



# Interest-Rate Smoothing and Optimal Monetary Policy: A Review of Recent Empirical Evidence

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The Federal Reserve and other central banks tend to change short-term interest rates in sequences of small steps in the same direction and reverse the direction of interest rate movements only infrequently. These characteristics, often referred to as interest-rate smoothing, have led to criticism that policy responds too little and too late to macroeconomic developments. This paper, however, argues that interest-rate smoothing may in fact be optimal. We present empirical results from several recent papers that offer three explanations of interest-rate smoothing: forward-looking behavior by market participants, measurement error associated with key macroeconomic variables, and uncertainty regarding relevant structural parameters. © 2000 Elsevier Science Inc.

*Keywords:* Interest-rate smoothing; Policy rules; Optimal monetary policy

*JEL Classification:* E52; E58

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## I. Introduction

The conduct of monetary policy by central banks is of considerable interest to both academic researchers and to financial market participants. This interest has generated a large literature that attempts to describe and evaluate the interest rate policies of central banks. One characteristic that has been widely noted in this literature is that many central banks, including the Federal Reserve, adjust short-term interest rates in a smooth manner. In fact, some researchers have argued that observed interest rate movements are too sluggish, and that a less timid interest rate policy would be more effective at stabilizing output and inflation. Furthermore, the observed smoothness of interest rates has been

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considered evidence that central banks have a separate objective of minimizing interest rate volatility in addition to the goals of stabilizing output and inflation.

This article, instead, argues that the observed smoothing of the interest rate may indeed be optimal, even if the central bank is not explicitly concerned with interest rate volatility. In particular, this article considers three characteristics of the policymaking environment that may render some degree of interest-rate smoothing optimal: forward-looking behavior by market participants, measurement error associated with key macroeconomic variables, and uncertainty regarding relevant structural parameters. The paper is organized as follows. This introductory section presents some evidence on the smoothness of the interest rate and clarifies the definition of interest-rate smoothing that is used throughout the paper. Sections II through IV describe each of the three arguments in detail and present supporting empirical results from recent research on the U.S. economy. Section V offers a brief conclusion.

### *A Definition of Interest-Rate Smoothing*

The belief that the Federal Reserve, like most other central banks, deliberately chooses a smooth path for the short-term interest rate may stem from the dual observations that the federal funds rate tends to move in sequences of small steps in the same direction and that reversals in its direction are relatively infrequent. As apparent in Figure 1, which displays the intended federal funds rate from 1984 through 1998, changes in the funds rate are frequently followed by further changes of the same sign. Indeed, in this sample 85 percent of funds rate changes represent “continuations” in the direction of policy. Furthermore, such continuations often occur in fairly rapid succession, with an average of 34 days separating changes when there is a continuation compared to an average of 97 days for a reversal, suggesting that these changes constitute steps within a single policy movement. The magnitude of these steps is modest, typically a quarter of a percentage point, as only 13 percent of funds rate changes in this sample have been by half a percentage point or larger.<sup>1</sup> Similar patterns are observed in official interest rates in many other countries. Lowe and Ellis (1997) have presented evidence for Australia, the United States, the United Kingdom, Japan, and Germany. The implications of these results are discussed further by Lindsey (1997). Goodhart (1998) has, in addition, looked at interest rates in France, Italy, Canada, Spain, the Netherlands, Belgium, Sweden, and Austria.

Of course, if monetary policy systematically reacts to macroeconomic variables such as inflation and output, these patterns in interest-rate behavior may simply reflect the persistence in the movements of those variables. This possibility becomes evident when central bank behavior is characterized by an interest rate reaction function—that is, a rule for setting the federal funds rate that responds systematically to variables such as output, inflation and past interest rates. A common specification of such a rule is

$$r_t = \rho r_{t-1} + (1 - \rho)(rr^* + \pi_t) + \alpha(\pi_t - \pi^*) + \beta y_t. \quad (1)$$

According to this rule, the current federal funds rate  $r_t$  is determined by the lagged funds rate, the equilibrium real interest rate,  $rr^*$ , the inflation rate,  $\pi_t$ , the inflation target,  $\pi^*$ , and the output gap,  $y_t$ , which is the difference between real current and potential output.

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<sup>1</sup> Rudebusch (1995), who was among the first to study this smoothness, presents more formal statistical evidence of this behavior for the U.S. economy.

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