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journal homepage: www.elsevier.com/locate/jmeMonetary policy in a channel system [☆]Aleksander Berentsen ^{a,*}, Cyril Monnet ^b^a Department of Economics, University of Basel, Switzerland^b Federal Reserve Bank of Philadelphia, USA

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ABSTRACT

Channel systems for conducting monetary policy are becoming increasingly popular. Despite its popularity, the consequences of implementing policy with a channel system are not well understood. We develop a general equilibrium framework of a channel system and study the optimal policy. A novel aspect of the channel system is that a central bank can “tighten” or “loosen” its policy without changing its policy rate. This policy instrument has so far been overlooked by a large body of the literature on the optimal design of interest-rate rules.

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1. Introduction

Channel systems for conducting monetary policy are becoming increasingly popular.¹ Several central banks already use a channel system, and others are using at least some features of the channel system.² Despite its popularity, the consequences of implementing monetary policy with a channel system are not well understood. How does implementation of monetary policy in a channel system differ from plain-vanilla open market operations? Why do central banks choose

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¹ In a channel system, a central bank offers two facilities: a lending facility whereby it is ready to supply money overnight at a given lending rate against collateral and a deposit facility whereby banks can make overnight deposits to earn a deposit rate. The interest-rate corridor is chosen to keep the overnight interest rate in the money market close to the target rate. In a pure channel system, a change in policy is implemented by simply changing the corridor without any open market operations.

² For example, versions of a channel system are operated by the Bank of Canada, the Bank of England, the European Central Bank, the Reserve Bank of Australia, and the Reserve Bank of New Zealand. The US Federal Reserve System recently modified the operating procedures of its discount window facility in such a way that it now shares elements of a standing facility. Prior to 2003, the discount window rate was set below the target federal funds rate, but banks faced penalties when accessing the discount window. In 2003, the Federal Reserve decided to set the discount window rate 100 basis points above the target federal funds rate and eased access conditions to the discount window. The resulting framework is similar to a channel system, where the deposit rate is zero and the lending rate 100 basis points above the target rate.

different corridors? Most central banks choose an interest-corridor of 50 basis points (e.g., Australia, Canada, and New Zealand), while the European Central Bank (ECB) chooses one of 200 basis points. Why can some central banks control the overnight interest rate very tightly, while others cannot? For instance, the Euro repo rate fluctuates considerably around the minimum bid rate set by the ECB (Fig. 1), and it tends to be above the minimum bid rate. In contrast, the overnight interbank cash rate in New Zealand is almost always equal to the policy rate (Fig. 2).

There are several stylized facts that a reasonable theoretical model of channel systems has to explain. First, all central banks set a strictly positive interest-rate spread—defined as the difference between the lending and the deposit rates. Second, central banks typically react to changing economic conditions by increasing or decreasing their interest-rate corridor without changing its spread. Third, the money market rate tends to be in the middle or slightly above the middle of the corridor.

To study these stylized facts, we construct a dynamic general equilibrium model of a channel system with a money market and a welfare-optimizing central bank. Market participants are subject to idiosyncratic trading shocks that generate random liquidity needs. The shocks can be partially insured in a secured money market. To provide further insurance, the central bank operates facilities where market participants can borrow or deposit money at the specified rates. In accordance with central bank practice, there is no limit to the size of deposits on which interest is paid, and there is no limit to the size of a loan that a market participant can obtain provided that the loan is fully collateralized. Finally, the cost of pledging collateral is explicit and money is essential.³

Within this framework we answer the following three questions. First, what is the optimal interest-rate corridor? Second, what is the optimal collateral policy? Third, how does a change in the corridor affect the money market rate?

The following results emerge from our model. First, it is optimal to have a positive spread if the opportunity cost of holding collateral is positive, and the optimal spread is decreasing in the rate of return of the collateral.⁴ Second, the money market rate is above the target rate if the opportunity cost of holding collateral is positive. This property of the model is consistent with the fact that the collateralized Eurepo rate tends to be above the minimum bid rate (Fig. 1). Third, a central bank has two equivalent options for implementing a given policy: it can either shift the corridor while keeping the spread constant or it can change the spread. For instance, to change its policy, it can keep the deposit rate constant and only change the borrowing rate, as done, for example, by the US Federal Reserve System, or it can shift the corridor without changing its spread as done by the ECB.

An interesting aspect of the channel system is that a central bank can “tighten” or “loosen” its policy without changing its target rate. The reason is that by increasing the spread of the corridor symmetrically around the target rate, the central bank worsens the option for banks of accessing the standing facility. As a result, the policy regime is tighter.⁵ This suggests that a characterization of policy through an interest-rate rule, as is commonly done in a large body of the literature, is incomplete. Rather, in a channel system, any policy must be characterized through an interest-rate *corridor* rule. We provide more discussion on this result in the literature section below.

1.1. Literature

There are very few theoretical studies of channel systems, and all of them are partial equilibrium models.⁶ An early contribution is the model of reserves management under uncertainty by Poole (1968). Woodford (2000, 2001, 2003) discusses and analyzes the channel system to address the question of how to conduct monetary policy in a world with a vanishing stock of money. Whitesell (2006) evaluates reserves regimes versus channel systems. Elements of channel systems have been previously discussed in Gaspar et al. (2004) and Guthrie and Wright (2000).

It appears that there are two reasons why there is no other general equilibrium analysis of a channel system. First, money growth is endogenous in such a system. In contrast, most theoretical models of monetary policy characterize optimal policy in terms of a path for the money supply. In practice, however, monetary policy involves rules for setting nominal interest rates, and most central banks specify operating targets for overnight interest rates.⁷ This paper, therefore, is a further attempt to break the apparent dichotomy (Goodhart, 1989) between theoretical analysis and central bank practices.

The second reason is related to the widespread belief that modeling the details of the framework used to implement a given interest-rate rule is unimportant when analyzing optimal monetary policy. That is, it is taken for granted that the

³ By “essential,” we mean that the use of money expands the set of allocations (Kocherlakota, 1998; Wallace, 2001).

⁴ The rate of return of the collateral determines the opportunity costs for commercial banks of accessing the lending facility where a high rate of return implies a small or zero opportunity cost.

⁵ This result suggests that the ECB with its 200 basis point corridor implements a tighter monetary policy than the other central banks operating a channel system as mentioned before.

⁶ There are general equilibrium models that study discount window loans. An early paper is Sargent and Wallace (1982). Williamson (2005) considers a general equilibrium model where the central bank provides one-period zero-nominal interest loans. As in our model, these discount window loans are financed by the issue of outside money. He shows that this arrangement yields a Pareto optimal allocation and that this allocation can also be supported with unregulated interbank lending and without outside money.

⁷ This fact is also emphasized in Woodford's (2003) book at the beginning of Chapter 2: “While virtually all central banks use short-term nominal interest rates (...) as their instrument (...), the theoretical literature in monetary economics has concerned itself almost entirely with the analysis of policies that are described by alternative (...) paths for the money supply.”

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