. Among them, we find the recent debate about the macroeconomic performance of the inflation targeting policy (ITP). There has been a growing interest, both theoretical and empirical, in this subject. These researches are separated into two major fronts. The first, based on the effect of this policy on the output, finds inspiration in the researches of Buckle et al. (2003) and Mollick et al (2008).... They consider the ITP as a relevant policy that leads to the best economic performance when it generates a positive impact on the output. The second front is concerned with the impact of the ITP on some economic variables.¹ This front of research finds

inspiration in the works of Mishkin and Posen (1997), Bermanke et al. (1999), Honda (2000) and Ball and Sheridan (2003).... The idea behind these pieces of research consists of checking the effect of IT implementation on the evolution of these variables. In the case when their paths become stable after the ITP intervention, we can characterize this policy as relevant.

These works reach different conclusions. Some of them show the efficiency of the ITP and justify its relevance such as King and Wolman (1996, 1999), Goodfriend and King (1997), Choi et al. (2003), Levin et al. (2004).... The others show that the ITP had no impact on the dynamic of the economic variables such as Lee (1999), Honda (2000), Ball and Sheridan (2003), Genc et al. (2007).... We suggest that the different conclusions are the result of a less rigorous econometric approach. In the first kind of work, the authors test the effect of the ITP only on the output. So, in the case where this policy generates a bad consequence for the evolution of other variables, this econometric approach cannot detect it. Indeed, in the second kind of work, most of the researchers model the studied variables before the inflation targeting adoption by an ARCH, ARMA, GARCH or VAR model.... Then, they generate a realization of these variables during the IT intervention. After that, they test the significant difference between the observed series and the predicted one during the period of

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¹ Like the interest rate, the inflation rate, the output and the exchange rate.

intervention. In these types of works, we notice two problems. The first one is related to a misspecification of the variables' processes. The second one is concerned with the construction of the test. Indeed, authors test whether the date of the inflation targeting adoption is a date of structural break or not. In other words, they didn't test whether the ITP had an effect on the stabilization of the economic variables. We suggest, in the case of the effect of ITP on the economic series, that the change in their paths can occur before or after the intervention of the policy.

In this paper, we propose a new methodology that allows us to judge the economic performance of the ITP. It is an original methodology allowing us to brighten this debate. In this work, we consider the monetary policy to be relevant and economically efficient when it ensures a stable monetary environment. Indeed, a stable monetary environment implies a low level of uncertainty. This low level of uncertainty traduces the predictability of the economic variables and a high level of convergence between the expectations of economic agents and those of the policy-makers. We consider the monetary environment as stable when the economic variables (interest rate, inflation rate, output growth)² converge in the long run to an equilibrium state. In other words, the interaction between the variables must be higher under the relevant monetary policy, which traduces a low level of uncertainty and a predictable environment. These variables must have the same response to economic shocks.

The methodology that we present above to check the economic performance of the monetary policy and particularly the relevance of the inflation targeting is based on the literature about long-run growth³ and macroeconomic stability. Business cycle and growth theories have traditionally been treated as unrelated areas of macroeconomics. Three papers published in the early 1980s, however, changed this perspective. First, Nelson and Plosser (1982) presented evidence that movement in the GNP tends to be permanent, and, second, Kydland and Prescott (1982) offered new models for analysing economic fluctuations that integrated growth and business cycle theory. According to these models, output fluctuations are induced by stochastic variations in technology. In more recent contributions to this literature, King and Rebelo (1988) incorporate endogenous growth into a real business cycle model, with the result that the temporary disturbances to production possibilities can have permanent effects on the path of the output. During this period, little attention was paid to the effect of business cycle volatilities on growth. This literature, in the middle of the 1980s, developed a positive relationship⁴ between long-run growth and business cycle volatilities. Among this research, we find Kormendi and Meguire (1985), Black and Fisher (1987), Grier and Tullock (1989), Caballero and Hammour (1994), Canton (1996) and Caporale and McKiernan (1996). However, in the middle of the 1990s, this literature developed a contrary conclusion. In other words, the relationship that is proved by recent works shows that the volatilities of the business cycle had a negative impact on the long-run growth. Among this research, we find Aizenman and Nancy (1993), Ramey and Ramey (1995), Ho (1996), Elbadawi and Schmidt-Hebbel (1998), Sanchez-Robles (1998), Lensink et al (1999), Martin and Rogers (2000), Beaudry et al. (2001), Kneller and Young (2001), Ismihan et al. (2003), Blackburn and Pelloni (2005) and Stiroh (2006). This second front of research criticizes the first one regarding the fact that they are based on the

traditional growth theory. Indeed, they explain that the conclusion of the first front of research was the result of some strong hypotheses. Indeed, they study this relationship by considering the investment as the most important transmission canal.⁵ The famous paper of Ramey and Ramey (1995) broke with the idea that considers the investment to have a main role in the relationship between long-run growth and cycle volatilities. Other research, such as that of Fischer (1993), Turovsky (1993) and Beaudry et al. (2001), studies the effect of an instable monetary environment on the economic performance. They show that a stable monetary environment is favourable to a good economic performance.

With the purpose of measuring the interaction between economic variables and their degrees of convergence, we use some notions such as co-movement,⁶ precisely the coherence function and/or the cohesion⁷ function. Our empirical objective is to measure the movement of three time series. So, we use the theory of evolutionary co-spectral analysis (Priestley and Tong 1973) and Priestley (1988, 1996). We construct a time-varying variable named cohesion that allows us to determine the long-run relationship between n times series where $n > 2$. The results show that the inflation rate, the interest rate and the growth rate converge more during the period of the inflation targeting policy. This implies that the monetary environment is stable during this policy. So, we conclude the relevance and the economic performance of the inflation targeting policy.

Our paper presents two major contributions. The first one is concerned with the theoretical methodology we followed to check the performance of a monetary policy based on the stability of the monetary environment. To our knowledge, there are no works that follow this methodology. The second one is concerned the original empirical methodology.

The paper is organized as follows. Section 2 presents the empirical analysis. Section 3 explains the data and shows the results. Then, Section 4 presents interpretations. The last section encompasses the conclusion (Figs. 1–4).

2. Empirical analysis

As mentioned in the introduction, our objective consists of measuring the degree of stability in the monetary environment. In most of the cases, three economic indicators represent this environment: inflation rate, interest rate and GDP growth.⁸ In our analysis, we consider this environment to be stable if the paths of these variables have the same movement in the long run. In other words, if a long-run equilibrium state exists in this environment, to which the paths of these variables converge, we then have stability. This movement between these variables is measured by the cohesion function. We propose a time-varying measure of this variable. So, we adopt the theory of the evolutionary co-spectral analysis as defined by Priestley and Tong (1973), which allows us to determine the interaction between non-stationary processes in two dimensions: the time dimension and the frequency one. After the estimation of all the pairs' relationships between the three variables (coherence), we construct the cohesion variable as a weighted average of all the coherence pairs. The last step is to check the evolution of the cohesion path. In other words, our objective is to verify whether the cohesion path has increased during the period of inflation targeting adoption or not. For this reason, we adopt

² We choose these three variables because, in most of the cases of industrial inflation targeting countries, these three variables are present in the monetary rule of this policy.

³ In the literature, the long-run growth is considered as a proxy for economic performance. In other words, a country that provides a high long-run growth is qualified by performing economically.

⁴ According to these researchers, they find that, when the cycles are volatile, the long-run growth is high.

⁵ Their argument of the positive relationship between business cycle volatilities is as follows: under an uncertain environment, the agents behave prudently and they will use precautionary savings. However, if the savings increase, the investment will increase.

⁶ The co-movement notion refers to the case of a bivariate process.

⁷ The cohesion function refers to the case of a multivariate process.

⁸ We choose only these three variables because, in the case of an inflation targeting policy, the reaction function that represents the ITP includes, in the case of industrial countries, only these three variables.

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