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Optimal monetary policy with the cost channel and monopolistically-competitive banks

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ABSTRACT

This paper studies the optimal nominal policy interest rate in a model with the cost channel and imperfect competition in the banking sector. Due to this market power, the interest rate on deposits is relatively low; in particular it is lower than the policy interest rate. This, in turn, leads to a suboptimal level of deposits and, as a result, to a low level of intermediation. Deviations from the Friedman Rule are optimal in this setup regardless of the assumption about price rigidity; since households can hold their assets in the form of cash or deposits, taxing money, which is an imperfect substitute for deposits, is optimal in order to increase the level of deposits and encourage intermediation. The main results of the paper are robust to the introduction of market power in the loan market as well as stickiness in both the deposit and the loan markets.

1. Introduction

Friedman (1969) suggests that a zero nominal interest rate, and thus deflating at the rate of time preference, is optimal. This idea is motivated by the fact that money is costless to produce and hence optimal policy should satiate the economy with money. The present paper revisits this topic by studying the optimal nominal policy interest rate in an economy with imperfectly-competitive commercial banks, stickiness of deposits and loans and the cost channel of the nominal interest rate. The paper shows that with imperfect competition in the banking sector, the monetary authority sets a strictly positive nominal interest rate, regardless of whether deposits, loans and prices are fully flexible or rigid, thus implying deviations from the Friedman Rule. The average nominal policy interest rate in the benchmark calibration of the model is above 3% annually when prices are sticky and it is slightly above 2% annually when prices are fully flexible.

This paper extends an otherwise standard New Keynesian (NK) model along three different dimensions. First, the paper allows for imperfect competition in the banking sector as well as deposit and loan rigidity. Each commercial bank has market power in both the deposit and the loan markets, with the interest rate on deposits being the key focus of the paper. Second, following Christiano et al. (2005) and Ravenna and Walsh (2006), among others, I assume that part of the wage bill is paid

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before production takes place, thus giving rise to borrowing by firms (which, in turn, leads to supply-side effects of the nominal interest rate on inflation as in the standard cost channel of monetary policy). Third, households derive direct utility from holding real money balances, which consists of both cash and deposits, thus generating demand for money in equilibrium.

In the absence of price rigidity and monopolistic competition in the banking sector, the existence of the monetary distortion calls for implementing the Friedman Rule. However, the imperfect competition in the deposit market alone implies a suboptimal level of deposits as banks push interest rates on deposits below the market (policy) interest rate. When deposit levels are below their optimal levels, Friedman's prescription does not emerge as optimal: cash holdings and deposits are substitutes, but they are not perfect substitutes from the viewpoint of households. This is mainly because, in contrast to cash, deposits are interest-bearing. Therefore, "taxing" money (with a positive nominal market interest rate) decreases the demand for cash, and consequently increases the level of deposits as households shift to a more interest-bearing portfolio. A positive nominal policy interest rate, thus, offsets (at least) some of the distortions stemming from the monopolistic power of banks. This result holds when market power in the loan market is introduced and/or with stickiness in the loan and deposit markets.

This work is motivated by the recent events in the financial markets and by the attempt to introduce more realism to the basic macroeconomic models that deal with optimal monetary policy. The collapses of few financial institutions and the mergers of others raise concerns regarding the possible increase in the U.S. banking concentration. Wheelock (2011) shows that nearly 4% of the banks that operated at the end of 2006 failed during the period 2007–2010, adding to local market concentration (albeit the effects on overall concentration were small). Since supervising banks is one of the central bank's roles, these events raise challenges for monetary policy makers. Also, encouraging deposit holding is very important as it is the other side of lending and hence it affects the level of intermediation and, in turn, macroeconomic activity. Therefore, studying optimal monetary policy in an environment featuring imperfect competition in the banking sector is evidently timely and important. Its interaction with the cost channel is one contribution of this paper.

This paper adds to the voluminous literature on the optimality of the Friedman Rule. Smith (2002) suggests that implementing the Friedman Rule leads to misallocation of resources and disintermediation and weakens the financial markets. Berentsen et al. (2007) show, within the search-theoretic framework of Lagos and Wright (2005), that the optimal inflation rate is positive if the rate of time preferences is lower than the fraction of sellers in the population. Aruoba and Chugh (2010) show, in a model with money-market frictions that is also based on Lagos and Wright (2005), that the Friedman Rule is typically not optimal. Andolfatto (2007) concludes that the Friedman Rule is feasible and optimal only if agents are sufficiently impatient or there are rapid diminishing returns to production. Schmitt-Grohe and Uribe (2004) suggest that the Friedman Rule is not optimal if prices are sticky or the product market is not perfectly competitive.

The remainder of the paper is organized as follows. Section 2 outlines the model and defines the private-sector equilibrium and the optimal monetary policy problem. Section 3 describes the calibration of the model. Section 4 presents the main results of the paper regarding optimal monetary policy. Section 5 presents robustness analyses and Section 6 shows impulse responses. Finally, Section 7 concludes.

2. The model economy

The economy is populated by a continuum of infinitely-lived households who derive utility from consumption and money holdings, and supply labor services. Households are also engaged in the intermediation sector; some of their assets in banks are held in the form of interest-earning deposits. The banking sector is imperfectly competitive as each individual bank has market power in the deposit and loan markets. Intermediate-good firms operate in an environment of monopolistic competition. They hire labor as the only input to produce differentiated products and they face an adjustment cost function for prices. Their products are sold to final-good firms (retailers) who package them into final goods using a one-to-one technology.

2.1. Households

The problem of the representative household is to choose consumption c_t, labor supply n_t, nominal money holdings M_t, nominal bonds B_t and nominal deposits D_t to maximize:

$$\max_{\{c_t,B_t,D_t,M_t,n_t\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u\left(c_t, n_t, \frac{X_t}{P_t}\right) \tag{1}$$

where β is the subjective discount factor, $\mathbb{E}_0$ is the expectation operator and X_t is a money composite that consists of cash and deposits, and it captures the utility from holding money in both forms. The period utility function $u(c_t, n_t, \frac{X_t}{P_t})$ satisfies the following properties: $\frac{\partial u}{\partial c} > 0$, $\frac{\partial^2 u}{\partial c^2} < 0$, $\frac{\partial u}{\partial x} > 0$, $\frac{\partial^2 u}{\partial x^2} < 0$, $\frac{\partial u}{\partial n} < 0$ and $\frac{\partial^2 u}{\partial n^2} < 0$, where $x_t = \frac{X_t}{P_t}$ stands for real money balances. The latter is increasing in real cash and deposits: $\frac{\partial x_t}{\partial m_t} > 0$ and $\frac{\partial x_t}{\partial d_t} > 0$.

Maximization is subject to the sequence of budget constraints:

$$P_t c_t + M_t + B_t + D_t = M_{t-1} + R^D_{t-1} D_{t-1} + R_{t-1} B_{t-1} + W_t n_t + T_t + \Pi_t \tag{2}$$