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Transactions, credit, and central banking in a model of segmented markets

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ABSTRACT

A segmented markets model is constructed in which transactions are conducted using credit and currency. Goods market segmentation plays an important role, in addition to the role played by conventional segmentation of asset markets. An important novelty of the paper is to show how the nonneutralities of money and their persistence depend on the nature of goods market transactions and on the arrangements for clearing and settlement of consumer credit. The model permits open market operations, daylight overdrafts, reserve-holding, and overnight lending and borrowing, allowing the consideration of a rich array of central banking arrangements and their implications.

1. Introduction

The purpose of this paper is to study the role of monetary policy in the very short run, in a model where nonneutralities of money arise because of segmentation in financial markets and goods markets. The model is explicit about the details of transactions, the role for monetary exchange vs. credit, and the instruments of central bank intervention. Further, the model is highly tractable.

The basic monetary transmission mechanism at work here was explored in a pure-currency framework in Williamson (2007). In that paper, the case was made that this segmented markets framework should be taken seriously as an alternative to typical reduced-form New Keynesian sticky-price models (e.g., Woodford, 2003), as a structure for understanding, formulating, and evaluating monetary policy. A key innovation, which is very important for how the model responds to central bank money injections, and for the costs of inflation and optimal money growth, is the presence of goods market segmentation. In the model constructed in Williamson (2007), a money injection by the central bank, received initially by *connected* households, acts to redistribute consumption from *unconnected* households to connected households, and reduces the nominal interest rate, much as in models with financial market segmentation.[2] However, goods market segmentation

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[2] For example Grossman and Weiss (1983), Rotemberg (1984), Alvarez et al. (2002), or Alvarez et al. (2001).

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implies that nonneutralities of money persist, that there is a negative Fisher effect that contributes to a persistent reduction in the nominal interest rate, that relative price dispersion increases across markets in response to the money shock, and that there can be a persistent increase in aggregate output. These effects are novel.

As well, goods market segmentation coupled with financial market segmentation implies that a Friedman rule is not optimal. That is, a Friedman rule tends to correct standard intertemporal monetary distortions reflected in a positive nominal interest rate, but with goods market segmentation an increasing or decreasing money supply results in relative price distortions. At the optimum, money growth is higher than under a Friedman rule, and the nominal interest rate is positive.

In this paper, I wish to focus on the conduct of monetary policy in the very short run, i.e. over a daily, weekly, or perhaps monthly horizon. Given this context, the effects of policy on production seem irrelevant, so in this model it is assumed that the aggregate endowment of goods is fixed. Then, the real effects of monetary policy stem from the implications of central bank asset exchanges for the distribution of wealth, the clearing and settlement of private debt, and for relative prices, which in turn determine the allocation of consumption across the population.

In the very short run, central bankers are concerned mainly with how they should accommodate disturbances to the financial system which are reflected in the demand for outside money. Some of these disturbances can be anticipated, such as the increased demand for currency over weekends and during the Christmas season in the United States, or changes in the demand for bank reserves as a result of how reserve requirements are enforced. Other financial disturbances are stochastic, for example those resulting from the failure of large financial institutions or the behavior of fiscal authorities. In this model, we model financial disturbances as payments systems shocks, affecting the proportion of consumer debt that requires the use of outside money for its clearing and settlement. These payments system shocks in turn produce fluctuations in the velocity of money.

In the model, there are heterogeneous households. These households are either connected, in that they trade in financial markets and with the central bank, or they are unconnected and thus limited in their access to financial markets and the central bank. Goods are purchased with credit, but some credit instruments can be cleared on a net basis while others require outside money for their clearing and settlement. In general, consumers pay a premium when they buy goods with a payment instrument that requires the use of outside money for clearing and settlement. The model is rich enough to incorporate different instruments of monetary policy. In particular, the money stock can be increased through open market purchases or daylight overdrafts.

The behavior of the model is first studied in response to monetary policy and payments system shocks. A permanent level increase in the money supply, brought about either through an open market purchase or a permanent increase in daylight overdrafts, causes a redistribution of consumption goods from unconnected households to the connected households who are directly affected on impact by monetary policy. There is a persistent decrease in the nominal interest rate, resulting from a negative real interest rate effect and a negative Fisher effect. This negative Fisher effect follows from the fact that goods prices tend to overshoot in response to a money supply increase in the markets in which connected households buy more frequently. As well, relative price dispersion increases as a result of the money supply increase, and more (fewer) goods are sold in net-settlement transactions in connected (unconnected) markets. While the money supply increase transfers consumption goods from unconnected to connected households, it does this in an inefficient manner (relative to what could be achieved by a benevolent social planner).

A feature that this model shares with Williamson (2007) is that a money injection by the central bank (however accomplished), once it occurs, has exactly the same consequences if the money injection was anticipated or unanticipated. In this sense, the nonneutrality of money that exists here is much different from what is obtained in some alternative models of the monetary transmission mechanism.

How should monetary policy respond to payments system shocks? Given a constant money supply (passive monetary policy) payments system shocks result in fluctuations in relative prices, nominal interest rates, and the misallocation of consumption goods across households. As a benchmark, I first determine optimal policy in the case where there is no market segmentation. Here, the absence of market segmentation means that all households have access to financial markets, hold reserve accounts with the central bank, and can borrow from the central bank both within the period and between periods. In this benchmark case, standard results obtain, in that a Friedman rule is optimal—the intraperiod nominal interest rate should be zero in all states of the world. There are at least three ways to implement a Friedman rule in the model. First, under a "daylight overdraft policy," optimality is achieved if the central bank sets the intraday nominal interest rate to zero and permits unlimited borrowing at that rate. Second, with an "interest on reserves" policy, the central bank can simply pay interest on reserves at the inter-period interest rate, which acts to eliminate intertemporal distortions. Third, under a zero-nominal-interest-rate policy, the central bank conducts open market operations so as to drive the inter-period nominal interest rate to zero in all states of the world.

In the general case, it is shown that no monetary policy supports a Pareto optimum. We then proceed to characterize an optimal policy, which will reflect a tradeoff between two types of welfare loss. The first type of welfare loss arises from the misallocation of consumption across connected and unconnected households, while the second comes from intertemporal distortions that cause a misallocation in how sellers allocate goods to transactions where payments instruments are cleared and settled using outside money. A monetary policy geared to minimizing the former welfare loss would be purely passive, with the aggregate money stock fixed for all time, while a policy geared to minimizing the latter type of welfare loss would involve nominal interest rate smoothing.