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Do credit market imperfections justify a central bank's response to asset price fluctuations?

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ABSTRACT

Do credit market imperfections justify a central bank's response to asset price fluctuations? This study addresses this question from the perspective of equilibrium determinacy. In the model we use, prices are sticky and the working capital of firms is subject to asset values because of a lack of commitment. If credit market imperfections exist to a small degree, the Taylor principle is a necessary and sufficient condition for equilibrium determinacy, and monetary policy response to asset price fluctuations is good from the perspective of equilibrium determinacy. However, if credit market imperfections exist to a large degree such that the collateral constraint is binding, then the Taylor principle no longer guarantees equilibrium determinacy, and monetary policy response to asset price fluctuations becomes a source of equilibrium indeterminacy. We find that the existence of credit market imperfections makes it unsuitable to initiate a monetary policy response to deal with asset price fluctuations. We also find that reductions in credit market imperfections can enlarge the indeterminacy region of the model parameters.

1. Introduction

A classical topic in the context of monetary policy is a central bank's response to asset price fluctuations. The boom in Japan's economy during the late 1980s and its long stagnation during the 1990s and the recent economic boom and bust in the U.S. seem to imply that a central bank should respond to asset price fluctuations. It is often said that credit market imperfections play an important role in the boom–bust periods. In this scenario, should a central bank respond to asset price fluctuations and do credit market imperfections justify such a response?

In this study, we address this question from the perspective of equilibrium determinacy. Following the standard Calvo-type setting, prices are sticky in our model. We also assume that the working capital of firms is subject to asset values because of a lack of commitment. In cases where the collateral constraint never binds, the Taylor principle guarantees equilibrium determinacy and a positive response of monetary policy to asset price fluctuations increases the determinacy region of the parameters. In contrast, if the collateral constraint binds deeply, the properties of the determinacy regions completely differ. We find that the Taylor principle no longer guarantees equilibrium determinacy and that monetary policy response to asset price fluctuations is a source of equilibrium indeterminacy. We show that both the sufficiently positive and negative sensitivities of monetary policy are sources of

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equilibrium indeterminacy, while a slightly positive or negative response of monetary policy to asset price fluctuations might increase the determinacy region. Our results imply that the existence of credit market imperfections makes it unsuitable to initiate a monetary policy response to deal with asset price fluctuations.

We also investigate the relationship between the degree of credit market imperfections and the determinacy region. We find that reductions in credit market imperfections can sometimes reduce the determinacy region of model parameters. While it is intuitive that reductions in credit market imperfections have positive effects, our result shows that this simple intuition is not correct from the perspective of equilibrium determinacy.

This is because the binding collateral constraint changes the relationship between inflation and the asset price. In our model, if the credit market imperfection is small and the collateral constraint is not binding, inflation and the asset price move in the same direction. However, under the binding collateral constraint, these two variables move in opposite directions. Moreover, there exists a case where a reduction in credit market imperfection strengthens this negative relation between inflation and the asset price.

Many studies on monetary policy and asset prices deal with these topics from the welfare perspective. Bernanke and Gertler (2001) and Gilchrist and Leahy (2002) find that responding to asset price fluctuations is not important. Iacoviello (2005) shows that monetary policy response to asset price fluctuations generates welfare gain. Faia and Monacelli (2007) find that monetary policy should negatively respond to asset price fluctuations. In this study, however, we discuss this question from the perspective of equilibrium indeterminacy.

This study is closely related to Carlstrom and Fuerst (2007) and Nutahara (2014) that also focus on the relationship between monetary policy responds to asset prices and equilibrium indeterminacy. However, in their model, there is no credit market imperfection. We show that, in our model, monetary policy response to asset price fluctuations is a source of equilibrium indeterminacy in an economy with credit market imperfections, while it is a source of equilibrium determinacy if there is no credit market imperfection.

Collateral constraints are often employed to explain the observed facts of business cycles in modern macroeconomics. Bernanke et al. (1999), Kiyotaki and Moore (1997), and Liu et al. (2013) show that collateral constraints amplify shock effects. Carlstrom and Fuerst (1997, 1998) show that collateral constraints generate hump-shaped responses to shocks. Kobayashi et al. (2012) show that a model with collateral constraints generates comovements of output, consumption, labor, and investment to news shocks. Monacelli (2009) shows that a model with collateral constraints accounts for sectoral comovements to monetary policy shocks. Given this information, analyses of a model with credit market imperfections would be important.

Recent studies focus on the financial frictions as an important mechanism for equilibrium indeterminacy. The present paper is also related to Harrison and Weder's (2013) study. They investigate equilibrium indeterminacy in a real model with collateral constraints and increasing returns to scale. In this study, we consider equilibrium indeterminacy in a monetary model with collateral constraints and constant returns to scale. Liu and Wang (2014) and Benhabib and Wang (2013) are also closely related to our paper since financial friction causes equilibrium indeterminacy in the non-monetary and constant returns to scale economies.

The rest of this paper is organized as follows. In Section 2, we introduce our model in which prices are sticky and the working capital is subject to asset values because of a lack of commitment. In Section 3, we investigate the equilibrium determinacy of the model and present the main results. In Section 4, we verify the robustness of our results. Finally, in Section 5, we draw conclusions.

2. The model

2.1. Households: workers and managers

Households consist of workers and managers. They hold as assets B_{t-1}, one-period nominal bonds that pay R_{t-1} gross interest rate, and N_{t-1}, shares of the stock of retailers that sell at price Q_t and pay dividend D_t.

The utility function is

$$U(C_t,H_t)=\frac{C_t^{1-\sigma}}{1-\sigma}-\zeta\frac{H_t^{1+\gamma}}{1+\gamma}, \tag{1}$$

where $\sigma>0$, $\gamma>0$, $\zeta>0$, C_t denotes consumption, and H_t denotes labor supply.

At the beginning of each period, a household is divided into a worker and a manager. A worker supplies labor H_t and earns wage income $P_tW_tH_t$, where P_t denotes the aggregate price level. A manager produces homogenous goods. The production function of managers is

$$Y_t=K_t^{\alpha}L_t^{1-\alpha}, \tag{2}$$

where $0<\alpha<1$, Y_t denotes output, K_t denotes capital stock, and L_t denotes labor demand.

We assume that managers have to pay wages to workers in advance and that they borrow working capital from banks. Banks can issue banknotes that can be circulated in the economy as payment instruments during a period. Let N_t be the amount that managers borrow. Then,

$$P_tW_tL_t\le N_t. \tag{3}$$