The high-frequency response of exchange rates to monetary policy actions and statements

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ABSTRACT

This paper investigates the impact of US monetary policy on the level and volatility of exchange rates using an event study with intraday data for five currencies (the US dollar exchange rate versus the euro, the Canadian dollar, the British pound, the Swiss franc, and the Japanese yen). I construct two indicators of news about monetary policy stemming separately from policy decisions and from balance of risk statements. Estimation results show that both policy decisions and communication have economically large and highly significant effects on the exchange rates, with the surprise component of statements accounting for most of the explainable variation in exchange rate returns in response to monetary policy. This paper also shows that exchange rates tend to absorb FOMC monetary surprises within 30–40 min from the announcement release.

1. Introduction

There is a considerable amount of interest in understanding the interactions between monetary policy and asset prices. This relationship is an important topic for several reasons. From the perspective of monetary policy makers, since monetary policy impacts the real economy through financial markets understanding the link between central bank announcements and asset prices is crucial to understand the policy transmission mechanism. From an asset pricing perspective, as evidenced by the extensive attention that the Federal Reserve receives in the financial press, market participants are obviously equally interested in estimating the response of asset prices to changes in monetary policy.

The purpose of this work is to assess the relationship between US Federal Reserve's (henceforth Fed) monetary policy and the US dollar exchange rate. This paper contributes to the existing literature in two main aspects. First, this work investigates the real-time effect on exchange rates of a new type of news item, specifically the information originating from the Federal Open Market Committee (FOMC) balance of risk statements in which the outlook for the future monetary policy stance is conveyed. Second, this paper considers high-frequency exchange rate data for five currencies (the US dollar exchange rate versus the euro, the Canadian dollar, the British pound, the Swiss franc, and the Japanese yen) and a long time series of intraday data – spanning up to June 2007. By using high-frequency data, this paper seeks to

more fully and precisely characterize the response of exchange rates to monetary policy shocks. On the one hand, the use of tick data and a narrow event window around FOMC meetings allows better control for (i) the endogeneity-reverse causality problem, and (ii) the omitted variables problem: short-term interest rates and the exchange rate may be influenced by each other and by other common variables, such as the release of scheduled macroeconomic announcements. On the other hand, this paper can also examine the speed of the response of exchange rates to FOMC decisions and statements.

The main findings of the paper can be summarized as follows. First, I show that the surprise components of both Fed's monetary policy actions and statements have economically important and highly significant effects on the US dollar exchange rates. However, the news stemming from Fed's statements matters more for the determination of exchange rates than news about actual monetary policy decisions. For instance, I find that around 80% of the explainable variation in exchange rate returns in response to the Fed's monetary policy is due to unanticipated statements rather than to unexpected changes in the federal funds rate target. I interpret this striking finding as indicating that exchange rates are strongly influenced by the expected path of policy.

Second, I precisely characterize how exchange rates adjust to the Fed's monetary policy. The volatility of exchange rate returns peaks at the FOMC announcement, and remains significantly higher than non-announcement days for about 40 min to 1 h. Moreover, there is a sharp spike in the impact of monetary policy announcements in the 10 min following the event, and monetary news is fully incorporated in about 30–40 min.

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Several papers have recently used high-frequency data to examine the response of asset prices to macroeconomic news and monetary decisions.[1] Two recent contributions examine the impact of the US Federal Reserve's monetary policy on asset prices as I do in this study. Faust et al. (2007) use intraday data to examine the response of exchange rates to scheduled macroeconomic announcements and Fed decisions.[2] The present paper shares the finding that public news has a significant impact both on the level and volatility of asset prices in the aftermath of announcements, and goes one step further by showing that the surprise component of FOMC statements, as opposed to the surprise component of its policy decisions, greatly adds to our understanding of the response of exchange rates to monetary policy announcements. In other words, I show that two factors are required to capture adequately the effects of the Fed monetary policy on exchange rates: the current federal funds rate target and the Fed's communication about the future monetary policy path.

The role of central bank communication for the conduct of monetary policy-making has recently received increasing attention in the academic literature both theoretically and empirically (see Blinder et al. (2008) for more details). In this respect, Gurkaynak et al. (2005) use changes in money market rates to construct multi-dimensional indicators of monetary policy news, capturing both central bank communication and monetary policy decisions. Then they assess the yield curve effects and stock market reactions to FOMC announcements using high-frequency data. This paper extends their work along two dimensions. First, I consider not only a different asset class, high-frequency exchange rate data, but also a more up-to-date sample period. Second, the identification of the surprise component of central bank statements is different. More specifically, instead of using a principal components, I employ content analysis to classify the tone of the statement and a forecasting regression to identify the surprise component of the Fed's announcement.

Another strand of the literature (see for instance Andersen et al., 2008) estimates a time series model to investigate the response of the conditional mean of exchange rate returns to macroeconomic announcements. In this paper I employ a pure event study methodology, only examining a short period around the release of the FOMC policy announcement while abstracting from noise caused by other events as well as intra-daily volatility patterns.

The rest of the paper is organized as follows. Section 2 starts by describing the dataset. Section 3 contains the discussion of the empirical results of the impact of the Fed monetary policy and news shocks on the US dollar exchange rate, and looks at the speed of exchange rate responses to FOMC announcements. Section 4 examines the robustness of the results. Finally, Section 5 concludes.

2. Data

I proceed by outlining the data for exchange rates and for the surprise component of monetary policy actions and statements.

2.1. Exchange rate data

The exchange rate data consist of the 5-min exchange rate for the US dollar versus the euro (EUR), the Canadian dollar (CAD), the British pound (GBP), the Swiss franc (CHF), and the Japanese yen (JPY) covering the years 1999–2007. Midpoints of bid/ask quotes, observed at the end of each 5-min interval, are used to generate the series of 5-min exchange rate returns. Throughout this paper, I measure exchange rates in US dollars needed to buy one unit of the foreign currency such that a negative change implies an appreciation of the US dollar.

2.2. Measuring monetary policy shocks

As standard in the literature (Kuttner, 2001) I use Fed funds futures data to extract market-based measures of monetary policy expectations.[3] These futures contracts have been trading at the Chicago Board of Trade since October 1988, and their settlement price at maturity is based on the average effective overnight federal funds rate that is realized for the calendar month specified in the contract. Since the futures rate on a given date would embody the average of realized funds rates through that date and expectations about the rates prevailing after that date, the current-month federal funds futures contract can be used to measure the surprise component of monetary policy decisions as follows:

$$MPS_t \equiv \Delta f_t \frac{m}{m-t} \tag{1}$$

where Δf_t is the change in the current-month federal funds futures rate in narrow windows around FOMC announcements, t is the day of the month of the meeting, and m is the total number of days in that month.[4] Following Gurkaynak et al. (2005), I compute policy surprises by looking at changes in the futures rate in narrow windows around FOMC announcements. In particular, I use two intraday measures, a "tight" window and a "wide" window, which begin 10 (15) min prior to the monetary policy announcement and end 20 (45) min after the policy announcement respectively. Note that the surprise can be nonzero even when the policy interest rate was not changed, if the market placed at least some probability on there being a change. More generally, the federal funds rate surprise is not necessarily in the same direction as the federal funds rate action itself. For instance, on June 25, 2003 the FOMC announced to cut the target rate by 0.25%, but this decision is characterized by a 18 basis point tightening (where one basis point corresponds to one-hundredth of a percentage point) since many market participants had been expecting the FOMC to ease policy by 50 basis points at that meeting.

The variable MPS is likely to provide the best measure of the surprise component of the current policy decision. However, a recent strand of the literature (Gurkaynak et al., 2005 and Rosa and Verga, 2008) show that on the meeting days of the monetary policy committee two pieces of news, rather than just one, systematically hit financial markets. First, the new level of the policy rate in force for the following month becomes public information. Second, the Fed releases a press statement that provides a rational for the policy

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