



A two-pillar DSGE monetary policy model for the euro area[☆]

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ARTICLE INFO

Article history:

Accepted 21 January 2011

JEL classification:

E52
E58

Keywords:

Monetary policy
Monetary aggregates
Monetary policy rules
ECB

ABSTRACT

The current financial crisis has revived the interest for monitoring both monetary and credit developments. Over the past two decades, consistent with the adoption of inflation targeting strategies by a growing number of central banks and the development of New Keynesian models for which monetary aggregates are largely irrelevant, money and credit have been progressively neglected in the conduct of monetary policy. A striking exception has been the Eurosystem, which has implemented a strategy known as the “two-pillar monetary policy strategy” giving a prominent role for money. In this paper, we develop a small optimizing model based on Ireland (2004), estimated on euro area data and featuring this two-pillar strategy. We evaluate an ECB-style cross-checking policy rule in a DSGE model with real balance effects of money. We find some evidence that indeed money plays a non-trivial role in explaining the euro area business cycle. This provides a rationale for the central bank to factor in monetary developments but also raises some issues regarding the reliability of M3 as an appropriate monetary indicator. We find some evidence that the ECB has systematically reacted to a filtered measure of money growth but weak evidence it has reacted more aggressively during excess money growth periods.

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1. Introduction

The current financial crisis has reminded both academics and central bankers of the crucial role played by money and credit in economic and financial developments. Such a renewed interest stems from two facts. First, central banks too narrowly focused on short-term price developments and neglecting money and credit growth may overlook the built-up of financial imbalances. In the current crisis episode for instance, this built-up was associated with a housing price bubble, fueled by financial innovations in the mortgage market and reflected in the balance sheets of financial institutions, thus in both money and credit developments. The latter could have informed the policy maker about growing financial risks, would have them been closely monitored. Second, as a response to this crisis, central banks have massively expanded their balance sheets in order to stimulate their economies in a context of near zero interest rates, thereby expecting some real balance effects of money.

There are three main reasons for why money and credit have been neglected over the past two decades.

First, the long-term relationship postulated between monetary developments and inflation, and known as the quantity theory of

money, has been challenged over time. Despite Lucas' (1980) claim that the two quantity-theoretic propositions, namely that a given change in money growth induces an equal change in price inflation and an equal change in nominal rate, “possess a combination of theoretical coherence and empirical verification shared by no other propositions in monetary economics”, several authors, like McCallum (1984) and Whiteman (1984), have challenged this view and shown that these links were in fact regime dependent. In a recent contribution, Sargent and Surico (2010) show, based on a DSGE model embedding a money growth rule, that an aggressive policy rule can prevent the emergence of persistent movement in money growth and that such a policy regime is also characterized by low low-frequency correlation between inflation and money growth and between interest rate and money growth. In addition, Goodhart (1975) shows that “any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes.” The Goodhart's law therefore attribute the breakdown of former low frequency correlation between money growth and inflation to the implementation of monetary targeting strategies in the 1970s. Finally, structural shifts in velocity, due for instance to financial innovations, may also account for a reduced correlation between money and inflation. This point is made for example by Lucas (1988) or Orphanides and Porter (2000) for the US and more recently by Bordes et al. (2007) for the euro area.

Second, and as a consequence of the former point, the chronic instability of the relationship between money growth and inflation as well as doubt on the controllability of monetary aggregates in a context of a rapid pace of financial innovations have contributed to

[☆] The views expressed in this paper do not necessarily reflect the opinion of the Banque de France. We thank Harris Dellas, Behzad Diba, Michel Juillard, François Langot, Edward Nelson, Celine Poilly, Michael Woodford and participants to seminars at the Banque de France and CEPREMAP for their very helpful comments. All remaining errors would be ours.

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the decline of monetary targeting strategies. These monetary policy regimes have been progressively replaced by inflation targeting strategies since the beginning of the 1990s. In this new set up, money and credit can still have an information role, which is limited at best as a kind of add-on or cross-check. The focus however is displaced from low-frequency correlations to high-frequency ones, inflation targeting central banks tending to limit their assessment of risks to price stability to their forecast horizon. Consequently, their inflation target is generally defined over a two or three-year horizon for which the correlation between money growth and inflation is usually weaker and the information content of money dominated by a wide set of economic indicators.

Third, New Keynesian models have become predominant, both in academia and central banks, for monetary policy purposes. In standard New Keynesian frameworks, such as those developed by Clarida et al. (1999) or Woodford (2003), optimal monetary policy can be formulated as an interest rate reaction function or policy rule, which is consistent with the current practice of central banks, but without any reference to money. Money is usually appended to these models through a money demand equation. As monetary policy is implemented by fixing the short-term interest rate, it becomes essentially endogenous. This feature has led some model builders to drop money completely from the models used to study monetary policy.

There are however few attempts to allow for a special role for money, even in the context of New Keynesian frameworks. Monetary aggregates can for example play an important role in the context of imperfect information as indicator variable to deal with data uncertainty (see for instance Coenen et al., 2005), model uncertainty and persistent misperception of key economic variables such as the output gap (see for instance Beck and Wieland, 2008). A even more active role for money is acknowledged in the context of financial crises for which several authors recommend the switch from an interest rate rule to a money base rule (see Christiano and Rostagno, 2001 or Christiano et al., 2009). In the vicinity of the zero lower bound for nominal interest rate, this case is even more stringent (see by example Orphanides and Wieland, 2000) and provides a rationale for the implementation of quantitative easing policies.

In this paper, we develop a DSGE model in which money enters into the structural equations of an otherwise standard New Keynesian model. Our main objective is to assess the extent to which money plays an active role in business cycle fluctuations in the euro area and is factored in by the European Central Bank (ECB hereafter) in the context of its two-pillar monetary policy strategy. Indeed, since its inception, the ECB has given a key role to monetary aggregates and their counterparts to assess the risks to price stability over the medium term in the euro area. So far, the two-pillar strategy implemented by the Eurosystem has received little support in the literature contrary to the inflation targeting framework. Christiano et al. (2006) and Beck and Wieland (2007) are the main contributions in this area. Contrary to Woodford (2007) who argues that there is no compelling reason to assign a prominent role to monetary aggregates in the conduct of monetary policy, we defend such a role by noting, first, that a monetary pillar offers an effective anchor for the price level and therefore would remove the long-term uncertainty about the price level associated to inflation targets and, second, by showing that indeed money plays an effective role in the economy.

Our “two-pillar” DSGE monetary policy model attempts to reflect both the essence of the Eurosystem’s monetary policy framework and the role of money in the conduct of monetary policy. To analyze this role, we elaborate on a model developed by Ireland (2004), which is a small scale DSGE model with sticky prices and monopolistic competition but without capital accumulation. In our setup, we first allow money to have an effective influence on both output and inflation and, second, the central bank to react to a filtered money growth indicator but not necessarily in a linear way. Unlike Ireland

(2004) and Andrès et al. (2006), we estimate our model resorting to Bayesian techniques rather than by maximum likelihood methods. By doing so, we impose less constraints on key parameters, in particular on the parameter measuring the effects of real balances on output and inflation. Indeed, the two above mentioned papers impose a non-negativity constraint on that parameter, which artificially leads to a zero coefficient estimate. As a consequence, these authors conclude that real balances have a limited, if any, role in explaining business cycle fluctuations. Two recent contributions by Favara and Giordani (2009) and Canova and Menz (2010) also argue that the cross-restrictions imposed by Ireland force estimates of the impact of money on other variables to zero, supporting our main findings.

By contrast, we show that money plays a non-trivial role in explaining the euro area business cycle. This provides a rationale for the central bank to factor in monetary developments but also raises some issues regarding the reliability of M3 as an appropriate monetary indicator. We also find some evidence that the ECB has systematically reacted to a filtered measure of money growth but weak evidence it has reacted more aggressively during excess money growth periods.

The paper proceeds as follows. Section 2 of the paper presents the main features of the ECB’s strategy and monetary analysis and the way we model it. Then, Section 3 details our two-pillar DSGE model for the euro area. Section 4 provides the model resolution and estimation. Finally, Section 5 discusses the role of money according to our estimates.

2. The European Central Bank and its monetary analysis

In this section, we describe how we model the ECB’s decision rule. First, we present the main features of the ECB monetary analysis and second we propose a formalization of the ECB’s policy rule.

2.1. A quick review of the role of money in the strategy

The most distinctive feature of the European Central Bank’s monetary policy framework has become known as the two-pillar strategy for assessing risk to price stability. In this very specific framework, money is given an important role, which, since the inception of the ECB, has been signalled by the announcement of a reference value for the growth of a broad monetary aggregate (M3).

The two-pillar strategy was reviewed in May 2003. While confirming the use of the two-pillar framework, the ECB’s Governing Council also emphasized that the “monetary analysis” (the former “first pillar” of the strategy) will mainly serve as a mean of cross-checking, from a long-term perspective, the indication stemming from the “economic analysis” (the former “second pillar”). In addition, and to underscore the long-term nature of the reference value, the Governing Council decided to discontinue the practice of an annual review. In practice, the reference value has not been reviewed since the inception of the ECB (it has remained unchanged at 4.5% since December 1998). This decision was interpreted by most observers as a downgrading of the role of money.

What is then the real role of money in the ECB’s monetary policy strategy and how is it factored in practice?

As far as the strategy is concerned, the role given to money acknowledges the fact that monetary growth and inflation are closely related in the medium to long run. Indeed, empirical studies carried out at the euro area level seem to confirm the monetarist statement according to which “inflation is always and everywhere a monetary phenomenon” (Friedman, 1963). In a recent contribution, Bordes and Clerc (2007) try to set out the need to announce a monetary growth reference value in the context of a two-pillar small backward-looking macroeconomic model. Their main point is that, contrary to the assumption usually made in New Keynesian frameworks, the central bank’s influence over the nominal interest rate does not operate in the

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