



Stock market reaction to fed funds rate surprises: State dependence and the financial crisis



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ABSTRACT

This paper examines the response of US stock returns to Federal Funds rate (FFR) surprises between 1989 and 2012, focusing on the impact of the recent financial crisis. We find that outside the crisis period, stock prices increased as a response to unexpected FFR cuts. State dependence is identified with stocks exhibiting larger increases when interest rate easing coincided with recessions, bear markets, and tightening credit conditions. However, an important structural shift occurred during the crisis, changing the stocks' response to FFR shocks and the nature of state dependence. Throughout the crisis period, stocks did not react positively to unexpected FFR cuts, which were interpreted as signals of worsening future economic conditions. This triggered a rebalancing of investment portfolios away from falling equities and towards safe-haven assets. Our results highlight the severity of the crisis and the ineffectiveness of conventional monetary policy close to the zero lower bound.

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"For the bears, low rates are a sign of the desperation of central bankers, and an indication that economic growth will be subdued for some time to come." (The Economist, 18/09/2010)

1. Introduction

The financial crisis that commenced in late 2007 has been global in nature and of an unprecedented magnitude, as compared to previous episodes of financial turmoil, and led to historically low interest rates in most advanced economies. In the United States (US), the Federal Funds rate (FFR) reached the zero lower bound in December 2008 and the Fed subsequently adopted a non-conventional monetary policy. The relationship between monetary policy and stock market performance has been extensively studied in the previous literature using a variety of empirical approaches, ranging from vector autoregressive models to event studies (see e.g. Cook and Hahn, 1989; Jensen and Johnson, 1995; Thorbecke,

1997; Bernanke and Kuttner, 2005; Kontonikas and Kostakis, 2013; Maio, 2013). Previous studies on the US stock market, have widely documented a positive reaction to expansionary monetary policy surprises and state dependence, with the aforementioned reaction being stronger during 'bad times' of negative economic growth and deteriorating financial conditions (see e.g. Basistha and Kurov, 2008; Kurov, 2010).

Nevertheless, these studies focus on the pre-crisis period and therefore an important question is naturally raised regarding the nature of the relationship between monetary policy and stock market performance during the financial crisis. It is not clear, a priori, how stock market participants will react to interest rate cuts when uncertainty in the macro-financial environment is heightened and monetary policy moves closer to the zero lower bound. In fact, since the onset of the credit crunch and up until early 2009, stock market investors have faced falling stock prices together with sharp cuts in interest rates, indicating that the inverse relationship between interest rates and stock market valuation has weakened.

Since anticipated policy actions should have already been incorporated into stock market participants' investment decisions, in line with market efficiency arguments, most of the previous

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studies focus on the reaction of stock returns to the unexpected component of interest rate changes. In agreement with these studies, we adopt an event study approach and use the methodology proposed by Kuttner (2001) to calculate monetary policy shocks using daily data from FFR futures contracts. These contracts provide real-time information about investors' expectations regarding future interest rates. As noted in previous research, endogeneity may impose potential econometric problems since monetary policy can be itself reacting to stock market developments (see Rigobon and Sack, 2003). Nevertheless, the problem of endogeneity in the relationship between monetary policy and stock market performance should be less potent when higher frequency data, such as daily data, are used within an event study framework (see e.g. Bredin et al., 2009; Chen, 2007; Kurov, 2010).

In this paper we investigate the impact of FFR surprises on US stock returns over the period 1989–2012. In line with previous literature, we find that outside the 2007–2009 financial crisis, stock prices increased as a response to expansionary monetary policy surprises: an unexpected 1% cut in the FFR was associated with an almost 4% increase in the S&P 500 index. We also find that prior to the financial crisis there was state dependence of a similar nature to that identified in previous studies. In particular, stock prices exhibited larger increases when interest rate easing occurred during 'bad times' of recession, bear stock markets, and tightening credit market conditions, indicating asymmetries in the stock market response to monetary policy.

This paper contributes to the existing literature on the relationship between stock returns and monetary policy shocks by providing a comprehensive analysis of the impact of the recent global financial crisis. Firstly, we show that a structural break took place during the financial crisis, altering the stock market response to FFR shocks, as well as the nature of state dependence with respect to 'good times' versus 'bad times'. Our findings reveal that throughout the crisis, stock market participants did not respond positively to expansionary FFR surprises; in fact, some estimates indicate a significantly *negative* response. The lack of a positive reaction to expansionary FFR shocks between 2007 and 2009 suggests that the asymmetric behaviour identified in previous studies for the pre-crisis period, did not materialise during the recent crisis. Using industry portfolios, we show that patterns observed in the broad stock market response to FFR surprises are also present in the majority of the industries. Specifically, the relationship between sectoral returns and policy shocks exhibits structural change, as well as state dependence with respect to 'good times' versus 'bad times'. Furthermore, in line with previous studies, we identify sectoral heterogeneity.

Secondly, we offer an explanation for the structural break based upon flight to safety trading during the financial crisis. Specifically, the non-positive reaction to expansionary FFR shocks throughout 2007–2009 implies that FFR cuts ceased to be seen as good news by stock market investors. With nominal interest rates approaching the zero lower bound and the macro-financial environment sharply deteriorating, these cuts highlighted the severity of the downturn and signalled worsening future conditions. This prompted a sell-off of equities and increased demand for safe-haven assets, such as US 3 month Treasury bills and gold. We find that the flight to safety trading taking place throughout the crisis was reinforced at FOMC meeting dates, with the price of both safe-haven assets significantly increasing in response to expansionary FFR shocks. Overall, our results highlight the unique character of the 2007–2009 episode, reveal the limits of conventional monetary policy at the zero lower bound and are consistent with the Keynesian liquidity trap theory.

The remainder of the paper is structured as follows: Section 2 describes the dataset. Section 3 presents and discusses the empirical findings. Finally, Section 4 concludes.

2. Data and stylised facts

We analyse the effects of 213 FOMC target rate decisions between June 1989 and December 2012.¹ As Bernanke and Mihov (1998), among others, point out, the FFR has been the key policy instrument in the US and therefore unexpected changes in this rate should provide good estimates of policy shocks. Following Kuttner (2001) and Bernanke and Kuttner (2005) we use data from FFR futures contracts in order to derive the unexpected component of the FFR change. While the FFR is a good proxy of monetary policy stance in relatively 'normal' periods (see e.g. Wright, 2012), the post-2007 period is quite exceptional. It is marked by the global financial crisis and the use of unconventional policies by the Fed since late 2008, when the zero lower bound for nominal interest rates was reached and the Fed replaced the FFR with its balance sheet as its primary policy instrument.²

As Wright (2012, p. F448) argues, "...things are murkier at the zero bound...[and]...there isn't as clean a single measure of the overall stance of unconventional monetary policy". Furthermore, unlike information provided by FFR futures contracts, there are no direct real-time measures of investors' expectations regarding the size of asset purchases. Hence, we use FFR shocks as the principal explanatory term in our empirical analysis, keeping in mind that they can be clearly identified as monetary policy shocks throughout most of the sample period, and will not attempt to measure shocks in unconventional policies.³

In line with Basistha and Kurov (2008) and Ehrmann and Fratzscher (2009) among others, we utilise both scheduled (189) and unscheduled (24) FOMC meetings.⁴ On the day of the FOMC decision, the FFR shock, Δi_t^u , is measured by the change in the implied rate of the current-month FFR futures contract, as traded on the CBOT market, relative to the day before the FOMC announcement, scaled by a factor related to the number of days in the month affected by the change:

$$\Delta i_t^u = \frac{D}{D-d} (f_{m,t} - f_{m,t-1}), \quad (1)$$

where Δi_t^u is the unexpected target rate change, $f_{m,t}$ is the current-month implied futures rate (100 minus the futures contract price), and D is the number of days in the month.⁵ We measure the expected interest rate change, Δi_t^e , as the actual change in the FFR target rate minus the surprise component:

$$\Delta i_t^e = \Delta i_t - \Delta i_t^u. \quad (2)$$

¹ In agreement with previous studies we exclude from our analysis the 17 September 2001 target rate announcement, which took place on the first trading day following the 11 September attacks (see e.g. Jansen and Tsai, 2010).

² Quantitative easing (QE) involves altering the Fed's balance sheet composition through significant financial asset purchases in order to support credit markets and to provide economic stimulus. Furthermore, the Fed issued press-release statements signalling that the FFR will be kept at the zero bound for a sustained period of time.

³ Rosa (2012) identifies the surprise component of asset purchases by the Fed using a methodology based upon interpreting the wording of related articles in the Financial Times. As he points out, though, the estimates of the response of US asset prices to his measure of unconventional policy shocks are surrounded by considerable statistical uncertainty and overall are not significantly different from the response to an unanticipated FFR cut.

⁴ Regarding the dating of the FOMC meetings, for the pre-February 1994 period, which was characterised by lack of press releases regarding FOMC decisions and ambiguity about the dates of open market operations, we use dates provided by Kuttner (2003). The FOMC started to explicitly announce rate changes on February 1994 in a move towards greater transparency and the corresponding dates are obtained from the Federal Reserve website at <http://www.federalreserve.gov/newsevents/press/monetary/2013monetary.htm>.

⁵ This scaling adjustment is necessary because the futures contract's settlement price is based upon the monthly average FFR. Following Bernanke and Kuttner (2005), unscaled changes in the 1-month futures rate are used to calculate the surprise component when the change takes place during the last three days of the month.

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