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Money, credit, risk of loss, and limited participation ☆

Hyung Sun Choi

Department of Economics, Kyung Hee University, Kyungheedae-ro 26, Dongdaemun-gu, Seoul 130-701, South Korea

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ABSTRACT

An asset market segmentation model is constructed to explore the distributional effects of monetary policy on theft and the choice of costly credit and money. Money is risky to hold due to theft. Traders who participate in the asset market can have a liquidity insurance against inflation while nontraders cannot. In equilibrium, money is nonneutral. An anticipated money injection always decreases theft and improves welfare of all. However, an unanticipated money injection decreases theft for traders but increases it for nontraders. If the policy effects on nontraders dominate, then there are welfare costs of inflation and the optimal money growth rate is negative.

1. Introduction

This paper constructs an asset market segmentation model to explore the distributional effects of monetary policy on theft and the choice of credit and money across economic individuals, where money is risky to hold and credit is costly to use.[1] Traditionally, money is widely accepted in market transactions. However, its anonymity makes money vulnerable from theft and leads to the rise of alternative means of payment.[2]

Alternative payment instruments such as debit and credit cards have been rapidly adopted recently while the use of money is still extensive. According to the 2009 Survey of Consumer Payment Choice and Foster, Meijer, Schuh, and Zabek (2011), 99.8% of consumers held cash in 2009 while 77.0% and 72.2% used debit and credit cards. Also, the average consumers use cash for 18.4 payments out of a total of 64.5 payments per month, debit cards for 19 payments, and credit cards for 11.2 payments.

By holding various payment instruments a user bears multiple opportunity costs. For example, the costs of money are generally nominal interest, the risk of loss, and counterfeiting and those of debit and credit cards are transaction costs and annual fees. In particular, nominal interest and the risk of loss are relevant to inflation. If money supply increases, then the value of money decreases. Nominal interest and theft would respond to inflation and they affect the choice of credit and cash. Thus, it would be important for

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E-mail address: hyungsunchoi@khu.ac.kr.

[1] Generally, theft is the illegal taking of another person's property without that person's permission or consent. This paper defines theft as the stealing of another person's money.

[2] Prescott (1987) notes that cash may not be used in order to reduce the risk of loss by theft or fire when there is an alternative means of payment. In Humphrey, Lawrence, and Vesala (1996), the use of noncash payment instrument increases across countries as the crime rate increases. In Kosse (2013), the safety perception is important for consumers' preferences for payment instruments.

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the government to comprehend the relationship between these costs and monetary policy in order to achieve an efficient payment system.

The contribution of this paper is to explore the relationship between inflation and the relevant costs of payment instruments when money in nonneutral. There is a set of literature that studies the endogenous choice of a multiple means of payments: Ireland (1994), Lacker and Schreft (1996), Aiyagari, Braun, and Eckstein (1998), Freeman and Kydland (2000), Williamson (2009), and Choi (2011b). In these models, a nominal interest is usually the only opportunity cost of holding money and the optimal monetary policy is deflationary or less inflationary.

Recently, monetary models of theft with multiple means of payments including He, Huang, and Wright (2005, 2008), Bolt and Chakravorti (2008), Alvarez and Lippi (2009), Sanches and Williamson (2009), and Choi (2011a) have been developed. Inflation decreases theft and cash would be preferred. The transaction costs of alternative payment instrument decrease. The optimal money growth rate would be positive unlike those without theft. The Friedman rule may not hold. However, they focus mostly on the role of theft in the choice of payment instruments and the optimal monetary policy rule. They cannot provide the asymmetric distributional effects of monetary policy on theft and the choice of payment instruments across economic individuals.

In this paper, an asset market segmentation model is constructed to capture the asymmetric effects of monetary policy between *traders*, who participate in the asset market and are generally rich, and *nontraders*, who do not.[3] The models are initially developed by Grossman and Weiss (1983) and Rotemberg (1984) and recently extended by Alvarez, Lucas, and Weber (2001), Alvarez, Atkeson, and Kehoe (2002), Khan and Thomas (2011), and Williamson (2008, 2009).

The model studied by Choi (2013) is particularly relevant. Choi (2013) explores the persistent effects of monetary policy on theft and nominal interest when money is the only means of payments. Without credit, inflation increases theft among the rich and decreases it among the poor. In some cases, they would lose all their cash before the goods market and the economy would not be sustainable. Monetary policy cannot play any role to prevent the economy from collapsing. The optimal monetary policy is to minimize theft.

However, with credit, the rich would have three insurance devices against inflation risk, transferring cash from the asset market, stealing cash from others, and spending on costly credit, while the poor have the last two. Unlike Choi (2013), there always exists a monetary equilibrium and the distributional effects would be quite different. For example, theft generally decreases with inflation. In the case of constant money growth, a very high inflation may drive theft out of the economy.

The paper extends Ireland (1994) and Choi (2011b) by adding the risk of holding money as in Choi (2011a). There are two types of households: *traders* and *nontraders*. The government conducts monetary policy through open market operations and only traders can exchange money and one-period government nominal bonds in the asset market. In the goods market, a shopper acquires a variety of consumption goods with credit or cash. Holding money is risky since a worker can steal cash by working less.

In equilibrium, money is nonneutral and monetary policy results in asymmetric distributional effects. Suppose the government injects money. Then, with a constant money growth, inflation will induce positive income effects on both traders and nontraders. Theft decreases and output increases. Cash is preferred and the transaction costs of credit decrease as well. Both consumption with credit and consumption with cash increase. Inflation improves welfare and the optimal money growth rate is set to drive theft out of the economy. The Friedman rule does not hold.

On the contrary, with a stochastic money growth, inflation will favor traders and tax nontraders. The real money holding of traders increases for precautionary purposes. Theft decreases and output increases. Cash is preferred. Next, since nontraders cannot have a liquidity insurance from the asset market they would decrease the real money holding. To acquire cash, theft increases and output decreases. Credit is preferred.

Unlike the constant money growth, the stochastic money injection increases welfare of traders, but decreases that of nontraders. The optimal money growth rate is to minimize theft and the transaction costs of credit. It is negative if the distributional effects on nontraders are greater than those on traders unlike He et al. (2005, 2008), Sanches and Williamson (2009), and Choi (2011b).

The remainder of the paper is organized as follows. Section 2 describes the environment of the model and Section 3 explains the equilibrium dynamics. In Sections 4 and 5, the distributional effects of monetary policy are studied when the money growth rate is constant and stochastic. Section 6 concludes.

2. The model

Time is discrete and indexed by $t = 0, 1, 2, \ldots$. There is a continuum of infinitely lived households with unit mass. Each household consists of a shopper and a worker. A fraction α of the households are traders living in an island which is connected to the asset market. The rest, $1 - \alpha$, are nontraders living in an island which is unconnected to the asset market. There is a continuum of spatially separated goods markets indexed by $i \in [0, 1]$ in each period. The household has preferences[4] given by

$$U(\{c_t, x_t\}_{t=0}^{\infty}) = E_0 \sum_{t=0}^{\infty} \beta^t \left\{ \int_0^1 \ln(c_t(i)) di - \int_0^1 \xi_t(i) \gamma(i) di \right\}, \tag{1}$$

[3] According to the Survey of Consumer Finance (2009) in the U.S., in 2007, 10.3% of families did not own a checking account, only 17.9 % held publicly tradable stocks, and 11.4% had direct ownership of pooled investment funds. Thus, when the Fed conducts open market operations, a large fraction of the U.S. population does not have an initial effect which results in the distributional effects between asset market participants and non-participants.

[4] Log preferences do not lose any key results and make the equilibrium analysis simple.