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## Does McCallum's rule outperform Taylor's rule during the financial crisis?☆

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### ABSTRACT

This paper makes an empirical comparison of two simple monetary policy rules, the McCallum rule and the Taylor rule and uses them to assess the monetary policy stance of the ECB during the financial crisis. After the Taylor rule, the McCallum rule ranks among the most widely analysed nominal feedback rules used for policy simulations. The retrospective evidence for the euro area suggests that these simple rules might have provided useful information about the policy stance of the ECB. While we find that for most of that period both rules were fairly close to actual policy, we find no support for McCallum (2000)'s claim on the superiority of his rule over the Taylor rule especially in an environment of very low interest rates.

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### 1. Introduction

Friedman (1968) made a famous contribution to the literature suggesting that a central bank should increase the money supply by a constant percentage rate every year in order to meet its objective of price stability. Ever since, the notion that inflation is ultimately a monetary phenomenon has become a central principle of monetary economics. Because growth in the money supply is erratic due to structural change in an economy or its monetary sector, it is complicated for a central bank to gain control over the money supply. Against this background, money growth rules have received increasingly less attention by policy-makers (Orphanides, 2007), and the Taylor (1993) rule, which uses the policy rate as an instrument, has played a dominant role in the monetary policy assessments of central banks (Asso, Kahn, & Leeson, 2010).

McCallum (1988) proposed a policy rule for the monetary base as an instrument. In relation to the Taylor rule, a potential advantage

of that rule is that it does not include unobservable variables such as the real interest rate and the output gap. For quite some time, researchers have recognized the difficulties associated with the measurement of the output gap (McCallum, 2001; Orphanides, Porter, Reifschneider, Tetlow, & Finan, 2000). A money base rule could dominate the Taylor rule, if it is difficult to assess the state of the economy in real time (Razzak, 2003). Based on a counterfactual comparison of the Taylor rule and the McCallum rule for three major economies, McCallum (2000) finds that from an ex post perspective money base rules tend to outperform interest rate rules, especially for Japan. Since May 1999, in its publication "Monetary Trends", the Federal Reserve Bank of St. Louis has regularly reported indications from a McCallum rule for the United States using alternative target inflation rates. Moreover, studies for Russia, China and India (Esanov, Merkl, & de Souza, 2005; Patra and Kapur, 2012; Sun, Gan, & Hu, 2012) find that a McCallum rule could be a suitable benchmark to assess the central banks' policy decisions.

The financial crisis had a strong impact on the global economy and on the transmission of monetary policy. Several major economies faced prolonged periods of low interest rates and even tested the zero lower bound. The zero lower bound on nominal interest rates has led most major central banks in the world to adopt non-standard measures implying a strong expansion of their balance sheets and thus an increased role for the monetary base

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as policy instrument. In an economic environment where the zero lower bound on interest rates becomes binding, it may be difficult for a central bank to implement the required negative interest rates. Moreover, the natural rate of interest, which normally is subject to some time-variation, has fallen considerably. Thus, the indications from an interest rate rule could become difficult to interpret for policy-makers. Despite this criticism, Taylor (2012) considers his rule to be “sound” also in those circumstances, since a central bank could still pursue other measures in order to further ease its monetary policy stance in the presence of the zero lower bound. This view is also supported by the observation that several major central banks have implemented negative rates (Jackson, 2015), thereby overcoming the zero lower bound constraint.

A knowledge gap exists as to whether base money rules, in which the natural rate of interest does not enter, would have been superior to the Taylor rule in a financial crisis. The aim of the paper is to address this question by examining the implications of the McCallum rule and the Taylor rule for the monetary policy stance of the ECB during the financial crisis. In an environment characterised by massive output losses, high unemployment and low interest rates, the policy rate may no longer be the sole indicator of the monetary policy stance. Since the monetary base can still be influenced by the central bank’s actions, the central bank can switch to a monetary base rule. A theoretical rationale for such an approach was given in Christiano and Rostagno (2001), who suggest that a central bank could monitor the money growth rate in parallel to the Taylor rule and commit to abandoning the Taylor rule in favour of a money growth rule under a clearly specified escape clause. Moreover, in addressing shortcomings of the New Keynesian model, other researchers (Beck and Wieland, 2007; Lucas, 2007) have argued that monetary information should continue to be used as a cross-check of the economic information in the monetary policy process.

The paper is organised as follows. Section 2 introduces the McCallum rule and the Taylor rule. Section 3 specifies a McCallum rule for the euro area. Section 4 assesses the McCallum rule for the euro area and compares it with the Taylor rule during the financial crisis. Section 5 concludes.

## 2. The McCallum rule and the Taylor rule

### 2.1. Simple rules and monetary policy strategies

A monetary policy strategy is the general approach used by central banks to achieve their primary objective – in the case of the ECB this goal is price stability. It provides both a framework for the internal deliberations among policy-makers and for explaining monetary policy decisions to the public in a clear and transparent manner. This makes it easier for the general public to understand the response pattern of monetary policy to economic developments, and thus to anticipate the broad direction of monetary policy over the policy horizon. It also helps to stabilise private sector expectations and to reduce fluctuations on the financial markets. While many central banks today pursue an inflation targeting strategy, the ECB prefers a two-pillar monetary policy strategy, which rests on an economic and a monetary analysis (for details see Issing, 2006).

A monetary policy strategy may lack sufficient institutional discipline to assure the achievement of the central bank’s goal(s) and there may be trade-offs between goals such as those between price stability and financial stability. The debate on rules versus discretion has illustrated that simple rules may not qualify as an optimal monetary policy strategy for a central bank. Though, a broad consensus exists among academic macroeconomists that policymakers’ choices should closely track pre-determined rules.

For example, Taylor (1993) demonstrated that the Federal Reserve’s monetary policy choices could, in fact, be well-approximated by a simple feedback rule. At the current juncture, however, it appears that central banks are unlikely to give up their discretionary powers to a nominal feedback rule. In that sense, a more promising avenue for a simple rule would be its use as an indicator of the monetary policy stance. Rather than stating that monetary policy should follow a specific fixed rule, simple rules could also be used as reference guides. In the literature, policy rules are understood as a positive and normative description how a policy instrument (e.g., short-term interest rate, monetary base, exchange rate) responds to changes in the macroeconomic environment (Blattner & Margaritov, 2010). As emphasized by Bernanke and Boivin (2003), central bankers routinely monitor a large number of economic variables, whereas simple policy rules typically only focus on a subset of these data. In empirical work, policy rules are often linked to macro models or are presented as single equation reduced forms. Their estimation is linked to a wide range of assumptions, e.g., concerning expectation formation, data and model uncertainty, and the monetary policy instrument.

Monetary policy has to be forward-looking, since policy actions affect inflation only with a lag. Simple rules can incorporate this element by replacing inflation and output variables with their corresponding forecasts at the policy horizon. However, simple rules only include a subset of the information available about the likely future path of inflation and output. As a matter of fact, an obvious limitation of the rules as guides to policy is that they ignore useful information about macroeconomic variables from other forward-looking indicators.

Optimal rules, which are derived from a first order condition of the central bank’s objective function, are typically model dependent (McCallum & Nelson, 2005). Compared to an assessment of all relevant monetary, financial and economic indicators, which seems to be supported by optimal monetary policy considerations (Dieppe, Küster, & McAdam, 2005), the advantage of a simple rule is that it has low information requirements. Nevertheless, in a real-time policy context, the application of these policy rules can be sensitive to the estimate of the natural interest rate, the value of the inflation target, the approach applied to estimate potential output and the quality of inflation and output forecasts. In addition, lags in the publication of statistical data on GDP and frequent revisions thereafter can hamper the application of a simple rule in assessing the monetary policy stance.

An argument against the validity of simulations performed with nominal feedback rules is that they could suffer from the Lucas critique. Lucas (1976) argues that the parameters of traditional macroeconomic models depend implicitly on agents’ expectations of the policy process and are unlikely to remain stable as policymakers change. In the present example, this argument means that the parameters used to simulate the data generating process for economic variables are calibrated from data absent nominal feedback rules, and they would presumably change if a nominal feedback rule were put into place. While at a theoretical level, the Lucas critique is uncontested – reduced-form models are not invariant to policy-induced structural changes –, its empirical relevance in the case of nominal feedback rules is less clear (Rudebusch, 2005).

Against this background, the following four criteria should be applied, when evaluating the usefulness of a monetary policy rule for practical purposes (McCallum, 1988): first, a policy rule should be robust in different models of the economy; second, the policy rule should help to reduce cyclical fluctuations in output and contribute to maintaining price stability; third, a policy rule should be specified in terms of an instrument variable that the monetary authority can control directly and/or accurately; and fourth, the rule should not rely upon the absence of regulatory change and

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