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Monetary policy objectives and Money's role in U.S. business cycles

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ABSTRACT

In a sticky-price model in which money can potentially play a key role in business cycles, I estimate monetary policy preference parameters under commitment in a timeless perspective. Empirical findings suggest that inflation stabilization and interest rate smoothing are the main objectives of monetary policy, with a very small role for output gap stabilization. Though the money growth rate is irrelevant as an argument in the Fed's objective function, its presence in structural equations improves model fit. Moreover, marginal likelihood comparisons show that the data favor Taylor rules over optimal policies. Finally, the way of describing monetary policy matters for macroeconomic dynamics.

1. Introduction

In the standard sticky-price new Keynesian model, as described in Galí (2008), monetary aggregates do not affect the equations describing inflation, interest rates and output dynamics. Furthermore, the central bank sets the interest rate and supplies any quantity of money demanded by economic agents at the given target rate. In sum, the canonical new Keynesian model, which is frequently employed to study monetary policy in academia and policy institutions, is block-recursive in money balances. Hence, the presence of a money demand equation imposes no restrictions on the dynamic behavior of key macroeconomic variables.

Evidence from estimated vector auto-regressions, such as Leeper and Roush (2003) and Favara and Giordani (2009), challenged this view for neglecting the role of money in business cycles. In addition, a burgeoning literature, based on estimated dynamic stochastic general equilibrium models, has started to find empirical evidence for the role of money in explaining macroeconomic fluctuations. Andrés et al. (2009), Poilly (2010), Canova and Menz (2011), Canova and Ferroni (2012), Benchimol and Fourçans (2012), Zanetti (2012) and Castelnuovo (2012) are examples of this literature. By supporting money as a relevant factor in business cycles, these papers contradict the early findings of Ireland (2004) and Andrés et al. (2006), who found no major role for money in cyclical fluctuations.

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The literature above used Taylor rules to summarize monetary policy and documented a significant interest rate reaction to the growth rate of nominal money. To assess the potential role for the money growth rate as a monetary policy objective, i.e., an argument in the central bank's loss function, I depart from the specification of monetary policy shown in these papers, and replace the Taylor rule with optimal monetary policy under commitment in a timeless perspective.

As discussed in Svensson (2003), there are pitfalls in trying to infer the target variables that central banks may care about in their loss functions from the coefficients of simple monetary policy rules. In fact, a significant coefficient associated with the money growth rate may only signal that money is a useful indicator for forecasting inflation and the output gap, which are the only variables that the central bank cares about. Appendix A illustrates this point with an example based on the model studied in this paper. In short, a statistically significant variable in a Taylor rule is not necessarily a target variable in the central bank's loss function.[1]

Following Dennis (2004, 2006), Ilbas (2010, 2012), Adolfson et al. (2011) and Givens (2012), I therefore specify the central bank's objective function as an intertemporal quadratic loss function to be minimized subject to the bank's information about the state of the economy and its view on the transmission mechanism. I then use quarterly data, ranging from 1984:Q1 to 2007:Q2, to estimate the model studied in Andrés et al. (2009) under optimal policy.

Empirical findings suggest that the Fed does not target the money growth rate and this variable is significant in estimated Taylor rules because it helps forecasting inflation and the output gap, which are themselves monetary policy objectives. The Fed's major concern is inflation stability and changes in interest rates are gradual, a typical conduct of central banks in normal times. There is evidence supporting the presence of money in the equations describing private agents' behavior. This presence indicates a more active role for money in explaining business cycles. Finally, optimal policies impose additional restrictions on the equations characterizing the equilibrium, which are rejected by the data. Thus, compared to Taylor rules, optimal policies lead to alternative cyclical behavior of key macroeconomic variables but do not improve model fit.

The rest of this paper proceeds as follows. Section 2 sets out the model. Section 3 discusses the empirical methodology. Section 4 presents the main findings. Section 5 checks the robustness of some results. Finally, the last section concludes.

2. A sticky-price model with money

In this section, I present the log-linear approximation of the sticky price economy developed by Andrés et al. (2009), henceforth the ALSN model. This artificial economy, in contrast to the canonical new Keynesian model, features an explicit role for money.

In the ALSN model, money affects the description of the equilibrium through the specification of nonseparable preferences and portfolio adjustment costs.

First, the model assumes that household preferences are nonseparable in consumption and real money balances. This nonseparability assumption affects households' intertemporal rate of substitution in consumption. Consequently, the Euler equation characterizing output dynamics depends on real money balances.

In addition, nonseparable preferences alter intratemporal choices. In this context, real money balances affect labor supply and real marginal costs. Therefore, the new Keynesian Phillips curve, which describes inflation dynamics, depends on the evolution of real money balances over time.

Second, the presence of portfolio adjustment costs makes the demand for money a forward-looking equation. In the canonical new Keynesian model, the demand for money is a static equation and real money balances do not influence the dynamics of the remaining macroeconomic variables. For this reason, the analysis of the canonical new Keynesian model does not really need an explicit money demand equation.

Andrés et al. (2009) and Arestis et al. (2010) showed that a forward-looking money demand equation implies that movements in real money balances not accounted for by the static determinants of money demand (output and the nominal interest rate) reflect variations in expected natural rates of output. Since the natural rate of output is a function of the structural shocks, which ultimately drive macroeconomic dynamics, money therefore conveys information on the determinants of aggregate demand and supply beyond that contained in its static determinants. Because of this informational role, regardless of whether monetary aggregates appear or not explicitly in the Euler equation and in the new Keynesian Phillips curve, if central banks somehow incorporate them in their monetary policy strategy, money will have an active role in business cycles.

2.1. The log-linear equilibrium conditions

The following equations define a linear rational expectations model, approximately describing the equilibrium conditions of the ALSN model.

[1] Kam et al. (2009) showed that, in small open economies under inflation-targeting, real exchange rates were significant macroeconomic variables in Taylor rules, but did not belong to the monetary authority's objective function.