ELSEVIER

Monetary policy and economic fluctuations in a sticky-price model

Hiroyuki Yoshida [*]

College of Economics, Nihon University, Misaki 1-3-2 Chiyoda-ku, Tokyo 101-8360, Japan

Abstract

This paper examines a simple monetary optimizing model with sticky-prices. Two types of monetary policy rules are considered: constant money growth rules and interest-rate feedback (Taylor-type) rules. In the case of constant money growth rules, we show the existence of limit cycles through the Hopf bifurcation theorem. On the other hand, in the case of the interest-rate feedback rules, we show that active monetary policy leads to the determinacy of equilibrium path, while passive monetary policy induces economic fluctuations.
© 2006 Elsevier B.V. All rights reserved.

1. Introduction

The analysis of whether the supply of money has a real effect is a central topic in the field of monetary economics. If real economic activity is independent of the rate of money growth, money is said to be "superneutral." The seminal work by Sidrauski (1967) shows that the superneutrality of money is valid in the long-run steady state using the money-in-the-utility-function (MIUF) approach. After his contribution, the validity of the Sidrauski result has been reexamined from many different viewpoints. There are several examples: Brock (1974) considers an MIUF model with endogenous labor supply and shows the invalidity of the superneutrality result in the long-run steady state. Siegel (1983) also demonstrates that money growth will in general influence real variables by introducing Harrod-neutral technological progress. Fischer (1979) and Asako (1983) point out that the superneutrality result does not always hold on the transition paths to the long-run

[*] Tel.: +81 3 3219 3363; fax: +81 3 3219 3363.
E-mail address: yoshida@eco.nihon-u.ac.jp.

steady state. To put it another way, they show that the growth rate of money affects the adjustment speed to the long-run steady state.

The present paper departs from the above literature by considering a sticky-price environment. As pointed out by Ball and Mankiw (1994, p. 127), prominent 20th Century economists such as John Maynard Keynes, Milton Friedman, Franco Modigliani, and James Tobin believe that price stickiness plays an important role in explaining economic fluctuations. Furthermore, Campbell (1994) and Nelson (1998) also approve the importance of macroeconomic rigidities and express the necessity to establish a new synthesis in macroeconomics, which includes both the optimizing behavior of agents and the presence of nominal rigidity. In line with their opinions, we allow for nominal price stickiness through the Phillips curve in this paper.

The main purpose of this paper is to investigate the possibility of endogenous and persistent business cycles in a sticky-price environment. Two types of monetary policy rules are examined: constant money growth rules and interest-rate feedback rules. The former is proposed by Milton Friedman. Friedman (1968, p. 17) stresses the role of the money stock in determining the level of real economic activity and writes on the money growth rate, "By setting itself a steady course and keeping to it, the monetary authority could make a major contribution to promoting economic stability." Concerning the latter, Taylor (1993) is a well-known example. He suggests that the monetary authority should adopt a proactive stance toward inflation to achieve macroeconomic stability; that is, the authority should respond to a 1% point increase in inflation with a more than 1% point increase in the nominal interest-rate.

In the case of constant money growth rules, the question we have to ask is whether changes in the money growth rate affect the qualitative properties of the long-run steady state. For this purpose we use bifurcation theory, which is a very useful tool to study the qualitative changes in dynamical systems. By choosing the monetary growth rate as a bifurcation parameter, we apply the Hopf bifurcation theorem to prove the existence of limit cycles in our sticky-price model. In the case of interest-rate feedback rules, we will be concerned with the stability condition to guarantee the determinacy of equilibrium path. If the stability condition is not satisfied, we employ a Liapunov function approach to prove the occurrence of periodic fluctuations, which are not limit cycles.

The remainder of the paper is organized as follows. Section 2 presents a monetary optimizing model with sticky-prices. Then we characterize the dynamic properties of the long-run steady state under the constant money growth rule. Section 3 discusses the interest-rate feedback rule. Finally, Section 4 concludes the major findings of our analysis.

2. A monetary economy

In this section we develop a simple infinite-horizon monetary economy with sticky-prices. There exist three agents: a representative household, a representative producer, and the government, and three commodities: physical goods, bonds, and money.

2.1. The model

2.1.1. Households
The infinitely lived representative household maximizes her lifetime utility:

$$\int_0^\infty \left[\frac{c_t^{1-\sigma} - 1}{1 - \sigma} + v(m_t) \right] e^{-\rho t} \, dt, \tag{1}$$