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Endogenous monetary policy and the business cycle

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Abstract

The correlations and volatilities of real variables seem to be stable over time, but the relation between real and nominal variables is unstable. Presumably, one important factor behind this observation is the nature of money supply. In this paper, I look at a business cycle model where the central bank sets money supply to minimize the volatility of inflation and output. I find that small changes in the central bank's preferences can generate large changes in the derived money supply rule and in correlations between real and nominal variables. Although wages are assumed to be sticky, changes in the money supply rule do not generate any major changes in the behavior of real variables. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

It is widely acknowledged that money, inflation, and output are positively correlated over the business cycle. The behavior of real variables seems to be stable, but there is clear evidence that the relations between real and nominal variables change over time. In a large sample of countries, Backus and Kehoe

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(1992) find real variables to behave similarly in different subperiods while the behavior of money, inflation, and the price level is changing. Gavin and Kydland (1996) document these facts for U.S. post-war data.

Presumably, variations in the monetary policy is one important explanation to these observations. Even if money does not have any major real effects, changes in money supply certainly have a large impact on nominal variables. If the central bank takes real variables such as output and unemployment into consideration when deciding on money supply, nominal and real variables will be correlated just because of the central bank's reactions to changes in these variables, and if the money supply rule changes, so will correlations between real and nominal variables.

In the present paper, the central bank does indeed take the real economy into consideration when deciding on monetary policy. More precisely, I solve for the money supply rule that minimizes the central bank's loss function over inflation and output variability in a dynamic stochastic general equilibrium model. There are shocks both to productivity and in the money supply process. Wages have to be set before contemporaneous shocks and central bank decisions are observed. Hence, unanticipated changes in money supply have real effects.

I find, as did Gavin and Kydland (1996), that changes in the money supply rule can induce large changes in the business cycle behavior of nominal variables. The present paper adds to Gavin and Kydland's analysis by showing that money supply rules can change substantially when central bank preferences change. I find that the quantitative effects that monetary policy has on real variables are small but significant enough to make the optimal money supply rule change considerably when the central bank's weight put on output stability changes. The paper thus shows that sizeable variations in the central bank reaction function can be a reality.

The reason for the instability of the optimal money supply rule is that the central bank faces a trade-off between output and inflation stabilization. When the central bank puts much weight on output stability, its response to a negative productivity shock is as follows. The central bank observes the shock and increases money supply directly. Since nominal wages are assumed to be sticky, this action will decrease real wages and thus stimulate employment. Wage contracts will then be renegotiated, so the central bank cannot exploit the Phillips curve in later periods. Instead, the central bank contracts money supply in successive periods to decrease inflation. This leads to a temporary decrease in the distortionary effects from inflation and stimulates real activity. When, on the other hand, the central bank puts much weight on inflation stability its reactions are different. The central bank does not exploit the Phillips curve at all. Instead it contracts money supply in order to dampen the inflationary tendencies caused by the productivity shock. Compared to the first scenario, the central bank's willingness to use the timing of the inflation tax as an instrument to stabilize output has decreased.

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