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Banks' reserve management, transaction costs, and the timing of Federal Reserve intervention

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Abstract

We use daily data on bank reserves and overnight interest rates to document a striking pattern in the high-frequency behavior of the US market for federal funds: depository institutions tend to hold more reserves during the last few days of each “reserve maintenance period”, when the opportunity cost of holding reserves is typically highest. We then propose and analyze a model of the federal funds market where uncertain liquidity flows and transaction costs induce banks to delay trading and to bid up interest rates at the end of each maintenance period. In this context, the central bank's interest-rate-smoothing policy causes a high supply of liquid funds to be associated with high interest rates around reserve-settlement days. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The high frequency behavior of the interbank market for reserves has been intensely scrutinized by research on banking in recent years. One of the goals of this research has been to identify patterns displayed by money-market data, mostly from the US, and to examine their consistency with the assumption of rational, profit-maximizing behavior of depository institutions. Our paper contributes to this research by documenting and modeling a pattern that is both remarkable and previously unnoticed in the literature on the US market for federal funds: the tendency of US banks to hold – and of the Federal Reserve to provide – the bulk of their reserves during the last days of each “reserve maintenance period” (the bi-weekly period over which banks’ reserves are averaged for the purpose of reserve requirements), when the opportunity cost of holding reserves is typically highest. After documenting this pattern empirically, we rationalize it in the context of a model where banks’ policy of liquidity management interacts with the central bank’s interest-targeting policy, and where transaction costs and liquidity shocks cause both interest rates and bank reserves to rise endogenously at the end of each maintenance period.

The main ingredients of our analysis are banks’ uncertainty on their reserve needs when trading reserves is costly, and the Federal Reserve’s interest-rate-smoothing policy. We show that small costs of trading federal funds and uncertainty on reserve flows induce banks to trade *late* in each maintenance period, so as to conduct federal funds transactions when they have more precise information on their eventual reserve needs. This policy allows individual banks to offset higher reserve-holding costs around period-end by saving on overall transaction costs. The aggregate effect of this policy would only be to cause interest rates to rise at period-end if the supply of reserves remained constant through the maintenance period. If, however, the central bank’s goal is to control the supply of reserves so as to limit fluctuations of market rates around their target, in equilibrium both interest rates and reserves should rise cyclically around period-end, in accordance with the clear empirical patterns of US federal funds data.

Our modeling perspective is similar to that of several recent studies of interbank markets, including Kopecky and Tucker (1993), Hamilton (1996), and Clouse and Dow (1999), who first pointed to the importance of trading and other fixed costs in the federal funds market. We build on these studies to develop a more complete account of the role of trading costs in explaining the joint behavior of interest rates and reserves. For instance, we extend Kopecky and Tucker’s (1993) work by assuming that trading costs are incurred every day (Kopecky and Tucker assume transactions to be costly only on settlement days), so as to be able to genuinely endogenize differences in behavior between days. Conversely, we strip Hamilton’s (1996) model of a number of accessory assumptions (such as heterogeneous bank behavior, tighter restrictions on

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