



The term structure of CD rates and monetary policy transmission

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ABSTRACT

The paper investigates the term structure of CD rates and its relationship with the federal funds rate or monetary policy. The term structure derived in this paper is governed primarily by the federal funds rate and secondarily by banks' income smoothing behavior. It is consistent with the estimation results and differs significantly from the standard term structure of interest rates. The downturn phase of business cycles appears to be accompanied by more aggressive income smoothing by banks (compared with the upturn phase) due to their pessimistic expectations of future profits. The compositional shift in banks' liabilities during the downturn phase away from CDs toward transaction deposits may pose a greater withdrawal risk for banks.

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1. Introduction

The term structure of interest rates has been extensively studied (see, for example, Shiller, 1990, and references therein; Gómez-Valle and Martínez-Rodríguez, 2008; Jiang and Yan, 2009). The empirical literature on this topic typically investigates Treasury securities (bond yields), and the term structure is commonly interpreted from the investors' perspective. For example, the term structure is often expressed by equating the long-term rate to the average of current and expected future short-term rates plus an extra yield. The extra yield (or a term premium) is interpreted as compensation for the interest rate risk that investors bear from holding long-term bonds instead of short-term bonds. In this paper, I investigate the term structure of interest rates on banks' certificates of deposit (CDs), which, to my knowledge, has never been studied. In addition, I investigate (monetary policy) interest rate pass-through based on the theory of the term structure of CD rates developed in this paper. More specifically, the primary objective is to derive clearly interpretable components that constitute a term premium associated with CDs. These components are shown to be consistent with observed data, but they represent the perspective of the suppliers (banks) instead of the perspective of buyers (investors). The secondary objective is to estimate the pass-through from the monetary policy target, or the federal funds rate, to CD rates. Asymmetric characteristics of

pass-through over business cycles are explained based on the paper's theory and empirical evidence of the term structure of CD rates.

The secondary objective is related to Hofmann and Mizen (2004) and other recent studies (for example, Liu et al., 2008) in that short-term rates vis-à-vis monetary policy are investigated. Generally, short-term money market rates (including CD rates) are considered unimportant for the efficacy of monetary policy, and their pass-through is presumed to be rather trivial. What matters for monetary policy is the pass-through from the FF rate to long-term interest rates (Bernanke, 2004). The study by Hofmann and Mizen (2004), which is especially relevant to the present research for a reason explained below, carefully investigates the presumption of trivial/complete pass-through of the average of UK banks' base rates (which moves closely with the official rate) to short-term retail bank rates (90-day deposit account rates). Additionally, standard variable-rate mortgages are also investigated. Using a non-linear error correction model (ECM), they uncover rich complexities or non-linear adjustments of these retail rates to the average base rate. Specifically, when deviations of retail rates from the average base rate are widening (or expected to widen), the loss resulting from not adjusting retail rates becomes greater than the "menu cost" (the cost of resetting retail rates), thereby forcing banks to adjust more quickly. Conversely, when deviations are narrowing, banks have less incentive to adjust, resulting in slower or no change in the adjustment speed. Some differences aside (i.e., the UK data of Hofmann and Mizen, 2004, versus the US data of this paper), considering Hofmann and Mizen's (2004) findings in this

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paper yields additional insights into adjustment of CD rates to the federal funds rate (explained in Section 6).

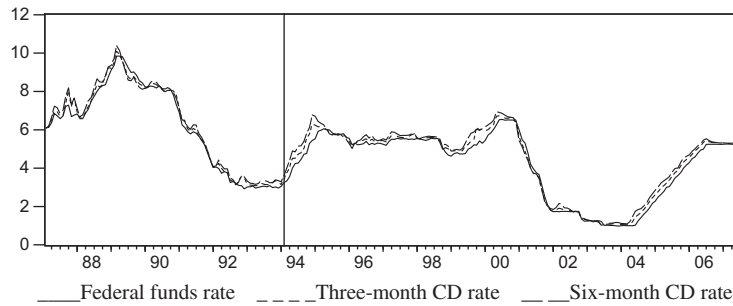
The remainder of the paper is organized as follows. In Section 2, the data used in this paper are described, and stylized facts (three observations) about CD rates vis-à-vis the federal funds rate are advanced. In Section 3, I derive the optimal CD pricing conditions from an intertemporal bank model. In Section 4, model calibration illustrates the consistency of each determinant of the CD rates in isolation with stylized facts. The term structure of CD rates is also summarized. In Section 5, empirical support for the term structure of CD rates is presented. Section 6 provides the pass-through estimation results, which are interpreted based on the term structure of CD rates. Section 7 concludes.

2. Data and three stylized facts

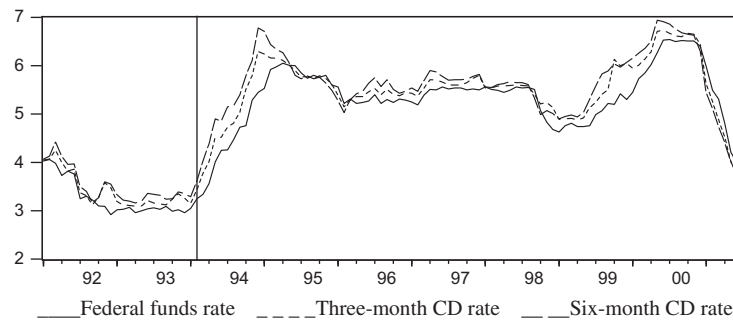
Except for Fig. 3, all of the data used in this paper come from the Federal Reserve Bank of St. Louis' Economic Data – FRED II. The data for Fig. 3 come from the Federal Reserve Bulletins from June

1996, June 2003, and July 2007 (Federal Reserve Board). For CD rates, the paper uses secondary market rates or averages of dealer rates on nationally traded CDs (Federal Reserve Statistical Release H.15). CDs traded in the secondary market (commonly called “negotiable,” “jumbo,” or “wholesale” CDs) were originally issued primarily by large banks and purchased directly by corporate treasurers, investment companies, banks and others who then sell in the secondary market. Alternatively, large banks may issue these CDs indirectly through dealers and brokers. Their denominations are \$100,000 or more. Because CDs were insured up to \$100,000 per investor (until October 3, 2008, when the insured amount was raised to \$250,000), banks and brokers have sometimes packaged CDs in \$100,000 increments so that the entire amount is fully insured (Koch and MacDonald, 2003, pp. 435–436). For large banks' profits (denoted by π below), the return on assets (ROA) of large US banks (or banks with average assets of greater than \$15 billion) is used instead of net income because ROA takes into account mergers, acquisitions, and/or divestitures, while net income does not.

A: Monthly sample, 1987:2 – 2007:5. The vertical line indicates February 1994.



B: Monthly sample, 1992:1 – 2001:6. The vertical line indicates February 1994.



C: Monthly sample, 1987:2 – 2007:5. The horizontal line indicates the sample mean of $i_{c3,t} - i_{f,t} = 0.1396$. The sample mean of $i_{c6,t} - i_{c3,t} = 0.0944$ is not shown. ($i_{c3,t}$ is the three-month CD rate; $i_{f,t}$ is the federal funds rate; and $i_{c6,t}$ is the six-month CD rate.)

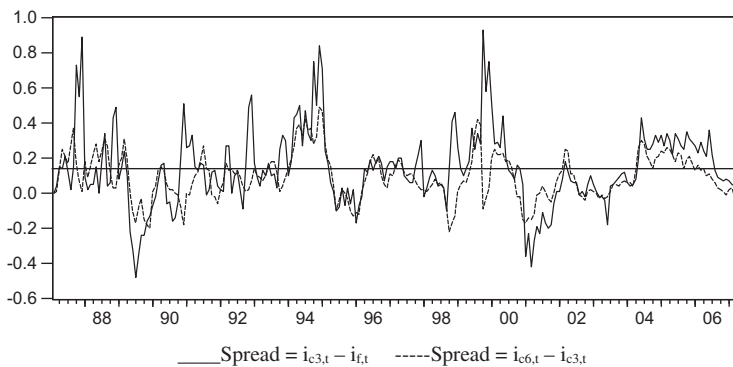


Fig. 1. The federal funds rate and the secondary market three- and six-month CD rates.

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