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Big bank, small bank: Monetary policy implementation and banks' reserve management strategies[☆]

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ABSTRACT

This paper provides estimates of banks' demand for excess reserve balances on a period average basis for the period from 2005 to mid-2008. Consistent with theoretical work, we find that the demand for excess depends critically on uncertainty of flows in and out of reserve accounts. We also document the variability of demand for excess reserve balances by institution size, evaluate different models for forecasting demand for excess on a period average basis, and report the forecasting performance of each of these models.

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1. Introduction

Traditionally, managing the supply of reserve balances has played a critical role in the implementation of U.S. monetary policy. The supply of excess reserve balances exploded in the fall of 2008 and has remained exceptionally high relative to historical levels. As the Federal Reserve considers its "exit strategy" and new tools to drain reserve balances, it is instructive to examine closely the demand for excess reserve balances in the U.S. before the financial crisis.

This paper reviews and formalizes one of the tools used to guide the provision of reserve balances over the course of the maintenance period during normal times. While this tool was surely not the only

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one used to forecast demand, this paper shows that there existed some consistencies in the average demand for reserve balances over the maintenance period that are in line with theoretical models.¹

During the period examined in this paper, the Federal Reserve implemented monetary policy by conducting overnight open market operations to align the supply of balances held by depository institutions (DIs) at Federal Reserve Banks with demand for those balances so that federal funds would trade around the target rate set by the Federal Open Market Committee (FOMC). Aside from open market operations, the supply of balances is determined largely by so-called autonomous factors, including the Treasury's account balance at the Federal Reserve, currency in circulation, and check float. In the period studied, the demand for balances varied significantly from day to day. Staff at the open market operations desk at the Federal Reserve Bank of New York (the Desk) and at the Federal Reserve Board (the Board) estimated the expected demand for balances at the policy target each day. The daily estimates took into account market conditions, including expectations of high payment flows, the day of the two-week maintenance period, and information gathered from discussions with banks and brokers. However, although the Desk's and DIs' reserve management decisions were made on a daily basis, they were within the context of an operating framework based on a two-week reserve maintenance period. In particular, while DIs must maintain a positive account balance each day, they must also meet their requirements on average over the course of the two-week maintenance period. As a result, the Desk and DIs paid attention to period average levels of reserves as well.

Most of the analysis of the demand for reserve balances was focused on the demand for excess balances, which are balances held over and above reserve balance requirements. In order to put the demand for excess reserves within a maintenance period construct, Board and Desk staff focused on the daily average demand for reserve balances over the maintenance period, or period average excess (PAE). This is simply the total amount of excess reserve balances held by DIs over the maintenance period divided by the number of days in the maintenance period.² This calculation was important because, although reserve balances are calculated and selected by DIs on a daily basis, reserve requirements are imposed on a maintenance period basis. That is, a DI can hold reserve balances below its requirements on a daily basis, but its average reserve balance holdings over the maintenance must meet its required reserve level. Over the period of analysis in this paper, some DIs would need to make substantial adjustments to their daily reserve balance holdings over the last few days of the maintenance period in order to meet their reserve requirements. The adjustments could and did often have a significant impact on daily reserve demand. As a result, a useful tool for estimating daily reserve demand late in the maintenance period was the analysis of average reserve balances over the maintenance period relative to reserve requirements, or period average excess (PAE). In general, PAE ranged from about \$1 billion to \$2 billion.³ Over the two years from August 3, 2005 to August 5, 2007, PAE averaged \$1.7 billion but varied substantially, ranging from \$1.2 billion to \$2.4 billion. Over the year of market turmoil that began in earnest in August, 2007, PAE averaged \$1.8 billion, ranging from \$800 million to \$3.1 billion.⁴

There is a long and extensive theoretical literature discussing reserves management and the demand for excess reserve balances. [Poole \(1968\)](#), who developed one of the early models of reserve

¹ The analysis presented in this paper was conducted during early 2008, well before the implementation of interest on reserves and the provision of large amounts of liquidity by the Federal Reserve.

² PAE is calculated as the average over the fourteen days of the reserve maintenance period. Weekends and holidays are assigned the value of the previous business day, so each Friday in the maintenance period counts for three days. In general, our main focus was total excess reserve balances over the maintenance period, but we scaled by the number of days in the maintenance period in order to aid calculations.

³ However, there were two clear outliers: the maintenance period ended August 15, 2007, which included the week in the turmoil began; and the maintenance period ended March 26, 2008, which included the collapse of Bear Stearns. As these maintenance periods were highly unusual for the sample period, we exclude them from our analysis.

⁴ We end the full sample at the maintenance period ended September 10, 2008. Beginning in September 2008, the Federal Reserve implemented several measures to provide liquidity to financial markets. These measures were not completely offset by corresponding reductions in other Federal Reserve's assets and, as a result, excess reserve balances reached very high levels. Most of the liquidity programs have ended, but reserve balances remain high due to the large-scale asset purchases that began in late 2008. Under these conditions, the Federal Reserve's approach to monetary policy implementation has differed from that described in this paper.

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