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# Identifying monetary policy shocks with changes in open market operations

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**Abstract**

In this paper, we reexamine the effects of monetary policy shocks by exploiting the information contained in open market operations. A sticky price model is developed where money is the counterpart of securities deposited at the central bank. The model's solution reveals that a rise in central bank holdings of open market securities can be interpreted as a monetary expansion. Estimates of vector autoregressions for US data are further provided showing that reactions to an unanticipated rise in open market securities are consistent with common priors about a monetary expansion, i.e., a decline in the federal funds rate, a rise in output, and inertia in price responses. Compared to federal funds rate shocks, prices do not exhibit a puzzling behavior and a larger fraction of the GDP forecast error variance can be attributed to open market shocks. However, the explanatory power of the latter has decreased since federal funds rate targets have been announced.


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## 1. Introduction

Short-run effects of monetary policy have always been of utmost interest for macroeconomists. In the recent past, research in this field has almost reached a consensus with regard to the empirical method by applying vector autoregressions (VARs). Though, different identification schemes have been utilized in the literature (see, e.g., Christiano

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et al., 1996; Leeper et al., 1996; Sims and Zha, 1998, or Bernanke and Mihov, 1998), the policy measure and some main results for US data are in common in most of these contributions. Monetary policy shocks are usually identified with changes in the operating target, in particular, the federal funds rate,[1] while an unanticipated decline of the latter is found to lead to a strong and persistent rise in real activity and inertia in price reactions. This empirical evidence, which is summarized in Christiano et al. (1999), is – at least broadly – consistent with common priors on the impact of monetary policy. Nevertheless, some questions regarding monetary policy effects are still left open. For example, output and, in particular, aggregate prices often exhibit puzzling responses to changes in the federal funds rate (see Sims, 1992; Uhlig, 2001; Hanson, 2002), while simultaneity makes it difficult to isolate exogenous policy shocks from endogenous policy responses. Moreover, it is even controversially discussed if these shocks really represent policy actions rather than specification errors (see, e.g., Rudebusch, 1998).

This paper presents an alternative approach to identify exogenous monetary policy actions via changes in open market operations. We reexamine the effects of unsystematic policy actions exploiting the fact that open market operations are the predominant instrument of the Federal Reserve, whereas the federal funds rate actually serves as an operating target. In particular, monetary policy actions are identified with changes in central bank holdings of securities which are traded in open market operations. Given that these asset holdings can directly be controlled by the central bank and are less exposed to non-policy disturbances than operating targets, we expect our approach to facilitate a revelation of unsystematic policy effects. On the other hand, we expect this identification scheme to be less appropriate to capture the total leverage of monetary policy on macroeconomic developments when announcements about interest rate targets are already effective with few open market operations, as found by Taylor (2001) and Demiralp and Jordà (2002, 2003) for the US, or even without any immediate use of conventional policy instruments, as shown by Guthrie and Wright (2000) for New Zealand.[2]

Before turning to the empirical analysis, we investigate the flow of funds in open market operations within a general equilibrium framework by introducing repurchase agreements in an otherwise standard sticky price model, i.e., the so-called New Keynesian model (see, e.g., Clarida et al., 2000 or Galí, 2002). It is shown that the amount of open market securities held by the central bank declines in equilibrium when the economy is hit by a positive innovation to an interest rate rule. Correspondingly, when the central bank is assumed to control the amount of securities traded in open market operations, it is shown that an unanticipated rise in open market securities can be interpreted as an expansionary monetary policy shock causing a rise in output, prices, and real balances accompanied by a decline in the nominal interest rate. Given the qualitative predictions of the macroeconomic model, we proceed by fitting a VAR for US data where central bank holdings of open market securities, which are either bought

[1] Non-borrowed reserves, which served as an operating target of the Federal Reserve in the early 1980s, are also applied for this purpose, as, e.g., by Eichenbaum (1992), Strongin (1995), or Hamilton (1997).

[2] These so-called 'open mouth operations' are in fact effective due to a credible threat of future open market operations (see Taylor, 2001).