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The Credit Channel of Monetary Policy Before and After the ZLB: Evidence from the US Equity Market[1]

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Abstract

We evaluate the effectiveness of conventional and unconventional monetary policy measures by examining the transmission mechanism through the credit channel before and after the zero lower bound. We focus on the impact of conventional and unconventional policy shocks on the cross-section of portfolio returns sorted on a few characteristics that capture firms' financial constraints (size, book-to-market). Our results show that the credit channel of monetary policy is even more relevant at the ZLB relative to the previous period and its effectiveness is almost entirely attributed to the high sensitivity of financially constrained firms (small and value stocks) to unconventional surprises. We find strong evidence that the reaction of portfolio returns to policy shocks is asymmetric depending on the state of the economy (recession vs. expansion), the type of policy surprises (positive vs. negative surprises), and the aggregate level of market volatility. Our findings are robust with respect to a number of model extensions and robustness checks.

JEL Classification: G14, E44, E52, E58.

Key Words: Credit channel, unconventional monetary policy, LSAPs, forward guidance.

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1. Introduction

In the wake of the 2007-2008 financial crisis and its aftermath, the Federal Reserve lowered the federal funds rate effectively to zero (often referred to as the zero lower bound, or ZLB) and turned to unconventional policy measures to mitigate the adverse effect of the crisis and stimulate the economy. Though these unconventional measures included a broad range of programs[1], the most important were forward guidance and Large-Scale Asset Purchases (LSAPs).

A key aspect of monetary policy transmission to the broader economy is through its impact on equity prices as policy actions affect both the expected cash flows and the rate at which these cash flows are discounted (Patelis (1997), Bernanke and Kuttner (2005)). In turn, stock prices affect the real economy through a number of channels such as the wealth effect or the firm's cost of capital (and their capacity to raise capital).

A large body of work has consistently documented a strong negative relationship between a monetary policy tightening and equity returns in the pre-ZLB period.[2] However, the evidence during the unconventional period is more mixed, casting doubt as to whether the standard transmission channels of monetary policy have continued to remain as effective. A number of studies have found that unconventional monetary policy has been either counterproductive (Kontonikas, MacDonald and Saggu (2013), Florackis, Kontonikas and Kostakis (2014)) or less effective than conventional policy (Kiley (2014)). In contrast, a number of other studies show that the response of stock returns to policy shocks since the crisis has been significantly stronger than in the conventional period (Kurov and Gu (2016), Eksi and Tas (2017)).

In addition, no clear consensus has emerged as to which measures of unconventional policy – LSAPs or forward guidance– has the largest impact on asset prices. Rosa (2012) finds that both LSAPs and forward guidance have a significant impact on stock returns, with LSAPs having a larger cumulative effect. Rogers, Scotti and Wright (2014) document that only LSAPs drive stock returns while Swanson (2018) finds that forward guidance is

[1] A host of other programs, such as the Commercial Paper Funding Facility (CPFF) and the Term Asset-Backed Securities Loan Facility (TALF) were also employed with the aim of supporting certain segments of the credit markets that ceased to function properly during the crisis.

[2] See, among others, Patelis (1997); Thorbecke (1997); Ehrmann and Fratzscher (2004); Bernanke and Kuttner (2005); Gürkaynak, Sack and Swanson (2005), D'Amico and Farka (2011), Maio (2014).

the only significant factor during the unconventional period.

These differences are partly attributed to the fact that the vast majority of studies focus on the overall stock market response to monetary policy rather than on the substantial heterogeneity observed in the cross-section of portfolio returns. However, the credit channel of monetary policy – which operates through the bank lending and balance sheet channels via information asymmetries and credit constraints – has a markedly heterogeneous impact on firms, with adverse shocks generating a far greater impact on financially constrained firms relative to unconstrained ones. Under both bank lending and the balance sheet channel, the financial accelerator amplifies and propagates shocks to the macroeconomy, allowing even small disturbances to have large and persistent effects (Bernanke and Gertler (1989), and Kiyotaki and Moore (1997).

This paper investigates the credit channel of conventional and unconventional monetary policy, aiming to evaluate its effectiveness across the two regimes. Arguably, the credit channel may have assumed an even more important role during the financial crisis since it tends to amplify and propagate policy shocks precisely at a time when this is needed the most: when credit markets are impaired.[3] Using an event-study approach, we focus on the cross-section of portfolio returns sorted on size and book-to-market to capture the various aspects of financial constraints faced by firms. These portfolios serve as an appropriate laboratory for analyzing credit frictions and in particular, the transmission mechanism of policy shocks through the credit channel (Kontonikas and Kostakis (2013)).

Our sample begins in May 1999 (when the Fed introduced its first forward guidance statement) and ends in October 2015 (the end of the ZLB era). This covers the conventional policy period (May 1999 – October 2008), and three waves of quantitative easing and the maturity extension program during the unconventional period (Nov. 2008 – October 2015). Because policy decisions may be anticipated in advance by market participants, we compute monetary policy surprises using high-frequency interest rate changes around FOMC announcements. Following Swanson (2018), we extract the first three principle components from these intraday changes, suitably rotating them so that the first factor (target rate

[3] Basistha and Kurov (2008) find that financially constrained stocks respond more strongly to conventional monetary shocks in recessions and tight credit market than stocks of relatively unconstrained firms. The question still remains as to whether this is still the case under unconventional monetary policy, which this paper aims to address.

shocks) corresponds to the change in federal funds futures, the second factor captures forward guidance surprises and the third, the LSAP factor. Clearly "target rate shocks" are only relevant during conventional policy, while LSAPs are relevant only during the ZLB period. Thus, our conventional period is characterized by "target rate" and "forward guidance" surprises, while the unconventional period by "forward guidance" and "LSAP" surprises.

Previewing our results, we find that the credit channel of monetary policy is even more relevant at the ZLB relative to the previous period and its effectiveness is almost entirely attributed to the high sensitivity of financially constrained firms (small and value stocks) to unconventional surprises. Overall, we find that both forward guidance and LSAP shocks are important drivers of portfolio returns during the unconventional period with forward guidance shocks generating the largest response. Likewise, portfolio returns respond significantly to both target rate and forward guidance shocks during the conventional period, though they are more sensitive to target rate surprises. When comparing the relative importance of each unconventional measure on different portfolio deciles, we find that forward guidance shocks have their greatest impact on value and small stocks, while LSAPs on value and large stocks. We attribute these results to the differential impact that unconventional tools have on the sources of financing. For example, while LSAPs substantially lowered corporate spreads especially for financially constrained firms (such as value firms), their impact on bank lending, which would have largely benefited small firms, was more muted (Ippolito, Ozdagli, and Perez (2018), Chakraborty, Goldstein, and MacKinlay (2020)).

We also estimate a large response of the value and size premiums to policy shocks across both periods: the size premium shows an equal-sized response across the two samples, while the reaction of the value premium is almost twice as large during the ZLB relative to the conventional era. Target rate shocks are the primary determinant of both premiums during the conventional period. In contrast, during the ZLB, while the value premium is driven equally by forward guidance and LSAP shocks, the size premium is only driven by forward guidance surprises.

We consider a number of important extensions to our analysis especially in quantifying whether the response of asset prices to monetary policy news is asymmetric depending on the state of the economy (recession vs. expansion), the type of policy surprises (positive vs. negative surprises), and the aggregate level of market volatility. We find substantial evidence

of asymmetry in all three cases, which is especially pronounced during the ZLB period.

In addition, we perform several sensitivity analyses to evaluate the robustness of our baseline estimates, including narrowing the set of important unconventional announcements, examining the importance of the first round of LSAP (LSAP-1), excluding intermeetings and speeches, exploring alternative sample partitions between conventional/unconventional periods, estimating robust regressions, and non-nested regressions. Overall, we find that our baseline results are robust to these alternative specifications and the central message of this paper – that the credit channel has assumed a greater importance during the ZLB period – remains essentially unchanged.

This paper is related to two strands of literature and contributes to them in a number of ways. The first active and growing literature aims at quantifying the effects of unconventional monetary policy on financial markets (Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), Hamilton and Wu (2012), Wright (2012), Rorgers, Scotti and Wright (2014), Swanson and Williams (2014), Neely (2015), Glick and Leduc (2018), and Swanson (2018)). Our paper adds to these efforts by seeking to understand the effect of monetary policy on portfolio returns across conventional and unconventional periods, separately evaluating the impact of target rate surprises, forward guidance and LSAPs.

By examining the cross-section of portfolio returns, our efforts contribute to a second strand of literature which focuses on the transmission mechanism of monetary policy on financial markets and the broader economy. Focusing on the pre-ZLB era, a number of studies have found that firms exhibiting a high degree of financial constraints (or high dependence on external finance) are significantly more affected by monetary policy than firms that do not face these constraints (Thorbecke (1997), Perez-Quiros and Timmermann (2002), Ehrmann and Fratzscher (2004), Basistha and Kurov (2008), Kontonikas and Kostakis (2013), Maio (2014), and Chava and Hsu (2019)). A number of recent studies (Haitsma, Unalmis and de Haan (2016), Wu (2018)) have further expanded these efforts to examine the relevance and effectiveness of the credit channel since the ZLB.

Our study shares a number of common elements with Kontonikas and Kostakis (2013) and Maio (2014), such as the use of portfolios sorted in size and value. However, while these studies focus on the conventional period, we examine the role of the credit channel across both conventional and unconventional periods. By investigating the importance of financial

constraints during the unconventional period, our paper is also closely related to Wu (2018). Nonetheless, it differs from Wu (2018) in two dimensions. First, his results are based on a much shorter period than ours and a smaller subset of policy days. Second, while Wu (2018) separates the set of policy announcements into predominantly LSAPs or predominantly forward-guidance, in reality, things are less clear-cut since a specific announcement may contain information related to both measures. Our methodology accounts for these complexities, allowing for the presence of both forward guidance and LSAP elements in FOMC announcements.

The rest of this paper is organized as follows. Section 2 summarizes the credit channel literature across the two periods. Section 3 describes the empirical framework and data including the identification of monetary policy surprises. Section 4 presents our baseline empirical results as well as extensions of the benchmark model allowing for asymmetries. Robustness analysis are carried out in Section 5. Concluding remarks are summarized in section 6.

2. The Credit Channel of Monetary Policy: pre- and post-ZLB

An extensive literature has provided an in-depth examination of the importance of the credit channel and its propagation via the bank lending and the balance sheet channel.[4] The bank lending channels works through the cyclicality of loans: a contractionary monetary policy, which decreases reserves and bank deposits, simultaneously reduces the amount of bank loans available and tightens credit terms. The balance sheet channel focuses on fluctuations in firms' net worth based on the quality of their balance sheets: an adverse policy shock which lowers firm's collateral and exacerbates information asymmetry costs, leads to a reduction in the availability and cost of external funds.

Both channels highlight important aspects of the monetary transmission as their impact on stock returns are highly asymmetric and heterogeneous. In the case of the bank lending channel, monetary policy has a greater impact on small firms (which depend more on bank loans) than large firms (which can get funding from a variety of other sources, such as by issuing stocks and bonds). Likewise, the balance sheet channel arises from the presence of

[4]See for example, Bernanke and Gertler (1995), Bernanke, Gertler and Gilchrist (1999), Kiyotaki and Moore (1997).

asymmetric information in the credit market: a policy tightening that leads to a significant reduction in net cash flows exacerbates firms' balance sheet position and available collateral. Value firms (high book-to-market) are especially vulnerable to an adverse policy shock since they are characterized by high cash flows relative to their market price and are generally more financially constrained as reflected by their low equity valuations (Kontonikas and Kostakis (2013)).[5]

2.1 The Credit Channel prior to the ZLB Empirical evidence on the bank lending channel during the conventional period is mixed. Ehrmann and Fratzscher (2004) find that small firms react significantly more to policy shocks than medium-sized and large firms. Other studies have confirmed similar results (Fazzari, Hubbard and Petersen (1988), Gertler and Gilchrist (1994)). Maio (2014) shows that the relationship between firm size and the response to monetary shocks is non-monotonic with medium-sized firms responding the most and large stocks the least. In contrast to these findings, a number of other studies have found that the size effect has disappeared in later years (post-1983) (Guo (2004), Kontonikas and Kostakis (2013)) or that it is significant only during recessions but not during expansions (Perez-Quiros and Timmermann (2000)).

Evidence for the balance sheet channel is generally stronger, with value stocks showing higher sensitivity to policy moves than growth stocks. For example, Maio (2014) and Kontonikas and Kostakis (2013) find that value portfolios (high book-to-market) respond nearly twice as much to policy shocks than growth firms and this differential is highly significant. However, as documented by Kontonikas and Kostakis (2013), the value premium has declined since early-1980s, becoming insignificant in some instances (depending on the type of value proxy used).

Other studies have examined the credit channel of monetary transmission by focusing on firm-level characteristics. Ehrmann and Fratzscher (2004) find that financially constrained firms (those with low cashflows, poor ratings, high earnings to price, high book to market) respond significantly more to unanticipated monetary policy shocks than unconstrained firms.

[5] Obviously, these channels are not easy to separate in our framework. Small stocks provide an ad hoc approach to investigate bank lending, but they are also affected by balance sheet considerations since they are likely less well collateralized than large stocks. Thus, it is possible to broadly characterize size-sorted portfolios as a more appropriate venue for analyzing the bank lending channel while value stocks in investigating balance sheet effects, though this distinction is hardly clear-cut.

Chava and Hsu (2019) classify firms as financially constrained/unconstrained and estimate that financially constrained firms earn lower returns following a policy tightening, though the effect is evident with some delay. Basistha and Kurov (2008) identify financial constraints based on a number of firm-specific characteristics (debt-rating, payout ratio, asset size and trade credit) and show that constrained firms are significantly more affected by monetary policy during adverse economic periods (recessions and tight credit).

2.2 The Credit Channel during the ZLB Evidence of the credit channel in the ZLB era is relatively more sparse. Using intraday changes in long-term rates as measures of unconventional policy surprises, Wu (2018) finds that financially constrained firms react more strongly to unconventional policy shocks than unconstrained firms. He splits the sample into predominantly LSAP, forward guidance and operation twist announcements and finds that the credit channel during the ZLB operates primarily through LSAPs but not through the other two channels. Haitsma, Unalmis and de Haan (2016) examine the effectiveness of the credit channel in the pre- and post-crisis period for the euro area and find significant evidence of the credit channel only during post-crisis.

Other studies focus on the impact of unconventional monetary policy on firm financing and investment. Chang and Song (2014) estimate that LSAPs significantly increased the probability of external financing resulting in higher issuance of public equity and bonds, but failed to meaningfully encourage bank lending. Aysun, Jeon and Kabukcuoglu (2016) find that an expansionary monetary policy since 2009 has benefited high borrowing spreads/low quality firms by reducing borrowing spreads for these firms, but it has had an opposite effect for low borrowing spreads/high quality firms, causing borrowing spreads to converge across firms. The opposite is found for the pre-crisis period, when borrowing costs tend to diverge across high/low quality firms. Foley-Fisher, Ramcharan, and Yu (2016) focus on the Maturity Extension Program (MEP) and find that it lowered financing costs and relaxed financial constraints primarily for firms that relied on longer-term debt which typically tend to be larger and older and thus less financially constrained.

3. Empirical Framework: Data and Methodology

3.1 Monetary Policy News and Events

We examine the effects of monetary policy surprises on portfolio returns over the conventional policy period (May 1999-October 2008) and unconventional period (November 2008 – October 2015). The separation along the two samples is not clear-cut since conventional monetary policy was still in effect at the time when the Fed began to signal its intentions to carry out unconventional measures.[6] In our baseline specification we assume that the unconventional period begins in November 2008, though in section 5 we relax this assumption.

Conventional policy is primarily conducted via changes in the federal funds rate. However, forward guidance language began to appear in the FOMC statements as early as May 1999 when a "policy bias" assessment was incorporated to indicate the likelihood of future tightening or easing.[7] This was replaced by a "balance of-risk-assessment" in February 2000, which was more explicitly tied to evolving macroeconomic variables (output growth and inflation).[8] The language was again changed in August 2003, referring more directly to the future stance of monetary policy in statements, along the lines of: "policy accommodation can be maintained for a considerable time" or "the committee can be patient in removing accommodation."

The conduct of unconventional policy was also carried out primarily along two dimensions: LSAPs and forward guidance. The first round (LSAP-1) was announced in November 2008 with the purchases being conducted from December 2008 to March 2010. The second round (LSAP-2) ran from November 2010 to June 2011 and involved purchases of $600 billion in longer term Treasury securities and the reinvestment of the principal payments from agency securities acquired in the first round into purchases of longer term Treasuries. From September 2011 to December 2012, the Fed implemented the Maturity Extension Pro-

[6] For example, while the zero lower bound was reached in December 16 2008, the Fed had announced on November 25 that it would "purchase up to $500 billion in mortgage backed securities and buy $100 billion of agency debt".

[7] FOMC statements appeared as early as 1994, but they were primarily used as a vehicle to telegraph the current target rate decision and contained little to no information about the future likely path of policy actions.

[8] The description included an evaluation as to whether the risks were balanced or weighted toward either economic weakness or heightened inflationary pressures. Obviously, the balance of risk assessment can be mapped into the likely evolution of future policy, but this is done indirectly by focusing on the Fed's dual objectives rather than on policy rate changes.

gram (MEP), under which a total of $667 billion in par longer-term Treasuries were financed through the sale of an equal amount of shorter-term securities. The third round of asset purchases (LSAP-3) was announced in September 2012 with purchases of MBS and longer term Treasuries of $40 billion and $45 billion per month, respectively. The LSAP program began to wind down in December 2013 and was completed in October 2014, after accumulating a total of $4.5 trillion in assets.

Aside from the these rounds of asset purchases, we also identify a number of episodes associated with the "taper" and "exit" periods when the Fed began to signal its intent to pull back from quantitative easing. Perhaps the most striking episode was the "taper tantrum" on May 22 2013 when Chairman Bernanke remarked in his testimony to Congress that the "Fed would likely slow asset purchases later in 2013 if economy and the job market continue to improve." This was interpreted by market participants that a reduction in asset purchases was imminent causing sizable movements in global asset prices. Appendix A lists the major LSAP announcement dates along with the program phase, a summary of the decision, and a brief news excerpt commenting on the market reaction to the announcement.

Another complementary and important tool during the ZLB was forward guidance, which underwent significant modifications over time to reflect changing economic conditions and associated policy adjustments. For example, in its December 2008 statement, when it lowered the target rate to the zero bound, the FOMC statement read: "weak economic conditions are likely to warrant exceptionally low levels for some time." This was modified in March 2009 when "exceptionally low rates were expected to prevail for an extended period." In August 2011 the language shifted to a calendar-based approach when the "extended period" was replaced by "at least through mid-2013." The language was modified again in January 2012 to "at least through late-2014" which was further extended to "at least through mid-2015" in the September 2012 meeting. The calendar guidance was replaced by a threshold guidance in December 2012 linking policy rates to developments in the labor market. As the economy continued to improve, forward guidance began to revert back to its pre-crisis language indicating the Fed would "maintain the current target rate for a considerable time" or that it would be "patient in beginning to normalize the stance of monetary policy." Appendix B summarizes the main forward guidance announcements together with news commentaries related to the language of the guidance.

Overall, our benchmark sample includes a total of 144 policy dates, of which 81 belong to the conventional period and 63 to the unconventional period. There are 77 scheduled meetings and 4 intermeetings in the conventional sample.[9] The unconventional period includes all regularly scheduled meetings and the initial announcement of the LSAP program on November 25, 2008. In addition, our sample includes selected speeches and testimonies by the Fed's Chairman Bernanke which signalled possible shifts in the future path of monetary policy (especially related to the bond purchasing program), which commonly came ahead of the formal announcement.[10]

3.2 Identifying Monetary Policy Surprises

There are a number of challenges when measuring policy shocks in the ZLB era. First, while changes in federal funds futures around policy announcement provide a good approximation of policy shocks during the conventional sample (Kuttner (2001)), there is no clean and direct measure for LSAP surprises, because it is unclear what market expectations were regarding these purchases. Second, as forward-looking variables, financial markets react only to unanticipated LSAP news, which means that the relevant impact is not when the purchases were actually made, but when they were first announced (or hinted at). As seen in Table 1a, in a number of instances the market learned about an upcoming change in the asset purchase program from advanced statements by the Fed Chairman and other Board members.

Another issue relates to the fact that sometimes the surprise came from a lack of an anticipated action – what the Fed failed to do – rather than its actions (Swanson (2018)). For example, the "taper hold" episode of September 18 2013, elicited an outsized positive response from the markets even though no major changes were announced because the Fed

[9] Our baseline sample includes the intermeeting announcements of January 3, 2001, April 18, 2001, January 22, 2008 and October 8, 2008 and excludes the following unscheduled meetings: September 17, 2001, August 10, 2007, August 17, 2007, and March 11, 2008. The September 2001 announcement is commonly excluded from the set of event studies due to the idiosyncratic nature of the meeting following the terrorist attacks of September 11 (see for example, Bernanke and Kuttner (2005), D'Amico and Farka (2011), Glick and Leduc (2018)). The unscheduled meetings of August 10, 2007, August 17, 2007 and March 11, 2008 are excluded because they did not contain important policy changes but rather focused on details about liquidity provisions through the Term Auction Facility, Term Securities Lending Facility, or discount window lending.

[10] Our sample includes five speeches from Chairman Bernanke and one Congressional testimony on the following days: December 1, 2008, August 27, 2010, October 15, 2010, August 26, 2011, August 31, 2012, and May 22, 2013. Overall, the unconventional sample consists of 56 regularly scheduled meetings, one unscheduled announcement (November 25, 2008), and six speeches/testimonies by the Fed Chairman.

decided to hold off unwinding its balance sheet despite hinting at this move in the previous months. Likewise, on September 17 2015, the Fed decided to postpone raising interest rates for the first time in over a decade, even though the markets widely expected it to do so.

An additional complication arises from the need to separately identify forward guidance effects from LSAPs. Some studies do so by simply splitting policy dates into predominantly LSAP or predominately forward guidance statements (Rogers, Scotti and Wright (2014), Wu (2018)). However, this distinction is not that apparent. First, a number of FOMC announcements contained important information related to both forward guidance and the asset purchase program.[11] Second, as argued by a number of authors (Krishnamurthy and Vissing-Jorgensen (2011), and Swanson (2018)), even clear LSAPs statements are likely to contain important forward guidance implications as they alter market's expectations about the future path of the target rate (signalling channel). In particular, in a number of instances, announcements related to extensions of an existing LSAP program moved shorter-term interest rates more than longer-term rates as they implied that a potential increase in the federal funds rate was likely pushed back further into the future.

This paper follows closely the methodology of Swanson (2018) (which extends the methodology of Gürkaynak, Sack and Swanson (2005) to the ZLB period) in identifying monetary policy shocks before and after the ZLB. We use intraday changes 15 minutes before and 1 hour and 45 minutes after a policy announcement in the first and third federal funds futures contracts (ΔFFR_1, ΔFFR), the second, third and fourth Eurodollar futures (ΔEUR_2, ΔEUR_3, ΔEUR_4), and the 2-, 5-,10-, and 30-year Treasury yields.[12] As pointed out by Swanson (2018), federal funds contracts are likely to reflect the near-term horizon of monetary policy, Eurodollar contracts capture the intermediate term (the expected path of the target rate over the next year), while long-dated Treasuries provide information about the

[11] Looking at Appendix A and B, elements of both policies were conveyed in at least six major announcements: December 16, 2008, March 18, 2009, September 13, 2012, December 12, 2012, December 18, 2013 and March 19, 2014.

[12] The data are obtained from staff at the Federal Reserve Board. As in Swanson (2018), we avoid overlapping future contracts since they tend to be highly correlated for institutional rather than policy reasons. Arguably, the window around announcements is a bit wider than what is commonly used in event-study analysis. However, the longer time-frame is necessitated by the fact that information delivered especially during the unconventional period involved understanding of statements and speeches rather than announcements of numerical values for target rate announcements. Commonly these take longer to process and digest. We also carried out our analysis using tighter windows (10 minutes to 20 minutes around FOMC announcements) and found that our results (available upon request) remain broadly unchanged.

longer-term path of policy rates.

As in Gürkaynak, Sack and Swanson (GSS, 2005), this dataset is used in the estimation of the following factor model:

$$X = Z\lambda + \varepsilon$$

where X is a $T\ x\ n$ matrix comprised of intraday changes in interest rates, Z is a $T\ x\ r$ matrix of latent factors such that $(r < p)$, λ is a matrix of factor loadings with dimensions $r \times n$, and ε is a $T \times n$ matrix of error terms. Similar to Swanson (2018), we compute the principle components of this dataset and find that the majority of the variation in the data is well-explained by three factors. Because these factors do not have a structural interpretation, following Swanson (2018), we search over all possible rotations in order to obtain another set of orthogonal factors (TS, FG and $LSAP$) where the first factor (TS) corresponds to "target surprises" (as in Kuttner (2001), $TS = \frac{m}{m-d}(FFR_t^{fut} - FFR_{t-1}^{fut})$), the second factor ($FG$) reflects the forward guidance factor (future path of monetary policy over the upcoming year), while the third factor ($LSAP$) captures LSAPs (longer-horizon surprises).[13]

More specifically, this method allows us to identify two orthogonal factors during the conventional period (TS and FG), where TS captures the immediate setting of monetary policy while FG reflects information about the future path of short-term rates *above and beyond changes* in the target rate (GSS (2005)). Likewise, the unconventional period is also characterized by two factors (FG and $LSAP$) where LSAPs are orthogonalized with respect to the forward guidance factor to capture the impact of FOMC announcements on long-term interest rates above and beyond movements in shorter maturity rates. Each factor is normalized to have a unit standard deviation, so results are interpreted in terms of basis points per standard deviation of monetary policy shock.[14] A positive surprise indicates a policy tightening for that policy instrument.

Summary statistics for the various measures of policy surprises are presented in Table

[13]Following Swanson (2018), we employ the following identifying restrictions: a) changes in forward guidance have no impact on the target surprises, b) changes in LSAPs have no impact on target surprises, and c) the LSAP factor is as small as possible over the conventional policy period (May 1999 - November 2008). Details of the methodology are provided in Swanson (2018).

[14]The target rate shock is normalized over the period from May 1999 - December 2008, the LSAP factor over the period of November 2008 - October 2015, while the forward guidance factor is normalized to have a unit standard deviation over the entire sample (May 1999 - October 2015).

1. During the conventional period, target surprises have a negative mean, implying a slight easing bias, while forward guidance shocks are on average positive. The mean values for forward guidance and LSAPs are negative during the unconventional period, suggesting an easing of policy. Focusing on important announcements presented in Table 1, summary statistics are further separated along the three LSAP rounds, MEP, taper and exit stages. As seen, the average values for both LSAP and forward guidance are large and negative during the LSAP1 announcement, indicating that this period was characterized by significant surprise easing. Other rounds of LSAP announcement show a smaller average surprise, while the MEP resulted in a surprise tightening in the forward guidance factor (consistent with the selling of short-term Treasuries) and a surprise easing in LSAP shocks (consistent with purchases of long-term securities). In line with expectations, the taper tantrum and exit episodes are characterized by a surprise tightening in both forward guidance and LSAP surprises, while the taper hold shows a large unanticipated easing of both. Overall, these summary statistics are consistent with the stance and direction of monetary policy during the various stages of unconventional monetary policy.

3.3 Portfolio Returns

We use the value-weighted daily returns during FOMC days for decile portfolios sorted according to size (market capitalization) and book-to-market (book value - to market capitalization ratio). The portfolio groups are the Fama and French (1992) portfolios obtained from the Kenneth French's online data library.[15] Excess returns are computed by subtracting the 1-month Treasury rate from the daily returns. We focus on portfolio rather than individual stock returns because their characteristics can be mapped easily and more directly to measures of financial constraints (size, book-to-market) than individual stocks. Moreover, portfolio-based returns are likely to display fewer measurement errors than individual stocks which tend to be considerably noisier around policy announcements (Maio (2014)). This dataset is also employed by Kontonikas and Kostakis (2013) and Maio (2014), though our sample extends to the unconventional period.

Summary statistics for daily portfolio returns on FOMC announcement days are shown in Table 2. As seen, value and small stocks appear to have higher average returns than growth

[15] The library is available at: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

and large stocks, especially during the unconventional period. Thus preliminary analysis seems to confirm the existence of size and value premiums (Fama and French (1992)) indicating that more financially distressed stocks have higher returns during policy announcement days than less distressed stocks.

4. Empirical Results

4.1 The effect of conventional and unconventional policy on portfolio returns

To examine the relationship between portfolio returns and policy surprises, we follow an event-study approach, similar to a number of previous studies.[16] We specify the following model:

$$r_t^i = \alpha_0 + \alpha_1 TS_t + \beta_1 FG_t + I_t^u(\alpha_2 + \beta_2 FG_t + \gamma_1 LSAP_t) + \varepsilon_t$$

where r_t^i represents the excess log return on day t on equity portfolio i ($i = 1, ..., 10$), TS_t is the surprise change in the federal funds target rate, FG_t is the forward guidance surprise (short-term path surprise), while $LSAP_t$ captures the LSAP surprise (long-term path surprise). I_t^u is an indicator variable equal to unity during the unconventional period and zero otherwise. This specification nests the two policy periods within the same setting so that $\alpha_1 + \beta_1$ captures the total impact of target rate surprises and forward guidance during the conventional period, while β_2 captures shifts in the impact of forward guidance between conventional and unconventional periods. The impact of forward guidance surprises on portfolio returns during the unconventional period are thus captured by $\beta_1 + \beta_2$, while the effect of LSAPs is given by γ_1. Overall, the impact of unconventional policy shocks on stock returns is reflected by the sum of parameters $\beta_1 + \beta_2 + \gamma_1$.

Results for the value- and sized- sorted portfolios are summarized in Tables 3a and 3b, respectively. For each portfolio group we also report responses for a number of spreads across extreme deciles.[17] Focusing first on the book-to-market sorted portfolios during the

[16] See for example, Ehrmann and Fratzscher (2004), Bernanke and Kuttner (2005) and Glick and Leduc (2018).

[17] We follow Maio (2014) and report results for $Spread_1$which captures the difference in slopes across the most extreme deciles ($(d^{10} - d^1)$ for value and $(d^1 - d^{10})$ for size portfolios); $Spread_2$ which stands for the difference between the average slopes of the first two most extreme deciles and last two ($(\frac{1}{2}(d^{10}+d^9)-\frac{1}{2}(d^1+d^2)$) for value and $\frac{1}{2}(d^1+d^2)-\frac{1}{2}(d^{10}+d^9)$) for size portfolios); and $Spread_3$ which represents the difference in average slopes between the first three most extreme deciles and the last three ($(\frac{1}{3}(d^{10}+d^9+d^8)-\frac{1}{3}(d^1+d^2+d^3)$) for value and $\frac{1}{3}(d^1 + d^2 + d^3) - \frac{1}{3}(d^{10} + d^9 + d^8)$) for size portfolios).

conventional period, we find that all portfolio deciles respond to both target rate shocks and forward guidance and that this response is statistically significant at conventional levels.

Moreover, we find a sizable value premium related to policy surprises as value stocks register a stronger response to both types of shocks relative to growth stocks. For example, the most extreme value portfolio returns (decile 10) drop by around 0.48% in response to a one-standard-deviation increase in the target rate and by 0.30% in response to a forward guidance shock. In contrast, the comparable estimates for growth portfolios (decile 1) are 0.29% (for target shocks) and 0.18% (for forward guidance shocks). Thus, the overall impact of a one-standard-deviation conventional policy shock ($\alpha_1 + \beta_1$) on the highest decile value portfolio is 0.79%, while its effect on the lowest decile (growth) stock is 0.48%, generating a statistically (and economically) significant spread differential of 0.30%. Results for the other deciles generally confirm the trend that the effect of policy shocks on portfolio deciles become progressively stronger as we move from growth to value deciles, though this relationship is not strictly monotonic.

These results corroborate others in the literature (Kontonikas and Kostakis (2013) and Maio (2014). This study further adds to these findings by separating the effects of target rate and forward guidance shocks on the value premium. We find that this premium is primarily driven by target rate shocks rather than forward guidance surprises during the conventional period. As seen in Table 3a, not only is the response of all three spread measures roughly twice as large for target rate shocks than for forward guidance, but the reaction to forward guidance surprises is not statistically significant.

For the unconventional period, we find that policy shocks have a significantly more pronounced impact on all portfolio returns relative to the conventional period, particularly for value stocks. Forward guidance surprises are by far the most important: they are statistically significant for all book-to-market sorted portfolio returns and their impact is 2-4 times larger than LSAP shocks. More specifically, by summing of coefficient estimates $\beta_1 + \beta_2$ (Table 3a, row 5), we find that a one-standard deviation increase in forward guidance depresses the most value portfolio by 0.75% and the most growth portfolio by 0.51%. In contrast, LSAP shocks do not have a statistically significant impact on the first three growth deciles, though their impact increases dramatically as we move from growth (lowest deciles) to value portfolios (highest deciles).

These results are comparable to Swanson's (2018) who also finds that stock returns respond more to surprise announcements about forward guidance than LSAPs.[18] Similarly, Glick and Leduc (2018) also show that information about the future path of monetary policy tends to move exchange rates by nearly twice as much as surprise LSAP announcements.[19] This does not come as a surprise: as argued by Campbell et al. (2015) and Bundick and Smith (2019), forward guidance shocks have important implications for economic outlook, contributing substantially to improvement in output, consumption and the labor market especially during the post-crisis period. Since asset prices are largely driven by the outlook for the macroeconomy particularly in the near-term, forward guidance announcements are expected to have an outsized impact on stock returns during the ZLB period.

Our estimates also indicate that value stocks react more strongly to LSAP announcements than growth stocks. This is in line with intuitive understanding: value stocks are characterized by high cash flows (relative to their market price) currently and in the near future, whereas growth stocks are expected to realize their cash flows further down the line (Kontonikas and Kostakis (2013)). As the financial crisis deepened and revenues and earnings tumbled, firms relying more heavily on cash flows faced increasingly higher borrowing costs, higher default risk premiums, and a more acute need for external finance to fund current operations at a time when this was the most costly. LSAPs were successful at mitigating these issues: as shown by Gilchrist and Zakrajsek (2013), the asset purchase program of the Federal Reserve was successful at substantially reducing default risk premiums and lowering borrowing costs especially for speculative-grade firms, which experienced a decline in insurance cost three to four more times larger than investment-grade firms. Wu (2018) and Haitsma, Unalmis and de Haan (2016) also find that high-book-to-market (financially constrained) firms react significantly more to LSAP announcements than other firms.

In addition, we find that the response of the value premium to policy shocks has almost doubled during the ZLB relative to the previous period, which suggests that unconventional

[18] Swanson (2018) finds that LSAP announcements do not have a statistically significant impact on aggregate stock returns. Our approach provides a more nuanced set of results, identifying portfolios that are not very sensitive to LSAP announcements (growth deciles) and those that react significantly to them (value portfolios).

[19] Our findings differ partially from Rogers, Scotti and Wright (2014) and Wu (2018) who report a significant impact of LSAP announcements in the stock market, but a negligible one for forward guidance. This divergence is likely attributable to the different measures of policy surprises as well different samples between these studies and ours.

monetary policy is an important risk factor during this time. More specifically, looking at the extreme decile returns, we find that the overall impact of a one-standard deviation unconventional policy shocks ($\beta_1 + \beta_2 + \gamma_1$) is 1.27% for the most value portfolio and 0.65% for the most growth decile, delivering a premium of 0.61%. For comparison, Wright (2012) and Eksi and Tas (2017) find a value premium on the HML Fama-French factor (the differential between value and growth stocks) during the ZLB period of 0.46% and 0.58%, respectively. In addition, unlike the conventional period, both forward guidance and LSAP shocks contribute in an economically and statistically significant way to the value premium, with the contribution almost evenly split between the two factors.

Comparisons pre- and post-ZLB are also instructive as they go to the heart of the debate about the overall effectiveness of monetary policy and the relevance of the credit channel when interest rates are constrained at the zero lower bound. A few studies have argued that unconventional monetary policy may become counterproductive especially in times of crisis when an easing of monetary policy (viewed by the market as a signal of a worsening economic outlook) may lead to a decline in stock prices, (Kontonikas, MacDonald and Saggu (2013), Florackis, Kontonikas and Kostakis (2014)). Others, do not document such a dramatic structural break but find that the impact of monetary policy on stock returns is significantly attenuated during the ZLB era ((Kiley (2014)). In contrast, Kurov and Gu (2016) show that when properly identified, the reaction of stock returns to during the ZLB is larger than pre-ZLB. Similarly, Eksi and Tas (2017) conclude that the effect of monetary policy on the stock market returns increased almost sevenfold during the unconventional period relative to the pre-crisis era.

Our findings show a more nuanced picture on the effectiveness of monetary policy before and after the zero bound and underscore the importance of accounting for the substantial heterogeneity observed in portfolio returns rather than relying on aggregate measures. While we find that the total effect of unconventional monetary policy ($\beta_1 + \beta_2 + \gamma_1$) on book-to-market sorted portfolio returns is larger than conventional shocks ($\alpha_1 + \beta_1$) by a factor of around 1.5, the difference is statistically significant only for value stocks (from decile 6 and up) but not for growth stocks. Moreover, the spread differential across conventional/unconventional periods is relatively large and statistically significant for all three spread measures. Taken together, these results imply that the credit channel of monetary policy is even more relevant

after the zero-lower bound though the increased effectiveness in the transmission process is entirely due to the high sensitivity of some firms (those with high book-to-market ratios) to unconventional monetary surprises, rather than to the sensitivity of the full universe of stocks.

Moving to size-sorted portfolios, our estimates are generally in line with our findings above though there are some notable differences. For the conventional period, our results shown in Table 3b can be summarized as follows. First, similar to the previous results, both target rate and forward guidance surprises have a statistically significant impact on all portfolio deciles with target rate surprises eliciting the largest response. Second, while the sensitivity to forward guidance appears to be decreasing in a fairly monotonic fashion as we move from the smallest market capitalization portfolio (decile 1) to the largest (decile 10), the exposure to target rate shocks is non-monotonic. Specifically, while small stocks are significantly more sensitive to target rate shocks than large cap stocks, the largest response is found for intermediate capitalization stocks, which means that the response displays a u-shaped pattern.[20] Third, the size premium is similar in magnitude to the value premium during this period. These results are broadly in line with the findings of Ehrmann and Fratzscher (2004) and Maio (2014) who also report spread responses of a similar magnitude. Fourth, similar to the book-to-value portfolios, the size premium is driven primarily by target rate shocks, while the impact of forward guidance surprises is smaller in magnitude and not statistically significant.

During the ZLB era, while both forward guidance and LSAP surprises have an economically and statistically significant impact on all portfolios, forward guidance tends to move small stocks more (almost by twice as much as large stocks) while LSAPs have a larger impact on large firms. A possible explanation for this differential impact is related to the sources of financing. Small firms, which tend to be more financially constrained, are also younger, have a smaller ownership base, and are typically less well capitalized than large firms. More importantly, unlike large firms that can easily tap capital markets by issuing bonds or commercial paper, small firms rely primarily on bank debt to finance their operations. However, while LSAPs are found to have a large and significant impact on corporate

[20] These findings are consistent with Thorbecke (1997), Kontonikas and Kostakis (2013) and Maio (2014), who also report a u-shaped pattern of response to monetary policy surprises for size-sorted portfolios.

bond yields (Swanson (2018)), they do not appear to have a large impact on bank lending. (Chang and Song (2014), Ippolito, Ozdagli, and Perez (2018), and Chakraborty, Goldstein, and MacKinlay (2020)). In contrast, forward guidance has proven more successful than LSAP at stimulating bank lending: as argued by Delis et al. (2020), corporate loans spread were substantially reduced as a result of forward guidance announcements, especially for riskier (smaller) firms.[21]

The overall effect of unconventional policy ($\beta_1 + \beta_2 + \gamma_1$) is more pronounced for small stocks (1.22%) than large stocks (0.87%). This means that the size premium continues to be affected by policy shocks in the ZLB era, though unlike book-to-market portfolios where the response of the value premium almost doubled, the size premium appears to have remained nearly identical in magnitude to the conventional period. As expected, the premium is entirely due to forward guidance announcements.

Lastly, comparing estimates before and after the zero bound, we find that while intermediate-sized firms are equally sensitive to conventional and unconventional monetary policy, more extreme portfolios (both large and small stocks) exhibit a much larger sensitivity to unconventional shocks (nearly twice as much). Thus, for size-sorted portfolios, enhancements in the transmission process of monetary policy during the unconventional period seem to have been carried out primarily through changes in asset prices for large and small stocks, and less by intermediate-sized firms.

4.2 Asymmetries

4.2.1 State dependence in the reaction of portfolio returns to policy announcements A large body of work has shown that the reaction of stock returns is state-dependent with regards to economic news (McQueen and Roley (1993)) and monetary policy news (Basistha and Kurov (2008), Kurov (2010), Eijffinger, Mahieu and Raes (2017)). Basistha and Kurov (2008) show that the reaction of stock returns to unexpected target rate changes is significantly stronger during recessions and in periods when credit conditions are tight than during expansions. Kurov (2010) extends the setting to FOMC statements and finds that

[21] These results differ partially from Wu (2018), who detects a credit channel effect from LSAPs, but not from forward guidance or MEP. However, that study follows a somewhat ad-hoc approach in classifying unconventional announcements as mainly LSAP or forward guidance, which may produce noisy estimates due to the limited number of observations in each category, especially for forward guidance and MEP events included in that study.

indications of a higher path of future policy rates lift stock returns during recessions but depress them in good economic times.

We contribute to this literature by examining whether the reaction of portfolio returns to policy announcements exhibits state dependence features during the conventional and unconventional periods and whether there are discernible differences between the two periods. Following Basistha and Kurov (2008), we use two proxies for the state of the economy a) the Chicago Fed National Activity Index (CFNAI), and b) banks' lending standards (easing/tightening) from the Fed's Senior Loan' Officer Opinion Survey.[22] We estimate the following regression:

$$\begin{aligned} r_t^i &= \alpha_0 + (\alpha_1 TS_t + \beta_1 FG_t) I^{\mathrm{Re}\,c/Tight} + (\alpha_2 TS_t + \beta_2 FG_t)(1 - I^{\mathrm{Re}\,c/Tight}) + \\ &+ I_t^u(\alpha_3 + \beta_3 FG_t + \gamma_1 LSAP_t) I^{\mathrm{Re}\,c/Tight} + I_t^u(\alpha_4 + \beta_4 FG_t + \gamma_2 LSAP_t)(1 - I^{\mathrm{Re}\,c/Tight}) + \varepsilon_t \end{aligned}$$

where $I^{\mathrm{Re}\,c/Tight}$ stands for the indicator variable capturing the state of the economy (recession/expansion) or credit market conditions (tight/ease).

Results are summarized in Tables 4a-4b (for the CFNAI indicator) and 5a-5b (for the bank survey). There is strong evidence that the response of portfolio returns is state dependent with regards to both conventional and unconventional monetary policy. During the conventional period, while a positive target rate shock depresses portfolio returns in both recessions and expansions, the impact is much larger (almost twice as much) during recessions (or when financial conditions are tight). The difference is statistically significant mostly for financially constrained portfolios (value and small stocks). In contrast, forward guidance surprises exhibit an entirely different pattern: a positive forward guidance shock (indication of higher future rates) during a recession (tight credit market conditions) tends to lift stock returns, while the same guidance in expansion depresses them. These results corroborate the findings of Kurov (2010) and Eijffinger, Mahieu and Raes (2017), who also report that indications of higher future rates in recessions have a positive impact on stock returns likely

[22] Similar to Basistha and Kurov (2008), we use the 3-month moving average of the CFNAI and the following threshold: a drop below the -0.7 to indicate a recession and a rise above 0.2 to indicate the end of a recession. For the credit proxy, we develop an indicator variable based on the net percentage of loan officers reporting tightening of credit standards to small and medium commercial borrowers relative to the previous quarter. The indicator assumes a value of unity if the percent of banks tightening standards exceeds 10% and zero otherwise.

because they signal a more upbeat economic outlook. This implies that, prior to the crisis, market participants tended to place more weight on the Fed's assessment of economic outlook during uncertain times (recessions) than on the future stance of monetary policy. We further add to these results by noting that the asymmetric responses to forward guidance shocks are driven primarily by value/small stocks rather than by growth/large stocks.

The impact of forward guidance announcements has shifted dramatically during the unconventional era. First, there appears to be a level shift in behavior: all portfolios react significantly more to forward guidance shocks during recessions (tight credit market conditions) than expansions (ease of credit standards).[23] Second, unlike the conventional period, a future tightening of interest rates signalled by a positive forward guidance shock, significantly depresses portfolio returns in recessions (tight credit markets), particularly for small and value stocks. This indicates that during the crisis (tight market conditions), the implied future stance of monetary policy mattered more to market participants than any potential change in the assessment of economic outlook conveyed by the FOMC statement at the time. One explanation for this phenomenon is that, at the height of the crisis, FOMC communications had less to offer in terms of additional information about the economic outlook (there was widespread consensus on the severity of the recession) and more in terms of what the Fed could do to ease those conditions. LSAP shocks also show a similar pattern: both book-to-market and size-sorted portfolios tend to react in a significant manner only to LSAP shocks during the recession, suggesting that the steps taken by the Federal Reserve during the crisis substantially eased financial conditions.

4.2.2 The impact of positive and negative policy surprises A number of studies have explored whether the effect of surprise tightenings and easings may have a different impact on asset prices. This issue is particularly relevant during the ZLB, since the adoption of unconventional policies during the crisis led to a significant policy easing.

The evidence for this type of asymmetry during the conventional period is mixed: Kuttner (2001) finds little evidence for asymmetry, whereas Ehrmann and Fratzscher (2004) show that

[23] It should be noted that while the shift compared to the conventional period is significant (β_3 is statistically different from β_4), the overall impact of forward guidance shocks during the unconventional period is not asymmetric in a statistically significant sense (when comparing $\beta_1 + \beta_3$ against $\beta_2 + \beta_4$) with the exception of value stocks in the recession/expansion specification.

easing surprises have a larger impact on stock returns than tightening surprises. In contrast, Glick and Leduc (2018) find that surprise tightenings (of both target rate and forward guidance shocks) have a substantially larger effect on the dollar than surprise easings.

The evidence during the ZLB appears to be more unified: Rogers, Scotti and Wright (2014) find that easing shocks have a significantly larger impact on stock returns than tightening surprises. Glick and Leduc (2018) conclude that while easing and tightening forward guidance surprises have roughly the same impact on the dollar, LSAP easing surprises have a substantially larger effect than tightening shocks.

We investigate this type of asymmetry by specifying the following model:

$$r_t^i = \sum_{k=+,-} (\alpha_0 + \alpha_1 TS_t + \beta_1 FG_t) + I_t^u \sum_{k=+,-} (\alpha_2 + \beta_2 FG_t + \gamma_1 LSAP_t) + \varepsilon_t$$

where a positive (negative) surprise means that the Federal Reserve has tightened (eased) more or eased less (tightened less) than expected.[24]

Tables 6a-6b report the results. We find asymmetric responses for both the conventional and unconventional period and a surprisingly large degree of heterogeneous responses among the different portfolios. For example, during the conventional period, a tighter-than-expected target rate shock has a larger and economically significant impact on growth portfolios but elicits a small and a statistically insignificant response from value stocks. In contrast, value stocks are driven primarily by easing (negative) target rate surprises. A different pattern emerges for size-sorted portfolios: tightening surprises appear to have an impact on intermediate-ranked portfolios but not on large and small stocks, while easing surprises have a larger impact on all stocks and particularly on small firms.

In contrast to target rate shocks, the response to forward guidance surprises displays significantly less variability: across all portfolios, tightening shocks (a tighter-than-expected future path of monetary policy) are the only ones that matter in a statistically significant sense and this impact is larger for value and small stocks. Overall, during the conventional period, financially constrained stocks (value and small stocks) appear to have been more deeply affected by easing target rate shocks and by tightening forward guidance surprises.

[24] In interpreting these results, recall that an increase in TS_t, FG_t, and $LSAP_t$, refers to a surprise tightening.

For the unconventional period, we find that only easing shocks matter both forward guidance and LSAPs. This reflects in large part, the simple fact that most unconventional surprises, especially during the financial crisis, have been easing surprises, which renders this type of analysis a bit more challenging during this period. Nonetheless, the results show that during the ZLB, the lift to stock returns from unanticipated expansionary policy is larger than a surprise policy tightening. Asymmetries are also bigger for financially constrained stocks: value stocks respond significantly more than growth stocks to easing forward guidance and LSAP surprises. For size-sorted portfolios, results are a bit more mixed: small stocks respond significantly more to easing forward guidance surprises, while large stocks register a somewhat larger response to easing LSAP shocks.

4.2.3 Market volatility and portfolio responses to monetary policy surprises Unconventional monetary policy was adopted at a time of substantial market turbulence and when the functioning of the market was dramatically impaired. It is possible that the effect of monetary policy on asset prices may be amplified during periods of high market uncertainty as it may mitigate or exacerbate the forces that cause this heightened volatility. For example, Ehrmann and Fratzscher (2004) find that the stock market response to target rate surprises during the conventional period are statistically significant only during periods of high stock market volatility.

In this section, we extend the Ehrmann and Fratzscher (2004) framework to the unconventional period, while also expanding the analysis for the conventional period to include the response of stock market to forward guidance surprises. Following Ehrmann and Fratzscher (2004), we separate the surprises into two subsets depending on whether value of the VIX index over the past 30 days has been low (below the 50th percentile of the overall volatility distribution in the entire sample) or high (above the 50-threshold).[25]

Our findings indicate that for both periods, the response of portfolio returns to policy shocks is substantially higher during periods of high market volatility. In fact, high volatility periods are the only ones that matter in a statistically significant sense, particularly during the ZLB era. While asymmetries are present in the conventional period, they are more

[25] We also experimented with other threshholds such as the 80th and 90th percent cutoff. Our results are broadly in line with the median cut-off and become more asymmetric under more extreme threshholds (such as the 10th vs. the 90th percentile).

pronounced for value and small stocks and especially for forward guidance surprises. However, during the unconventional period, all portfolios react more strongly to both forward guidance and LSAP shocks when market uncertainty is high. These results should be interpreted with some caution: as noted above, unconventional policy measures were put in place during periods of high market volatility, which makes this sort of analysis more difficult in this context. Nonetheless, our overall findings corroborate those of Ehrmann and Fratzscher (2004), indicating that policy actions both in the conventional and unconventional era are substantially more influential during periods of high uncertainty than in normal times.

5. Robustness Analysis

In this section we evaluate the robustness of our benchmark results by carrying out a number of sensitivity analysis. In particular, we assess the role of important unconventional announcements, the importance of the first round of LSAP (LSAP1), excluding intermeetings and speeches, alternative sample partitions between conventional/unconventional periods, robust estimation, and non-nested regressions. Overall, we find that our results are robust to these alternative specifications and that the central message of this study – that the effectiveness of monetary policy has increased during the ZLB primarily via its impact on financially constrained stocks – remains essentially unchanged.

5.1 Important unconventional policy announcements

Some unconventional policy announcements, especially those announcing a new program or a new policy direction, have been more influential than others. For example, dates that announced the first round of LSAPs (or QE1) (November 18, 2008, December 16, 2008 and March 19, 2009) had an enormous impact on financial markets. Likewise, the "taper tantrum" episode in mid-2013 (May 22, 2013 and June 19, 2013) resulted in a large increase in the LSAP factor, as the Fed signalled its intention to wind-down the pace of LSAP purchases. Some key forward rate announcements also stand out: on December 17, 2014, March 18, 2015 and September 17, 2015, the market widely expected the FOMC to signal the commencement of rate hikes, but was surprised when the statements signalled patience and caution in doing so.

As a first robustness check, we examine the extent to which our results are driven by

key announcements, by re-estimating our baseline regressions over a shorter sample based on important unconventional announcements as summarized in Appendices A and B. The sample matches that of Wu (2018). Results are summarized in Tables 8a and 8b. Not surprisingly, we find that the impact of both LSAPs and forward guidance is much larger now for all portfolio returns relative to the full event set. The effect is a bit more pronounced for LSAP shocks as they now appear to have a statistically significant impact also on growth stocks. The value and size premiums are also larger: compared to the conventional period, the value premium is roughly three times as big, while the size premium is 1.5 times larger. Overall, the estimated impact of unconventional policy shocks is roughly twice as large as conventional shocks with this subsample, as opposed to around 1.5 times with the full event set.

5.2 Separating LSAP-1 announcements

Because financial markets were substantially impaired at the height of the financial crisis (late 2008 and early 2009), it is possible that monetary policy measures adopted during this time may have had a substantially different effect than the ones carried out in less uncertain times. Glick and Leduc (2018) find that the impact of policy shocks on the dollar is larger and more persistent during the LSAP-1 phase than in other times during the post-crisis period. We follow their approach and separate LSAP-1 announcements from other announcements, using dummy variables to isolate the impact:

$$r_t^i = \alpha_0 + \alpha_1 TS_t + \beta_1 FG_t + \sum_{i=1}^{2} I_t^u(\alpha_2^i + \beta_2^i FG_t + \gamma_1^i LSAP_t) + \varepsilon_t$$

where α_1 and β_1 are the estimates for the conventional period and β_2^i and γ_1^i reflect the (additional) impact of forward guidance and that of LSAP shocks during the LASP1 phase ($i = 1$) and other announcements ($i = 2$). Results should be interpreted with care since only a handful of observations (a total of five announcements) make up the LSAP-1 subsample (Appendix A).

Table 9a-9b show that the impact of LSAP1 surprises on portfolio returns are much larger than other unconventional policy surprises, though standard errors for this small subset of days are also significantly higher. Specifically, almost all portfolios display an outsized reaction to both LSAPs and forward guidance relative to the baseline results during the

first round of asset purchases, with the response being around three and a half times larger than the conventional period. Nonetheless, our estimates also indicate that, though more muted, unconventional monetary policy has also had a large impact outside of the LSAP-1 period especially for financially constrained stocks, when the response is almost one and a half time larger than during the pre-crisis era. Taken together, these findings imply that although unconventional measures undertaken during the LSAP-1 period were likely the most significant at restoring financial stability, subsequent applications of these measures were also highly effective, especially for value and small stocks.

5.3 Excluding intermeetings and speeches

As discussed in Section 3, our set of policy days includes four unscheduled intermeeting announcements during the conventional period, and seven non-FOMC events during the ZLB (five speeches by chairman Bernanke, one Congressional testimony and the unscheduled announcement of 11/25/2009 which first announced the LSAP program). Unscheduled announcements may affect our baseline results because they tend to occur during periods of heightened uncertainty and are generally larger in magnitude than normal policy surprises. For example, Fleming and Piazzesi (2005) and Farka and DaSilva (2011) find that the response of Treasury rates to conventional (target rate) surprises during unscheduled intermeetings is more attenuated than in normal times, while Glick and Leduc report similar results for the dollar. As argued by Fleming and Piazzesi (2005) a likely explanation for this phenomenon is that intermeeting policy moves are undertaken in response to changes in economic outlook and may contain a larger "signalling" component than normal policy shocks. It is also possible that they may take a longer time to digest given that they occur during periods of high uncertainty.

During the unconventional period the market also became aware of important policy decisions by the Fed, especially related to the LSAP program, not from scheduled FOMC releases but from a number of speeches and Congressional testimony by chairman Bernanke.[26]

[26] For example, in his Jackson Hole address on August 26, 2011, Bernanke promised "...the Fed will do all that it can to help restore high rates of growth and employment," prompting news articles to declare "stocks saw a Ben Bernanke-fueled rally Friday. It looks like they're open to doing QE3" (*CNNMoney*). Similarly, Bernanke's Congressional testimony on May 22, 2003 led to the first outburst of the taper-tantrum, when the chairman stated that "the FOMC will likely slow asset purchases later in 2013 if economy continues to improve". Bloomberg's headline on the news was: "U.S. 10-Year Yield Tops 2% as Bernanke Says Fed May

Table 10a-10b examines the robustness of our benchmark results when removing all the unscheduled announcements (intermeetings, speeches, and the Congressional testimony) from the full data set.

Overall, our results are broadly consistent with the baseline findings, with the largest differences being observed for the conventional period. Specifically, we find that the impact of target rate shocks on all portfolios is higher when intermeeting dates are excluded, while the opposite is true for forward guidance shocks. These results corroborate those of the previous studies discussed above, suggesting that intermeeting announcements embed a large "signaling" component.[27] The removal of these dates means that forward guidance shocks (which tend to impart information over the near-term horizon) now have a smaller impact, while target rate shocks (which generally measure the current setting of policy) generate a larger reaction from portfolio returns.

Changes are less pronounced over the unconventional period with LSAP surprises generating a smaller reaction when important speeches and announcements are excluded, and forward guidance shocks having a slightly larger impact. These findings are attributed to the fact that speeches and announcements occurring outside the regularly scheduled FOMC meetings were particularly focused on the LSAP program as they informed the public about possible new rounds or modifications in asset purchases. Removing these dates from the full set of policy announcements leads to a reduced impact of LSAP shocks on portfolio returns.

5.4 Alternative breaks between conventional/unconventional period

As discussed previously, the separation between the conventional and unconventional period is not very clear-cut, since the Fed signalled its intention to begin asset purchases in November 2008, but interest rates did not hit the zero lower bound until December 16 2008. Our unconventional period starts in November 2008, when the Fed first indicated its plan to launch the LSAP program. However, because the ZLB was not reached until December 16,

Taper Buys."

[27] Intermeeting moves have tended to reveal a weaker-than-expected future economic landscape. For example, the financial press characterized the intermeeting rate cut of January 3 2001 as follows: "...the statement led many economists to believe the Fed continues to be extremely worried about the risk of a recession and that the rate cuts were meant as an insurance policy against such a downturn" (CNNMoney). Likewise, the 50 basis point rate cut of April 18, 2001 was also in response to a weakening outlook: "Officials said they took the extraordinary step of cutting rates between regularly scheduled meetings yet again to combat weakness in corporate and consumer spending and investment" (WSJ).

2008, this means that during three observations in our sample (November 25 2008, December 1 2008 and December 16 2008) both conventional and unconventional polices were in effect.

We follow Glick and Leduc (2018) and continue to consider November 2008 as the start of the unconventional period, but use dummy variables to control for these three announcements.[28] Results shown in Tables 11a-11b indicate that our baseline findings remain largely unaffected by this modification. While the three announcements have a significant impact on most portfolio returns, we find that stock returns, and in particular value and small stocks continue to respond more strongly to unconventional policy shocks relative to conventional shocks, even though this response is a bit smaller than in the baseline. Specifically, while LSAP shocks have a broadly similar impact to the baseline, the effect of forward guidance surprises is somewhat more attenuated both for book-to-market and size-sorted portfolios. A closer inspection reveals that this is largely attributed to the December 16 announcement which did not release important information about the LSAP program (other than signalling that the Fed had more tools to help the economy), but assured the markets that interest rates would remain low "...for some time." Given the important forward-guidance implication of this announcement, it is no surprise that the impact of forwards guidance shocks is smaller once we control for this date. In addition, our estimates show that the December 1st speech had a large negative impact particularly on value and small stocks, but this is likely driven by the fact that on that day the NBER declared that the US economy had entered a recession as far back as December 2007. Overall, while the transition between the conventional and unconventional period cannot be identified with exact precision, our results hold under alternative break dates.

5.5 Robust Regressions

A few policy announcements, particularly those released during times of high uncertainty (such as in the early part of unconventional policy or intermeeting decisions in the conventional era) are characterized by policy shocks that are significantly larger in magnitude relative to ordinary shocks. Since OLS estimates may be sensitive to the excessive influence of these outliers, we re-cast our baseline models using robust regressions. Specifically, we

[28] We also examine the robustness of our results by starting the unconventional period in January 2009 and find that our results are essentially unchanged.

use the MM weighted least squares procedure introduced by Yohai (1987), which maintains robustness in the presence of a large number of outliers.

Tables 12a-12b examine the sensitivity of our results when estimation is carried out with robust regression. We find that our baseline results go through with this alternative estimation. Estimates for the pre-ZLB period are somewhat larger with robust regression (particularly for target rate shocks), while the evidence is a bit more mixed for the unconventional period with forward guidance shocks generating a smaller response, while LSAP shocks a slightly larger one. Overall, though the pre/post ZLB estimates are closer in magnitude now, portfolio returns continue to respond more to policy shocks during the unconventional period relative to the conventional one. Perhaps the most notable difference when compared to the baseline results is that though the spread differential for book-to-market portfolios between extreme deciles is still larger during the unconventional period, the difference relative to the conventional period is no longer significant.

5.6. Non-nested regressions

The above analysis is carried out for the entire set of observations, separating conventional and unconventional periods with dummy variables. As a final robustness test, we estimate the effects of policy surprises on portfolio returns carrying out our regressions for the conventional and unconventional periods separately. Specifically, we estimate the following model for the conventional period

$$r_t^i = \alpha_0 + \alpha_1 TS_t + \beta_1 FG_t + \varepsilon_t$$

and

$$r_t^i = \alpha_2 + \beta_2 FG_t + \gamma_1 LSAP_t + \varepsilon_t$$

for the unconventional period. As in Glick and Leduc (2018), we now compute policy surprises separately for each period, which means that they are orthogonalized and standardized separately for the conventional and unconventional samples. Results displayed in Tables 13a-13b are very similar to our baseline estimates, particularly for target rate shocks during the conventional period and LSAPs during the unconventional sample. Forward guidance results are also fairly close to the baseline estimates, but their impact on portfolio returns is slightly larger now over the conventional sample and slightly smaller during the ZLB. Over-

all, we continue to find that the sensitivity of portfolio returns to monetary policy shocks is larger during the ZLB period compared to the conventional era especially for financially constrained stocks (value and small stocks).

6. Conclusions

This study examines the effectiveness of monetary policy transmission via the credit channel across the conventional period (May 1999 - November 2008) and unconventional period (November 2008 - December 2015). We use an event-study approach, to evaluate the impact of policy surprises during the conventional/unconventional periods on the cross-section of portfolio returns sorted on a few characteristics which tend to capture firms' financial constraints (size, book-to-market). The high degree of heterogeneity in portfolio responses to policy shocks provides a natural laboratory for investigating the effectiveness of the credit channel pre and post financial crisis. We follow Swanson (2018) and compute policy surprises using high-frequency interest rate changes around FOMC announcements. We extract two factors for the conventional period (target rate and forward guidance shocks) and two for the unconventional period (forward guidance and LSAP shocks).

The central message of our empirical results is that the credit channel of monetary policy is even more relevant at the ZLB, which means that monetary policy has become more effective during the unconventional period, though this increased efficacy can be attributed almost entirely to the high sensitivity of financially constrained firms (small and value stocks) to unconventional surprises. LSAP surprises tend to have their largest impact on value and large stocks, while forward guidance surprises on value and small stocks. Though both policy measures used in each period matter for portfolio returns, stocks are significantly more sensitive to target rate shocks than forward guidance surprises during the conventional period (by a factor of around 2), while during the ZLB the largest reaction is found for forward guidance rather than LSAP shocks (by a factor of around 3). The response of the value premium to monetary policy shocks almost doubles in size over the unconventional period driven equally by LSAP and forward guidance surprises, while the reaction of the size premium is almost identical across the two periods and is driven exclusively by forward guidance surprises during the unconventional period and by target rate surprises during the pre-crisis era.

Furthermore, following previous research, this study considers a number of asymmetries and examines whether the response of portfolio returns to policy shocks is asymmetric depending on the state of the economy (recession vs. expansion), the type of policy surprises (positive vs. negative surprises), and the aggregate level of market volatility. In all these cases, we find that monetary policy affects portfolio returns in a strongly asymmetric fashion. Our results for the ZLB show that portfolio returns react significantly more to forward guidance and LSAP shocks when the economy is undergoing a recessions (tight credit market conditions), when policy is accommodative (easing shocks) and when market uncertainty is high. The evidence is a bit more nuanced during the conventional period, but even here we find that policy shocks have a larger impact during recessions (with a positive target rate shock depressing stock returns and forward guidance surprises lifting them) and during periods of high market volatility. In addition, financially constrained stocks (value and small stocks) appear to have been more deeply affected by easing target rate shocks and by tightening forward guidance surprises.

Our findings are robust with respect to a number of extensions and alternative model specifications such as, narrowing the set of unconventional days to important unconventional announcements, assessing the role of the first round of LSAP (LSAP-1), excluding intermeetings and speeches, considering alternative sample partitions between conventional/unconventional periods, estimating robust regressions, and non-nested regressions. The largest departure from our baseline results are found when separating the first round of LSAP from other unconventional announcements as the heightened sensitivity of portfolio returns to policy shocks during the ZLB appears to be largely driven by the implementation of the early stages of the LSAP program at the height of the crisis. Nonetheless, our results are remarkably robust which means that the central message of this study – that the effectiveness of monetary policy transmission through the credit channel has increased during the ZLB primarily via its impact on financially constrained stocks – remains essentially unchanged across these different specifications.

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Table 1
Monetary Policy Surprises Summary Statistics

	Full Sample	*Conventional*	*Unconventional*	*LSAP1*	*LSAP2*	*MEP*	*LSAP3*	*Taper Tantrum*	*Taper Hold*	*Exit*
Target Surprise	**n/a**	**-0.233**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
		(1.000)								
Forward Guidance	**0.004**	**0.067**	**-0.087**	**-0.953**	**0.154**	**0.715**	**-0.084**	**0.453**	**-1.037**	**0.306**
	(1.000)	(1.094)	(0.863)	(1.234)	(0.528)	(0.257)	(0.744)	(0.513)		(0.905)
LSAP	**n/a**	**n/a**	**-0.005**	**-1.474**	**0.551**	**-1.306**	**-0.300**	**1.324**	**-1.705**	**0.079**
			(1.000)	(2.764)	(1.020)	(0.296)	(0.784)	(0.082)		(0.806)
No. Obs.	144	81	63	5	5	2	3	2	1	3

Notes: This table reports summary statistics for the various monetary policy surprises separated over various subsamples and policy dates. Mean values are given in percent and standard errors in parenthesis. Positive values indicate monetary policy tightening. Monetary policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Full sample period is from May 1999 – December 2015; the conventional period from May 1999 – October 2008 and unconventional period from November 2008 – December 2015. Target surprises are normalized to have a unit standard deviation over the conventional period; LSAP surprises over the unconventional period, while forward guidance shocks are normalized over the entire period. Statistics for the various phases of unconventional policy as well as taper-related and exit dates are computed for key announcement days as summarized in Appendix A.

Table 2
Portfolio Returns Summary Statistics

	Lowest decile	*2nd*	*3rd*	*4th*	*5th*	*6th*	*7th*	*8th*	*9th*	*Highest decile*
					Book-to-Market Portfolios					
Full Sample	**0.37**	**0.31**	**0.35**	**0.36**	**0.40**	**0.38**	**0.39**	**0.48**	**0.49**	**0.61**
	(1.08)	(0.99)	(0.95)	(1.04)	(1.20)	(1.13)	(1.22)	(1.54)	(1.51)	(1.68)
Conventional	**0.28**	**0.26**	**0.33**	**0.28**	**0.26**	**0.24**	**0.28**	**0.27**	**0.29**	**0.43**
	(1.04)	(0.96)	(0.93)	(0.93)	(1.05)	(1.01)	(1.15)	(1.22)	(1.18)	(1.25)
Unconventional	**0.48**	**0.38**	**0.38**	**0.46**	**0.58**	**0.56**	**0.53**	**0.75**	**0.72**	**0.85**
	(1.14)	(1.05)	(0.99)	(1.18)	(1.37)	(1.27)	(1.31)	(1.87)	(1.86)	(2.20)
					Size Portfolios					
Full Sample	**0.46**	**0.47**	**0.47**	**0.45**	**0.43**	**0.43**	**0.47**	**0.45**	**0.39**	**0.27**
	(1.19)	(1.25)	(1.35)	(1.37)	(1.39)	(1.42)	(1.46)	(1.41)	(1.40)	(1.02)
Conventional	**0.42**	**0.43**	**0.46**	**0.45**	**0.43**	**0.47**	**0.42**	**0.40**	**0.33**	**0.19**
	(1.03)	(1.08)	(1.25)	(1.27)	(1.26)	(1.27)	(1.26)	(1.21)	(1.16)	(0.75)
Unconventional	**0.48**	**0.49**	**0.49**	**0.45**	**0.44**	**0.42**	**0.50**	**0.48**	**0.45**	**0.39**
	(1.37)	(1.46)	(1.48)	(1.50)	(1.57)	(1.61)	(1.69)	(1.65)	(1.68)	(1.30)

Notes: This table shows summary statistics for decile value-weighted portfolio excess returns sorted by book-to-market value ratio (book-to-market portfolios) and market capitalization (size portfolios). Daily excess returns are computed on policy announcement days. Mean values are given in percent and standard errors in parenthesis. Full sample period is from May 1999 – December 2015; the conventional period from May 1999 – October 2008 and unconventional period from November 2008 – December 2015.

Table 3a
Monetary Policy Surprises and Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.30*****	**-0.33*****	**-0.35*****	**-0.35*****	**-0.42*****	**-0.44*****	**-0.49*****	**-0.46*****	**-0.52*****	**-0.49*****	**-0.20****	**-0.19****	**-0.16****
	(0.100)	(0.120)	(0.115)	(0.109)	(0.114)	(0.119)	(0.122)	(0.124)	(0.128)	(0.132)	(0.099)	(0.096)	(0.082)
(2) FG (β_1)	**-0.18****	**-0.19****	**-0.20****	**-0.16***	**-0.16***	**-0.22****	**-0.19****	**-0.22****	**-0.25****	**-0.30****	**-0.12**	**-0.09**	**-0.07**
	(0.090)	(0.089)	(0.092)	(0.087)	(0.089)	(0.101)	(0.092)	(0.112)	(0.122)	(0.126)	(0.096)	(0.092)	(0.087)
(3) I^U * FG (β_2)	**-0.33*****	**-0.38*****	**-0.33*****	**-0.38*****	**-0.46*****	**-0.49*****	**-0.53*****	**-0.56*****	**-0.52*****	**-0.48*****	**-0.16**	**-0.15**	**-0.18**
	(0.114)	(0.109)	(0.121)	(0.134)	(0.130)	(0.128)	(0.132)	(0.141)	(0.131)	(0.147)	(0.118)	(0.101)	(0.105)
(4) I^U * LSAP (γ_1)	**-0.14**	**-0.18**	**-0.18**	**-0.15***	**-0.15****	**-0.22****	**-0.28****	**-0.33*****	**-0.39*****	**-0.48*****	**-0.34*****	**-0.28*****	**-0.23*****
	(0.098)	(0.110)	(0.111)	(0.088)	(0.077)	(0.098)	(0.119)	(0.121)	(0.130)	(0.158)	(0.099)	(0.091)	(0.087)
(5) $\beta_1 + \beta_2$	**-0.51*****	**-0.57*****	**-0.54*****	**-0.55*****	**-0.62*****	**-0.72*****	**-0.72*****	**-0.78*****	**-0.77*****	**-0.79*****	**-0.28*****	**-0.24*****	**-0.24*****
	(0.078)	(0.078)	(0.092)	(0.094)	(0.090)	(0.095)	(0.087)	(0.097)	(0.091)	(0.094)	(0.080)	(0.079)	(0.085)
(6) $\alpha_1 + \beta_1$	**-0.48*****	**-0.53*****	**-0.55*****	**-0.51*****	**-0.58*****	**-0.67*****	**-0.68*****	**-0.68*****	**-0.77*****	**-0.80*****	**-0.31****	**-0.28****	**-0.23***
	(0.138)	(0.152)	(0.150)	(0.142)	(0.148)	(0.159)	(0.156)	(0.171)	(0.181)	(0.187)	(0.141)	(0.135)	(0.122)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-0.65*****	**-0.74*****	**-0.71*****	**-0.70*****	**-0.77*****	**-0.94*****	**-1.00*****	**-1.11*****	**-1.16*****	**-1.27*****	**-0.61*****	**-0.52*****	**-0.48*****
	(0.120)	(0.128)	(0.140)	(0.130)	(0.120)	(0.135)	(0.140)	(0.150)	(0.150)	(0.170)	(0.123)	(0.118)	(0.120)
(8) Post/Pre ZLB	**-0.17**	**-0.22**	**-0.16**	**-0.19**	**-0.19**	**-0.27***	**-0.32****	**-0.43****	**-0.39****	**-0.47****	**-0.30****	**-0.24***	**-0.24***
	(0.139)	(0.158)	(0.166)	(0.151)	(0.147)	(0.166)	(0.163)	(0.173)	(0.179)	(0.189)	(0.141)	(0.143)	(0.139)
Line 7/Line 6	1.4	1.4	1.3	1.4	1.3	1.4	1.5	1.6	1.5	1.6	2.0	1.8	2.1

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 3b
Monetary Policy Surprises and Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.43***** (0.118)	**-0.49***** (0.125)	**-0.61***** (0.136)	**-0.65***** (0.137)	**-0.63***** (0.141)	**-0.56***** (0.138)	**-0.43***** (0.122)	**-0.37***** (0.125)	**-0.32**** (0.134)	**-0.25**** (0.109)	**-0.18*** (0.101)	**-0.18*** (0.105)	**-0.20**** (0.098)
(2) FG (β_1)	**-0.33***** (0.106)	**-0.31***** (0.113)	**-0.30**** (0.123)	**-0.28**** (0.124)	**-0.30**** (0.127)	**-0.29**** (0.133)	**-0.26*** (0.134)	**-0.22*** (0.123)	**-0.21*** (0.124)	**-0.19*** (0.098)	**-0.14** (0.086)	**-0.12** (0.082)	**-0.10** (0.077)
(3) I^U * FG (β_2)	**-0.63***** (0.162)	**-0.70***** (0.167)	**-0.56***** (0.161)	**-0.63***** (0.154)	**-0.57***** (0.153)	**-0.52***** (0.148)	**-0.43***** (0.149)	**-0.38***** (0.140)	**-0.34**** (0.152)	**-0.33**** (0.128)	**-0.30***** (0.111)	**-0.33***** (0.110)	**-0.28***** (0.103)
(4) I^U * LSAP (γ_1)	**-0.27**** (0.108)	**-0.25**** (0.116)	**-0.23*** (0.128)	**-0.22*** (0.130)	**-0.27**** (0.134)	**-0.28**** (0.142)	**-0.31**** (0.133)	**-0.30**** (0.121)	**-0.38***** (0.123)	**-0.36***** (0.098)	**0.09** (0.070)	**0.11** (0.079)	**0.10** (0.076)
(5) $\beta_1 + \beta_2$	**-0.95***** (0.121)	**-1.00***** (0.125)	**-0.86***** (0.120)	**-0.91***** (0.114)	**-0.87***** (0.114)	**-0.82***** (0.111)	**-0.69***** (0.107)	**-0.60***** (0.095)	**-0.55***** (0.105)	**-0.51***** (0.094)	**-0.44***** (0.085)	**-0.45***** (0.084)	**-0.39***** (0.078)
(6) $\alpha_1 + \beta_1$	**-0.76***** (0.162)	**-0.79***** (0.172)	**-0.91***** (0.187)	**-0.93***** (0.189)	**-0.93***** (0.194)	**-0.86***** (0.195)	**-0.69***** (0.185)	**-0.59***** (0.180)	**-0.53***** (0.186)	**-0.44***** (0.150)	**-0.32**** (0.135)	**-0.29**** (0.135)	**-0.30**** (0.127)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-1.22***** (0.163)	**-1.25***** (0.171)	**-1.09***** (0.173)	**-1.13***** (0.169)	**-1.15***** (0.172)	**-1.10***** (0.173)	**-1.00***** (0.165)	**-0.90***** (0.148)	**-0.94***** (0.157)	**-0.87***** (0.134)	**-0.35***** (0.112)	**-0.33***** (0.115)	**-0.29***** (0.108)
(8) Post/Pre ZLB	**-0.46***** (0.183)	**-0.46**** (0.194)	**-0.18*** (0.202)	**-0.20** (0.201)	**-0.21** (0.205)	**-0.24** (0.205)	**-0.30** (0.188)	**-0.30** (0.175)	**-0.41**** (0.185)	**-0.43**** (0.158)	**-0.03** (0.140)	**-0.04** (0.144)	**0.01** (0.135)
Line 7/Line 6	1.6	1.6	1.2	1.2	1.2	1.3	1.4	1.5	1.8	2.0	1.1	1.1	1.0

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^1 - d^{10}$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^1 + d^2) - \frac{1}{2}(d^{10} + d^9)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^1 + d^2 + d^3) - \frac{1}{3}(d^{10} + d^9 + d^8)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 4a
Asymmetries: Business Cycle and the Response of Book-to-Market Portfolios to Monetary Policy Surprises

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) I^{Rec} * TS (α_1)	**-0.51*****	**-0.53*****	**-0.52*****	**-0.47*****	**-0.58*****	**-0.59*****	**-0.62*****	**-0.58*****	**-0.73*****	**-0.75*****
	(0.154)	(0.143)	(0.137)	(0.152)	(0.157)	(0.154)	(0.173)	(0.192)	(0.197)	(0.202)
(2) I^{Exp} * TS (α_2)	**-0.16**	**-0.20**	**-0.24***	**-0.30***	**-0.30***	**-0.33****	**-0.33****	**-0.33***	**-0.28***	**-0.30**
	(0.163)	(0.148)	(0.140)	(0.159)	(0.166)	(0.163)	(0.169)	(0.179)	(0.172)	(0.182)
(3) I^{Rec} * FG (β_1)	**0.30**	**0.28**	**0.33****	**0.36****	**0.38****	**0.41****	**0.50****	**0.51****	**0.50****	**0.58****
	(0.192)	(0.186)	(0.168)	(0.188)	(0.196)	(0.192)	(0.218)	(0.244)	(0.251)	(0.258)
(4) I^{Exp} * FG (β_2)	**-0.28****	**-0.25****	**-0.32****	**-0.22**	**-0.26***	**-0.27***	**-0.19**	**-0.21**	**-0.26**	**-0.37***
	(0.139)	(0.128)	(0.123)	(0.136)	(0.141)	(0.139)	(0.156)	(0.172)	(0.177)	(0.199)
(5) I^{U} * I^{Rec} * FG (β_3)	**-0.97*****	**-0.92*****	**-0.96*****	**-0.88*****	**-1.09*****	**-0.96*****	**-0.93*****	**-1.37*****	**-1.57*****	**-1.48*****
	(0.275)	(0.247)	(0.233)	(0.269)	(0.282)	(0.276)	(0.263)	(0.294)	(0.298)	(0.338)
(6) I^{U} * I^{Exp}* FG (β_4)	**-0.13**	**-0.04**	**0.02**	**-0.02**	**0.01**	**0.00**	**-0.18**	**-0.05**	**0.15**	**0.31**
	(0.204)	(0.186)	(0.176)	(0.200)	(0.208)	(0.204)	(0.233)	(0.246)	(0.237)	(0.283)
(7) I^{U} * I^{Rec} * LSAP (γ_1)	**-0.31**	**-0.35***	**-0.38****	**-0.36***	**-0.33***	**-0.48****	**-0.53****	**-0.56****	**-0.65*****	**-0.97*****
	(0.196)	(0.182)	(0.174)	(0.193)	(0.200)	(0.197)	(0.220)	(0.244)	(0.251)	(0.281)
(8) I^{U} * I^{Exp} * LSAP (γ_2)	**0.18**	**0.20**	**0.18**	**0.26**	**0.27**	**0.25**	**0.17**	**0.39**	**0.37**	**0.44**
	(0.220)	(0.204)	(0.195)	(0.217)	(0.225)	(0.221)	(0.247)	(0.274)	(0.282)	(0.316)
(9) $\alpha_1 - \alpha_2$	**-0.35**	**-0.33**	**-0.28**	**-0.17**	**-0.28**	**-0.26**	**-0.29**	**-0.25**	**-0.44***	**-0.45***
	(0.222)	(0.203)	(0.193)	(0.218)	(0.227)	(0.222)	(0.239)	(0.260)	(0.259)	(0.269)
(10) $\beta_1 - \beta_2$	**0.58****	**0.54****	**0.65*****	**0.58****	**0.63****	**0.67*****	**0.69****	**0.72****	**0.77****	**0.95*****
	(0.241)	(0.230)	(0.212)	(0.237)	(0.246)	(0.242)	(0.272)	(0.304)	(0.313)	(0.332)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**-0.26**	**-0.35**	**-0.33**	**-0.28**	**-0.47**	**-0.29**	**-0.07**	**-0.60**	**-0.95****	**-0.83****
	(0.336)	(0.310)	(0.288)	(0.329)	(0.344)	(0.337)	(0.351)	(0.384)	(0.374)	(0.401)
(12) $\gamma_1 - \gamma_2$	**-0.49***	**-0.54****	**-0.56****	**-0.61****	**-0.60****	**-0.73****	**-0.70****	**-0.95*****	**-1.02*****	**-1.41*****
	(0.295)	(0.274)	(0.262)	(0.291)	(0.301)	(0.296)	(0.332)	(0.367)	(0.378)	(0.424)

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises over recession and expansion periods during conventional/unconventional samples. I^{Rec} / I^{Exp} is a dummy variable based on the CFNAI index (a value less than -0.7 indicates recession and greater than 0.2, expansion). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 4b
Asymmetries: Business Cycle and the Response of Size Portfolios to Monetary Policy Surprises

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) I^{Rec} * TS (α_1)	**-0.68***** (0.168)	**-0.73***** (0.179)	**-0.87***** (0.192)	**-0.92**** (0.193)	**-0.87***** (0.199)	**-0.70***** (0.208)	**-0.54***** (0.202)	**-0.50**** (0.196)	**-0.39**** (0.191)	**-0.31**** (0.163)
(2) I^{Exp} * TS (α_2)	**-0.28*** (0.171)	**-0.31*** (0.185)	**-0.37*** (0.202)	**-0.35*** (0.204)	**-0.35*** (0.211)	**-0.38*** (0.223)	**-0.30** (0.242)	**-0.25** (0.239)	**-0.22** (0.238)	**-0.21** (0.164)
(3) I^{Rec} * FG (β_1)	**0.49**** (0.191)	**0.41**** (0.206)	**0.43*** (0.224)	**0.43*** (0.226)	**0.39*** (0.234)	**0.32*** (0.246)	**0.28** (0.265)	**0.32** (0.262)	**0.24** (0.261)	**0.13** (0.184)
(4) I^{Exp} * FG (β_2)	**-0.41***** (0.151)	**-0.36**** (0.161)	**-0.42**** (0.173)	**-0.39**** (0.174)	**-0.41**** (0.179)	**-0.45**** (0.187)	**-0.43**** (0.200)	**-0.34*** (0.198)	**-0.35*** (0.197)	**-0.29*** (0.146)
(5) I^{U} * I^{Rec} * FG (β_3)	**-1.35***** (0.210)	**-1.20***** (0.235)	**-1.07***** (0.267)	**-1.09***** (0.271)	**-1.00***** (0.284)	**-0.95***** (0.307)	**-0.91***** (0.340)	**-0.67**** (0.335)	**-0.53**** (0.263)	**-0.58**** (0.296)
(6) I^{U} * I^{Exp} * FG (β_4)	**-0.38*** (0.196)	**-0.50**** (0.213)	**-0.44*** (0.233)	**-0.41*** (0.236)	**-0.36** (0.245)	**-0.26** (0.259)	**-0.16** (0.281)	**-0.22** (0.277)	**-0.18** (0.276)	**-0.21** (0.187)
(7) I^{U} * I^{Rec} * LSAP (γ_1)	**-0.25*** (0.134)	**-0.28*** (0.148)	**-0.26*** (0.154)	**-0.31**** (0.156)	**-0.36**** (0.163)	**-0.36**** (0.175)	**-0.39**** (0.192)	**-0.37**** (0.190)	**-0.47**** (0.189)	**-0.47**** (0.157)
(8) I^{U} * I^{Exp} * LSAP (γ_2)	**-0.01** (0.234)	**-0.08** (0.196)	**-0.01** (0.214)	**0.14** (0.217)	**0.09** (0.225)	**0.19** (0.238)	**0.16** (0.257)	**0.13** (0.254)	**0.15** (0.254)	**0.19** (0.233)
(9) $\alpha_1 - \alpha_2$	**-0.40*** (0.237)	**-0.42*** (0.255)	**-0.50**** (0.276)	**-0.57*** (0.278)	**-0.52** (0.287)	**-0.32** (0.302)	**-0.25** (0.312)	**-0.25** (0.306)	**-0.17** (0.302)	**-0.10** (0.228)
(10) $\beta_1 - \beta_2$	**0.91***** (0.249)	**0.77***** (0.266)	**0.85***** (0.288)	**0.82***** (0.290)	**0.80***** (0.300)	**0.77**** (0.315)	**0.71**** (0.338)	**0.66**** (0.334)	**0.60*** (0.333)	**0.42*** (0.239)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**-0.06** (0.290)	**0.07** (0.319)	**0.23** (0.355)	**0.14** (0.359)	**0.16** (0.375)	**0.07** (0.400)	**-0.05** (0.438)	**0.20** (0.432)	**0.25** (0.391)	**0.04** (0.338)
(12) $\gamma_1 - \gamma_2$	**-0.24** (0.270)	**-0.20** (0.246)	**-0.25** (0.265)	**-0.45*** (0.267)	**-0.45** (0.278)	**-0.55*** (0.295)	**-0.55*** (0.322)	**-0.50** (0.318)	**-0.61*** (0.317)	**-0.66**** (0.281)

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises over recession and expansion periods during conventional/unconventional samples. I^{Rec} / I^{Exp} is a dummy variable based on the CFNAI index (a value less than -0.7 indicates recession and greater than 0.2, expansion). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 5a

Asymmetries: Credit Market Conditions and the Response of Book-to-Market Portfolios to Monetary Policy Surprises

	(i) Lowest decile	*(ii)* 2nd	*(iii)* 3rd	*(iv)* 4th	*(v)* 5th	*(vi)* 6th	*(vii)* 7th	*(viii)* 8th	*(ix)* 9th	*(x)* Highest Decile
(1) I^{Tight} * TS (α_1)	**-0.57*****	**-0.51*****	**-0.65*****	**-0.89*****	**-0.80*****	**-0.69*****	**-0.70*****	**-0.74*****	**-0.86*****	**-0.76*****
	(0.130)	(0.119)	(0.114)	(0.121)	(0.129)	(0.126)	(0.140)	(0.155)	(0.163)	(0.174)
(2) I^{Ease} * TS (α_2)	**-0.28****	**-0.31*****	**-0.33*****	**-0.31****	**-0.42*****	**-0.36*****	**-0.36****	**-0.37****	**-0.34****	**-0.32***
	(0.130)	(0.119)	(0.114)	(0.121)	(0.129)	(0.126)	(0.140)	(0.155)	(0.163)	(0.184)
(3) I^{Tight}* FG (β_1)	**0.27***	**0.21**	**0.28****	**0.32****	**0.33****	**0.38****	**0.37****	**0.40****	**0.39****	**0.48****
	(0.158)	(0.145)	(0.138)	(0.148)	(0.156)	(0.153)	(0.170)	(0.188)	(0.198)	(0.223)
(4) I^{Ease} * FG (β_2)	**-0.34**	**-0.38****	**-0.44****	**-0.46****	**-0.44****	**-0.49****	**-0.42***	**-0.48***	**-0.54****	**-0.58****
	(0.211)	(0.193)	(0.185)	(0.197)	(0.209)	(0.205)	(0.227)	(0.251)	(0.264)	(0.280)
(5) I^{U} * I^{Tight} * FG (β_3)	**-0.68****	**-0.57****	**-0.66****	**-0.68****	**-0.71****	**-0.69****	**-0.75****	**-1.15*****	**-0.95****	**-0.97****
	(0.307)	(0.278)	(0.263)	(0.284)	(0.304)	(0.297)	(0.335)	(0.376)	(0.397)	(0.416)
(6) I^{U} * I^{Ease} * FG (β_4)	**-0.09**	**0.00**	**0.10**	**0.16**	**0.01**	**0.15**	**-0.10**	**0.10**	**0.12**	**0.20**
	(0.299)	(0.275)	(0.262)	(0.280)	(0.296)	(0.290)	(0.323)	(0.336)	(0.317)	(0.354)
(7) I^{U} * I^{Tight} * LSAP (γ_1)	**-0.32**	**-0.42****	**-0.40****	**-0.41****	**-0.40***	**-0.54*****	**-0.56****	**-0.60****	**-0.77*****	**-1.09*****
	(0.208)	(0.191)	(0.182)	(0.194)	(0.206)	(0.202)	(0.224)	(0.248)	(0.260)	(0.259)
(8) I^{U} * I^{Ease}* LSAP (γ_2)	**0.19**	**0.21**	**0.17**	**0.26**	**0.27**	**0.26**	**0.16**	**0.38**	**0.37**	**0.42**
	(0.232)	(0.213)	(0.203)	(0.217)	(0.230)	(0.225)	(0.250)	(0.277)	(0.290)	(0.283)
(9) $\alpha_1 - \alpha_2$	**-0.29**	**-0.21**	**-0.32****	**-0.58*****	**-0.38****	**-0.33***	**-0.33***	**-0.37***	**-0.51****	**-0.44***
	(0.179)	(0.164)	(0.157)	(0.167)	(0.177)	(0.174)	(0.193)	(0.213)	(0.224)	(0.246)
(10) $\beta_1 - \beta_2$	**0.61*****	**0.59****	**0.72*****	**0.77*****	**0.77*****	**0.87*****	**0.80*****	**0.89*****	**0.93*****	**1.06*****
	(0.264)	(0.243)	(0.232)	(0.247)	(0.262)	(0.257)	(0.285)	(0.316)	(0.331)	(0.360)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**0.02**	**0.02**	**-0.03**	**-0.06**	**0.05**	**0.04**	**0.15**	**-0.37**	**-0.14**	**-0.11**
	(0.371)	(0.334)	(0.315)	(0.342)	(0.367)	(0.358)	(0.407)	(0.446)	(0.453)	(0.487)
(12) $\gamma_1 - \gamma_2$	**-0.51**	**-0.63****	**-0.57****	**-0.67****	**-0.67****	**-0.80*****	**-0.72****	**-0.98*****	**-1.14*****	**-1.51*****
	(0.312)	(0.287)	(0.273)	(0.292)	(0.309)	(0.303)	(0.337)	(0.372)	(0.391)	(0.385)

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises over periods of tightening/easing credit standards during conventional/unconventional samples. I^{Tight} / I^{Ease} is a dummy variable based on the Fed's Senior Loan Officer Opinion Survey (indicator assumes a value of one if the percent of banks tightening standards exceeds 10% and zero otherwise). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 5b
Asymmetries: Credit Market Conditions and the Response of Size Portfolios to Monetary Policy Surprises

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) I^{Tight} * TS (α_1)	**-0.54*****	**-0.57*****	**-0.64*****	**-0.69*****	**-0.70*****	**-0.68*****	**-0.56*****	**-0.48*****	**-0.39****	**-0.25***
	(0.139)	(0.146)	(0.157)	(0.159)	(0.162)	(0.168)	(0.179)	(0.177)	(0.158)	(0.132)
(2) I^{Ease} * TS (α_2)	**-0.39*****	**-0.39****	**-0.35***	**-0.36***	**-0.37***	**-0.26**	**-0.19**	**-0.23**	**-0.17**	**-0.16**
	(0.128)	(0.152)	(0.192)	(0.203)	(0.213)	(0.246)	(0.185)	(0.153)	(0.150)	(0.108)
(3) I^{Tight}* FG (β_1)	**0.46*****	**0.42****	**0.44****	**0.36***	**0.39***	**0.32**	**0.28**	**0.26**	**0.18**	**0.13**
	(0.168)	(0.178)	(0.191)	(0.193)	(0.197)	(0.204)	(0.218)	(0.215)	(0.214)	(0.160)
(4) I^{Ease} * FG (β_2)	**-0.62*****	**-0.60*****	**-0.66*****	**-0.57*****	**-0.59*****	**-0.61*****	**-0.59****	**-0.46***	**-0.44***	**-0.28***
	(0.175)	(0.187)	(0.205)	(0.207)	(0.213)	(0.222)	(0.241)	(0.237)	(0.236)	(0.164)
(5) I^{U} * I^{Tight} * FG (β_3)	**-1.00*****	**-0.87*****	**-0.76*****	**-0.66*****	**-0.49****	**-0.44****	**-0.39***	**-0.35***	**-0.35***	**-0.28***
	(0.191)	(0.201)	(0.216)	(0.188)	(0.193)	(0.201)	(0.217)	(0.213)	(0.213)	(0.151)
(6) I^{U} * I^{Ease}* FG (β_4)	**-0.27**	**-0.28**	**-0.24**	**-0.26**	**-0.22**	**-0.25**	**-0.14**	**-0.12**	**-0.15**	**-0.14**
	0.239	0.257	0.282	0.285	0.294	0.307	0.333	0.327	0.326	0.223
(7) I^{U} * I^{Tight} * LSAP (γ_1)	**-0.31***	**-0.34***	**-0.39***	**-0.38***	**-0.49****	**-0.49****	**-0.40***	**-0.49****	**-0.58****	**-0.58*****
	(0.172)	(0.184)	(0.201)	(0.204)	(0.209)	(0.218)	(0.237)	(0.233)	(0.232)	(0.161)
(8) I^{U} * I^{Ease}* LSAP (γ_2)	**0.03**	**0.08**	**0.05**	**0.14**	**0.05**	**0.20**	**0.30**	**0.16**	**0.17**	**0.02**
	(0.247)	(0.261)	(0.280)	(0.283)	(0.290)	(0.300)	(0.320)	(0.316)	(0.315)	(0.236)
(9) $\alpha_1 - \alpha_2$	**-0.15**	**-0.18**	**-0.29**	**-0.33**	**-0.34**	**-0.42**	**-0.37**	**-0.25**	**-0.22**	**-0.09**
	(0.184)	(0.206)	(0.242)	(0.252)	(0.262)	(0.292)	(0.251)	(0.228)	(0.211)	(0.166)
(10) $\beta_1 - \beta_2$	**1.09*****	**1.02*****	**1.10*****	**0.93*****	**0.97*****	**0.93*****	**0.87*****	**0.72****	**0.63****	**0.41***
	(0.244)	(0.260)	(0.281)	(0.285)	(0.292)	(0.303)	(0.327)	(0.321)	(0.321)	(0.231)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**0.36**	**0.43**	**0.58**	**0.53**	**0.70**	**0.73**	**0.62**	**0.48**	**0.43**	**0.27**
	(0.384)	(0.409)	(0.444)	(0.437)	(0.448)	(0.467)	(0.505)	(0.496)	(0.495)	(0.348)
(12) $\gamma_1 - \gamma_2$	**-0.34**	**-0.43**	**-0.44**	**-0.52**	**-0.54**	**-0.68***	**-0.69***	**-0.65***	**-0.75***	**-0.60****
	(0.302)	(0.320)	(0.346)	(0.350)	(0.358)	(0.372)	(0.399)	(0.393)	(0.392)	(0.286)

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises over periods of tightening/easing credit standards during conventional/unconventional samples. I^{Tight} / I^{Ease} is a dummy variable based on the Fed's Senior Loan Officer Opinion Survey (indicator assumes a value of one if the percent of banks tightening standards exceeds 10% and zero otherwise). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 6a
Asymmetries: Positive and Negative Policy Surprises and Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) TS^+ (α_1)	**-0.59***** (0.171)	**-0.64***** (0.182)	**-0.62***** (0.229)	**-0.58**** (0.281)	**-0.63**** (0.321)	**-0.37** (0.262)	**-0.32** (0.224)	**-0.18** (0.182)	**-0.19** (0.176)	**-0.15** (0.165)
(2) TS^- (α_2)	**-0.20** (0.145)	**-0.19** (0.148)	**-0.35***** (0.130)	**-0.40***** (0.139)	**-0.45***** (0.145)	**-0.48***** (0.143)	**-0.55***** (0.138)	**-0.59***** (0.115)	**-0.63***** (0.126)	**-0.59***** (0.122)
(3) FG^+ (β_1)	**-0.41**** (0.170)	**-0.44**** (0.187)	**-0.40**** (0.179)	**-0.41**** (0.193)	**-0.38**** (0.192)	**-0.57***** (0.198)	**-0.52**** (0.219)	**-0.56**** (0.245)	**-0.58**** (0.237)	**-0.62**** (0.278)
(4) FG^- (β_2)	**0.13** (0.193)	**0.08** (0.206)	**0.13** (0.206)	**0.23** (0.222)	**0.22** (0.232)	**0.29** (0.228)	**0.25** (0.215)	**0.35** (0.282)	**0.31** (0.297)	**0.33** (0.303)
(5) $I^U * FG^+$ (β_3)	**0.22** (0.328)	**0.33** (0.358)	**0.37** (0.339)	**0.57** (0.370)	**0.57** (0.389)	**0.60** (0.381)	**0.60** (0.428)	**0.75** (0.483)	**0.87** (0.571)	**0.88** (0.580)
(6) $I^U * FG^-$ (β_4)	**-0.92***** (0.339)	**-0.95***** (0.315)	**-0.83***** (0.301)	**-1.03***** (0.325)	**-1.05***** (0.340)	**-1.17***** (0.334)	**-1.22***** (0.369)	**-1.49***** (0.412)	**-1.37***** (0.434)	**-1.43***** (0.459)
(7) $I^U * LSAP^+$ (γ_1)	**0.22** (0.208)	**0.19** (0.232)	**0.22** (0.246)	**0.23** (0.222)	**0.22** (0.215)	**0.19** (0.202)	**0.26** (0.201)	**0.29** (0.245)	**0.22** (0.247)	**0.24** (0.253)
(8) $I^U * LSAP^-$ (γ_2)	**-0.26**** (0.118)	**-0.32***** (0.117)	**-0.32***** (0.109)	**-0.29**** (0.123)	**-0.30**** (0.132)	**-0.34***** (0.128)	**-0.37**** (0.149)	**-0.42**** (0.175)	**-0.48***** (0.188)	**-0.66***** (0.219)
(9) $\alpha_1 - \alpha_2$	**-0.40** (0.249)	**-0.45*** (0.258)	**-0.27** (0.286)	**-0.19** (0.338)	**-0.19** (0.377)	**0.10** (0.323)	**0.22** (0.290)	**0.41*** (0.246)	**0.43*** (0.248)	**0.44*** (0.241)
(10) $\beta_1 - \beta_2$	**-0.55*** (0.315)	**-0.52** (0.331)	**-0.53*** (0.324)	**-0.64*** (0.349)	**-0.61*** (0.359)	**-0.86**** (0.358)	**-0.77**** (0.370)	**-0.91**** (0.443)	**-0.90**** (0.454)	**-0.95*** (0.494)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**0.59** (0.434)	**0.76** (0.456)	**0.67** (0.438)	**0.96**** (0.475)	**1.02**** (0.495)	**0.91*** (0.488)	**1.05**** (0.531)	**1.33**** (0.611)	**1.35**** (0.680)	**1.35*** (0.698)
(12) $\gamma_1 - \gamma_2$	**0.49*** (0.295)	**0.51** (0.312)	**0.54*** (0.319)	**0.52*** (0.308)	**0.52*** (0.308)	**0.54*** (0.294)	**0.63**** (0.311)	**0.72*** (0.369)	**0.71*** (0.382)	**0.90**** (0.415)

Notes: This table show the response of book-to-market excess portfolio returns to easing and tightening policy surprises during conventional/unconventional periods. + /- indicates positive/negative surprises: i.e. monetary policy tightening (tightening more/easing less than expected) and easing (tightening less/ easing more than expected). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 6b
Asymmetries: Positive and Negative Policy Surprises and Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) TS$^+$ (α_1)	**-0.46**	**-0.52***	**-0.64***	**-0.68*****	**-0.50***	**-0.57****	**-0.47****	**-0.40***	**-0.32**	**-0.28**
	(0.304)	(0.304)	(0.344)	(0.253)	(0.263)	(0.278)	(0.230)	(0.240)	(0.226)	(0.208)
(2) TS$^-$ (α_2)	**-0.58*****	**-0.64*****	**-0.86*****	**-0.82*****	**-0.88*****	**-0.95*****	**-0.76*****	**-0.67*****	**-0.49*****	**-0.28****
	(0.156)	(0.164)	(0.176)	(0.178)	(0.181)	(0.188)	(0.198)	(0.169)	(0.154)	(0.135)
(3) FG$^+$ (β_1)	**-0.63*****	**-0.65*****	**-0.77*****	**-0.68*****	**-0.77*****	**-0.73*****	**-0.71*****	**-0.60*****	**-0.57*****	**-0.43*****
	(0.192)	(0.218)	(0.243)	(0.247)	(0.252)	(0.261)	(0.274)	(0.226)	(0.207)	(0.180)
(4) FG$^-$ (β_2)	**0.22**	**0.24**	**0.29**	**0.21**	**0.28**	**0.25**	**0.30**	**0.22**	**0.18**	**0.10**
	(0.204)	(0.243)	(0.281)	(0.285)	(0.290)	(0.301)	(0.316)	(0.311)	(0.312)	(0.173)
(5) I^U * FG$^+$ (β_3)	**0.37**	**0.40**	**0.48**	**0.37**	**0.55**	**0.62**	**0.59**	**0.55**	**0.63**	**0.48**
	(0.362)	(0.387)	(0.421)	(0.429)	(0.439)	(0.460)	(0.488)	(0.478)	(0.481)	(0.459)
(6) I^U * FG$^-$ (β_4)	**-1.49*****	**-1.45*****	**-1.37*****	**-1.40*****	**-1.43*****	**-1.37*****	**-1.38*****	**-1.27*****	**-1.13****	**-0.94*****
	(0.365)	(0.384)	(0.411)	(0.417)	(0.425)	(0.441)	(0.462)	(0.455)	(0.457)	(0.338)
(7) I^U * LSAP$^+$ (γ_1)	**0.26**	**0.29**	**0.15**	**0.16**	**0.19**	**0.15**	**0.16**	**0.16**	**0.12**	**0.17**
	(0.130)	(0.127)	(0.196)	(0.163)	(0.171)	(0.188)	(0.212)	(0.204)	(0.206)	(0.167)
(8) I^U * LSAP$^-$ (γ_2)	**-0.37*****	**-0.33*****	**-0.35*****	**-0.31****	**-0.29****	**-0.34****	**-0.40****	**-0.42*****	**-0.48*****	**-0.43*****
	(0.107)	(0.118)	(0.124)	(0.133)	(0.132)	(0.137)	(0.164)	(0.148)	(0.138)	(0.111)
(9) $\alpha_1 - \alpha_2$	**0.12**	**0.12**	**0.22**	**0.14**	**0.38**	**0.39**	**0.29**	**0.27**	**0.17**	**0.00**
	(0.368)	(0.374)	(0.417)	(0.341)	(0.351)	(0.369)	(0.340)	(0.328)	(0.307)	(0.273)
(10) $\beta_1 - \beta_2$	**-0.85****	**-0.89****	**-1.07****	**-0.89****	**-1.05****	**-0.98****	**-1.01****	**-0.82***	**-0.75***	**-0.54***
	(0.342)	(0.391)	(0.441)	(0.448)	(0.456)	(0.474)	(0.497)	(0.461)	(0.452)	(0.307)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**1.01***	**0.96***	**0.79**	**0.88**	**0.92**	**1.01**	**0.95**	**1.01**	**1.01**	**0.88**
	(0.524)	(0.571)	(0.627)	(0.638)	(0.651)	(0.678)	(0.714)	(0.688)	(0.686)	(0.566)
(12) $\gamma_1 - \gamma_2$	**0.63*****	**0.62*****	**0.50***	**0.47***	**0.48***	**0.49**	**0.56**	**0.59***	**0.60***	**0.60****
	(0.228)	(0.237)	(0.299)	(0.279)	(0.286)	(0.306)	(0.344)	(0.327)	(0.324)	(0.256)

Notes: This table show the response of size-sorted excess portfolio returns to easing and tightening policy surprises during conventional/unconventional periods. + /- indicates positive/negative surprises: i.e. monetary policy tightening (tightening more/easing less than expected) and easing (tightening less/ easing more than expected). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 7a
Asymmetries: Stock Market Volatility and the Response of Book-to-Market Portfolios to Monetary Policy Surprises

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) $TS^{Low\ Vol}$ (α_1)	**-0.12**	**-0.15**	**0.02**	**-0.04**	**-0.15**	**-0.07**	**0.02**	**0.05**	**0.03**	**-0.01**
	(0.114)	(0.130)	(0.157)	(0.163)	(0.184)	(0.237)	(0.245)	(0.237)	(0.258)	(0.290)
(2) $TS^{High\ Vol}$ (α_2)	**-0.29****	**-0.31****	**-0.38****	**-0.41*****	**-0.42*****	**-0.46*****	**-0.46*****	**-0.50*****	**-0.49*****	**-0.59*****
	(0.147)	(0.143)	(0.175)	(0.123)	(0.130)	(0.128)	(0.141)	(0.159)	(0.177)	(0.191)
(3) $FG^{Low\ Vol}$ (β_1)	**-0.02**	**-0.01**	**0.00**	**0.02**	**0.08**	**0.08**	**0.12**	**0.13**	**0.12**	**0.10**
	(0.160)	(0.177)	(0.171)	(0.181)	(0.169)	(0.182)	(0.173)	(0.196)	(0.182)	(0.172)
(4) $FG^{High\ Vol}$ (β_2)	**-0.38****	**-0.44****	**-0.45*****	**-0.46****	**-0.42***	**-0.51****	**-0.46****	**-0.50****	**-0.55****	**-0.61*****
	(0.180)	(0.190)	(0.173)	(0.202)	(0.219)	(0.234)	(0.235)	(0.252)	(0.224)	(0.236)
(5) $I^U * FG^{Low\ Vol}$ (β_3)	**-0.02**	**-0.06**	**-0.03**	**-0.08**	**-0.01**	**-0.04**	**-0.04**	**-0.09**	**0.03**	**0.15**
	(0.143)	(0.119)	(0.128)	(0.126)	(0.162)	(0.173)	(0.202)	(0.187)	(0.201)	(0.242)
(6) $I^U * FG^{High\ Vol}$ (β_4)	**-0.54*****	**-0.54*****	**-0.49*****	**-0.56*****	**-0.61*****	**-0.60*****	**-0.63*****	**-0.89*****	**-0.85*****	**-0.79*****
	(0.172)	(0.193)	(0.185)	(0.152)	(0.182)	(0.198)	(0.222)	(0.245)	(0.262)	(0.231)
(7) $I^U * LSAP^{Low\ Vol}$ (γ_1)	**-0.08**	**-0.06**	**0.08**	**0.06**	**0.10**	**0.12**	**0.12**	**0.08**	**0.11**	**0.08**
	(0.129)	(0.156)	(0.163)	(0.128)	(0.139)	(0.129)	(0.141)	(0.166)	(0.198)	(0.201)
(8) $I^U * LSAP^{High\ Vol}$ (γ_2)	**-0.25***	**-0.27***	**-0.33****	**-0.33****	**-0.36*****	**-0.40****	**-0.37****	**-0.39*****	**-0.40*****	**-0.59*****
	(0.148)	(0.154)	(0.166)	(0.165)	(0.138)	(0.175)	(0.152)	(0.142)	(0.152)	(0.163)
(9) $\alpha_1 - \alpha_2$	**-0.17**	**-0.16**	**-0.40***	**-0.37***	**-0.27**	**-0.39**	**-0.48***	**-0.55****	**-0.53***	**-0.58***
	(0.180)	(0.188)	(0.229)	(0.198)	(0.219)	(0.263)	(0.276)	(0.278)	(0.305)	(0.338)
(10) $\beta_1 - \beta_2$	**-0.36**	**-0.43**	**-0.45***	**-0.48***	**-0.50***	**-0.59****	**-0.58****	**-0.63****	**-0.66****	**-0.71****
	(0.242)	(0.261)	(0.244)	(0.272)	(0.278)	(0.298)	(0.293)	(0.321)	(0.290)	(0.294)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**-0.88*****	**-0.91*****	**-0.91*****	**-0.96*****	**-1.10*****	**-1.15*****	**-1.17*****	**-1.43*****	**-1.55*****	**-1.65*****
	(0.254)	(0.276)	(0.265)	(0.265)	(0.295)	(0.323)	(0.338)	(0.352)	(0.343)	(0.335)
(12) $\gamma_1 - \gamma_2$	**-0.18**	**-0.20**	**-0.41***	**-0.34***	**-0.45****	**-0.52****	**-0.49****	**-0.47****	**-0.52****	**-0.67****
	(0.198)	(0.221)	(0.234)	(0.212)	(0.197)	(0.219)	(0.209)	(0.220)	(0.251)	(0.261)

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises over periods of high/low market volatility during conventional/unconventional periods. *High/Low* volatility is based on the VIX index over the past 30 days; High (low) volatility is when the VIX is above (below) the 50th percentile of the overall volatility distribution in the entire sample. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 7b
Asymmetries: Stock Market Volatility and the Response of Size Portfolios to Monetary Policy Surprises

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest Decile*
(1) $TS^{Low\ Vol}$ (α_1)	**-0.19**	**-0.34**	**-0.43***	**-0.46***	**-0.40***	**-0.34**	**-0.35**	**-0.32**	**-0.25**	**-0.22**
	(0.195)	(0.214)	(0.250)	(0.273)	(0.210)	(0.264)	(0.383)	(0.360)	(0.366)	(0.196)
(2) $TS^{High\ Vol}$ (α_2)	**-0.40*****	**-0.46*****	**-0.58*****	**-0.63*****	**-0.61*****	**-0.53*****	**-0.40*****	**-0.36*****	**-0.29****	**-0.24***
	(0.151)	(0.096)	(0.103)	(0.115)	(0.117)	(0.120)	(0.126)	(0.137)	(0.135)	(0.135)
(3) $FG^{Low\ Vol}$ (β_1)	**0.01**	**0.01**	**-0.05**	**-0.08**	**-0.09**	**-0.03**	**0.03**	**0.08**	**0.02**	**0.11**
	(0.167)	(0.176)	(0.190)	(0.193)	(0.197)	(0.203)	(0.217)	(0.214)	(0.215)	(0.161)
(4) $FG^{High\ Vol}$ (β_2)	**-0.60*****	**-0.57*****	**-0.61*****	**-0.54****	**-0.56****	**-0.62*****	**-0.63*****	**-0.55****	**-0.55****	**-0.36****
	(0.188)	(0.198)	(0.214)	(0.217)	(0.222)	0.229	0.244	0.242	0.242	0.171
(5) I^U * $FG^{Low\ Vol}$ (β_3)	**0.04**	**0.03**	**0.14**	**0.07**	**0.14**	**0.32**	**0.33**	**0.27**	**0.27**	**0.01**
	(0.112)	(0.123)	(0.130)	(0.148)	(0.176)	(0.182)	(0.190)	(0.202)	(0.229)	(0.224)
(6) I^U * $FG^{High\ Vol}$ (β_4)	**-1.26*****	**-1.31*****	**-1.16*****	**-1.20*****	**-1.17*****	**-1.23*****	**-0.96*****	**-0.87*****	**-0.61****	**-0.57****
	(0.224)	(0.240)	(0.266)	(0.270)	(0.278)	(0.289)	(0.313)	(0.308)	(0.309)	(0.284)
(7) I^U * $LSAP^{Low\ Vol}$ (γ_1)	**0.14**	**0.10**	**0.09**	**0.02**	**0.09**	**0.09**	**0.10**	**0.19**	**0.08**	**0.04**
	(0.185)	(0.202)	(0.228)	(0.233)	(0.234)	(0.252)	(0.277)	(0.183)	(0.162)	(0.174)
(8) I^U * $LSAP^{High\ Vol}$ (γ_2)	**-0.37*****	**-0.34****	**-0.38****	**-0.44*****	**-0.38****	**-0.43*****	**-0.45****	**-0.41****	**-0.48*****	**-0.52*****
	(0.135)	(0.135)	(0.151)	(0.154)	(0.159)	(0.166)	(0.181)	(0.168)	(0.179)	(0.119)
(9) $\alpha_1 - \alpha_2$	**-0.21**	**-0.12**	**-0.15**	**-0.17**	**-0.21**	**-0.20**	**-0.05**	**-0.04**	**-0.04**	**-0.02**
	(0.240)	(0.228)	(0.263)	(0.288)	(0.232)	(0.282)	(0.394)	(0.377)	(0.381)	(0.231)
(10) $\beta_1 - \beta_2$	**-0.61****	**-0.58****	**-0.55***	**-0.47**	**-0.47**	**-0.59***	**-0.67****	**-0.64****	**-0.56***	**-0.47****
	(0.253)	(0.266)	(0.288)	(0.292)	(0.298)	(0.308)	(0.328)	(0.325)	(0.326)	(0.236)
(11) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**-1.91*****	**-1.91*****	**-1.85*****	**-1.73*****	**-1.77*****	**-2.14*****	**-1.95*****	**-1.78*****	**-1.44*****	**-0.83****
	(0.298)	(0.311)	(0.324)	(0.346)	(0.366)	(0.381)	(0.413)	(0.413)	(0.405)	(0.350)
(12) $\gamma_1 - \gamma_2$	**-0.50****	**-0.44***	**-0.47***	**-0.47***	**-0.48***	**-0.52***	**-0.55***	**-0.60****	**-0.56****	**-0.56*****
	(0.231)	(0.245)	(0.275)	(0.281)	(0.285)	(0.304)	(0.333)	(0.250)	(0.243)	(0.212)

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises over periods of high/low market volatility during conventional/unconventional periods. *High/Low* volatility is based on the VIX index over the past 30 days; High (low) volatility is when the VIX is above (below) the 50th percentile of the overall volatility distribution in the entire sample. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 8a
Robustness: The Effect of Important Unconventional Announcement Days on Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.30*****	**-0.33*****	**-0.35*****	**-0.35*****	**-0.42*****	**-0.44*****	**-0.49*****	**-0.46*****	**-0.52*****	**-0.49*****	**-0.20****	**-0.19****	**-0.16****
	(0.100)	(0.120)	(0.115)	(0.109)	(0.114)	(0.119)	(0.122)	(0.124)	(0.128)	(0.132)	(0.099)	(0.096)	(0.082)
(2) FG (β_1)	**-0.18****	**-0.19****	**-0.20****	**-0.16***	**-0.16***	**-0.22****	**-0.19****	**-0.22****	**-0.25****	**-0.30****	**-0.12**	**-0.09**	**-0.07**
	(0.090)	(0.089)	(0.092)	(0.087)	(0.089)	(0.101)	(0.092)	(0.112)	(0.122)	(0.126)	(0.096)	(0.092)	(0.087)
(3) I^U * FG (β_2)	**-0.61*****	**-0.70*****	**-0.65*****	**-0.57*****	**-0.68*****	**-0.66*****	**-0.72*****	**-0.89*****	**-0.91*****	**-0.98*****	**-0.37****	**-0.29****	**-0.28***
	(0.168)	(0.150)	(0.142)	(0.159)	(0.192)	(0.179)	(0.194)	(0.255)	(0.252)	(0.269)	(0.157)	(0.141)	(0.146)
(4) I^U * LSAP (γ_1)	**-0.20***	**-0.31*****	**-0.29****	**-0.37*****	**-0.33****	**-0.44*****	**-0.41*****	**-0.45****	**-0.53*****	**-0.62*****	**-0.42*****	**-0.32****	**-0.27****
	(0.122)	(0.120)	(0.121)	(0.131)	(0.148)	(0.152)	(0.140)	(0.177)	(0.167)	(0.202)	(0.132)	(0.129)	(0.127)
(5) $\beta_1 + \beta_2$	**-0.80*****	**-0.89*****	**-0.85*****	**-0.73*****	**-0.83*****	**-0.88*****	**-0.91*****	**-1.12*****	**-1.17*****	**-1.29*****	**-0.49*****	**-0.38*****	**-0.35*****
	(0.123)	(0.111)	(0.108)	(0.115)	(0.137)	(0.134)	(0.139)	(0.186)	(0.189)	(0.189)	(0.106)	(0.107)	(0.113)
(6) $\alpha_1 + \beta_1$	**-0.48*****	**-0.53*****	**-0.55*****	**-0.51*****	**-0.58*****	**-0.67*****	**-0.68*****	**-0.68*****	**-0.77*****	**-0.80*****	**-0.31****	**-0.28****	**-0.23***
	(0.138)	(0.152)	(0.150)	(0.142)	(0.148)	(0.159)	(0.156)	(0.171)	(0.181)	(0.187)	(0.141)	(0.135)	(0.122)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-1.00*****	**-1.20*****	**-1.14*****	**-1.10*****	**-1.17*****	**-1.32*****	**-1.32*****	**-1.57*****	**-1.70*****	**-1.91*****	**-0.91*****	**-0.70*****	**-0.61*****
	(0.167)	(0.157)	(0.154)	(0.166)	(0.192)	(0.193)	(0.190)	(0.249)	(0.246)	(0.265)	(0.158)	(0.158)	(0.162)
(8) Post/Pre ZLB	**-0.51*****	**-0.68*****	**-0.59*****	**-0.59*****	**-0.59*****	**-0.65*****	**-0.64*****	**-0.89*****	**-0.92*****	**-1.11*****	**-0.60*****	**-0.42****	**-0.38****
	(0.168)	(0.173)	(0.172)	(0.172)	(0.190)	(0.200)	(0.193)	(0.237)	(0.241)	(0.248)	(0.157)	(0.165)	(0.163)
Line 7/Line 6	2.1	2.3	2.1	2.2	2.0	2.0	1.9	2.3	2.2	2.4	2.9	2.5	2.6

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods. The set of policy days for the unconventional period is confined over important announcements summarized in Appendices A and B. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 8b
Robustness: The Effect of Important Unconventional Announcement Days on Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.43*****	**-0.49*****	**-0.61*****	**-0.65*****	**-0.63*****	**-0.56*****	**-0.43*****	**-0.37*****	**-0.32****	**-0.25****	**-0.18***	**-0.18***	**-0.20****
	(0.118)	(0.125)	(0.136)	(0.137)	(0.141)	(0.138)	(0.122)	(0.125)	(0.134)	(0.109)	(0.101)	(0.105)	(0.098)
(2) FG (β_1)	**-0.33*****	**-0.31*****	**-0.30****	**-0.28****	**-0.30****	**-0.29****	**-0.26***	**-0.22***	**-0.21***	**-0.19***	**-0.14**	**-0.12**	**-0.10**
	(0.106)	(0.113)	(0.123)	(0.124)	(0.127)	(0.133)	(0.134)	(0.123)	(0.124)	(0.098)	(0.086)	(0.082)	(0.077)
(3) I^U * FG (β_2)	**-0.93*****	**-0.97*****`	**-0.82*****	**-0.92*****	**-0.83*****	**-0.80*****	**-0.66*****	**-0.58*****	**-0.45****	**-0.47*****	**-0.51*****	**-0.54*****	**-0.46*****
	(0.201)	(0.211)	(0.232)	(0.231)	(0.240)	(0.248)	(0.233)	(0.202)	(0.192)	(0.164)	(0.145)	(0.132)	(0.114)
(4) I^U * LSAP (γ_1)	**-0.42****	**-0.46****	**-0.43****	**-0.38***	**-0.44****	**-0.37***	**-0.56*****	**-0.54*****	**-0.65*****	**-0.58*****	**0.16**	**0.18***	**0.16**
	(0.174)	(0.181)	(0.195)	(0.194)	(0.200)	(0.206)	(0.216)	(0.209)	(0.199)	(0.148)	(0.122)	(0.101)	(0.098)
(5) $\beta_1 + \beta_2$	**-1.26*****	**-1.28*****	**-1.12*****	**-1.21*****	**-1.13*****	**-1.10*****	**-0.92*****	**-0.79*****	**-0.65*****	**-0.65*****	**-0.61*****	**-0.62*****	**-0.52*****
	(0.170)	(0.178)	(0.196)	(0.194)	(0.203)	(0.204)	(0.178)	(0.153)	(0.145)	(0.130)	(0.130)	(0.122)	(0.121)
(6) $\alpha_1 + \beta_1$	**-0.76*****	**-0.79*****	**-0.91*****	**-0.93*****	**-0.93*****	**-0.86*****	**-0.69*****	**-0.59*****	**-0.53*****	**-0.44*****	**-0.32*****	**-0.29****	**-0.30*****
	(0.162)	(0.172)	(0.187)	(0.189)	(0.194)	(0.195)	(0.185)	(0.180)	(0.186)	(0.150)	(0.135)	(0.135)	(0.127)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-1.68*****	**-1.74*****	**-1.55*****	**-1.59*****	**-1.57*****	**-1.47*****	**-1.48*****	**-1.33*****	**-1.31*****	**-1.23*****	**-0.45****	**-0.44*****	**-0.36****
	(0.235)	(0.245)	(0.268)	(0.266)	(0.277)	(0.281)	(0.266)	(0.242)	(0.230)	(0.189)	(0.176)	(0.155)	(0.148)
(8) Post/Pre ZLB	**-0.92*****	**-0.94*****	**-0.64****	**-0.66****	**-0.64****	**-0.61****	**-0.78****	**-0.75*****	**-0.79*****	**-0.79*****	**-0.12**	**-0.14**	**-0.06**
	(0.248)	(0.259)	(0.283)	(0.281)	(0.292)	(0.289)	(0.259)	(0.242)	(0.232)	(0.195)	(0.184)	(0.164)	(0.153)
Line 7/Line 6	2.2	2.2	1.7	1.7	1.7	1.7	2.1	2.3	2.5	2.8	1.4	1.5	1.2

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods. The set of policy days for the unconventional period is confined over important announcements summarized in Appendices A and B. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 9a
Robustness: Disaggregating LSAP-1 Announcements -- Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.30*****	**-0.33*****	**-0.35*****	**-0.35*****	**-0.42*****	**-0.44*****	**-0.49*****	**-0.46*****	**-0.52*****	**-0.49*****	**-0.20****	**-0.19****	**-0.16****
	(0.100)	(0.120)	(0.115)	(0.109)	(0.114)	(0.119)	(0.122)	(0.124)	(0.128)	(0.132)	(0.099)	(0.096)	(0.082)
(2) FG (β_1)	**-0.18****	**-0.19****	**-0.20****	**-0.16***	**-0.16***	**-0.22****	**-0.19****	**-0.22****	**-0.25****	**-0.30****	**-0.12**	**-0.09**	**-0.07**
	(0.090)	(0.089)	(0.092)	(0.087)	(0.089)	(0.101)	(0.092)	(0.112)	(0.122)	(0.126)	(0.096)	(0.092)	(0.087)
(3) I^{LSAP1} * FG (β_{12})	**-0.73**	**-0.59**	**-0.53**	**-0.78***	**-0.87***	**-0.92****	**-1.07****	**-1.96*****	**-2.07*****	**-2.15*****	**-1.42*****	**-1.45*****	**-1.44*****
	(0.457)	(0.420)	(0.400)	(0.431)	(0.452)	(0.444)	(0.489)	(0.526)	(0.545)	(0.614)	(0.471)	(0.368)	(0.325)
(4) I^{LSAP1} * LSAP (γ_{12})	**-0.58****	**-0.67*****	**-0.70*****	**-0.62*****	**-0.63*****	**-0.74*****	**-0.80*****	**-0.69*****	**-0.77*****	**-1.06*****	**-0.48****	**-0.29***	**-0.19**
	(0.224)	(0.206)	(0.196)	(0.212)	(0.222)	(0.218)	(0.240)	(0.258)	(0.267)	(0.301)	(0.201)	(0.178)	(0.160)
(4) I^{Other} * FG (β_{22})	**-0.24****	**-0.29*****	**-0.24*****	**-0.29*****	**-0.34*****	**-0.34*****	**-0.42*****	**-0.47*****	**-0.38****	**-0.35***	**-0.11**	**-0.10**	**-0.14**
	(0.118)	(0.100)	(0.090)	(0.105)	(0.115)	(0.111)	(0.132)	(0.150)	(0.159)	(0.192)	(0.110)	(0.092)	(0.092)
(4) I^{Other} * LSAP (γ_{22})	**-0.08**	**-0.10**	**-0.12**	**-0.11**	**-0.11**	**-0.14**	**-0.20**	**-0.17**	**-0.29***	**-0.39****	**-0.31**	**-0.25**	**-0.19**
	(0.112)	(0.095)	(0.086)	(0.081)	(0.089)	(0.106)	(0.127)	(0.122)	(0.153)	(0.185)	(0.115)	(0.109)	(0.099)
(6) $\alpha_1 + \beta_1$	**-0.48*****	**-0.53*****	**-0.55*****	**-0.51*****	**-0.58*****	**-0.67*****	**-0.68*****	**-0.68*****	**-0.77*****	**-0.80*****	**-0.31****	**-0.28****	**-0.23***
	(0.138)	(0.152)	(0.150)	(0.142)	(0.148)	(0.159)	(0.156)	(0.171)	(0.181)	(0.187)	(0.141)	(0.135)	(0.122)
(7) $\beta_1 + \beta_{12} + \gamma_{12}$	**-1.49*****	**-1.45*****	**-1.43*****	**-1.57*****	**-1.66*****	**-1.89*****	**-2.06*****	**-2.87*****	**-3.09*****	**-3.51*****	**-2.02*****	**-1.83*****	**-1.70*****
	(0.452)	(0.416)	(0.397)	(0.426)	(0.447)	(0.442)	(0.482)	(0.521)	(0.543)	(0.610)	(0.457)	(0.369)	(0.328)
(8) $\beta_1 + \beta_{22} + \gamma_{22}$	**-0.50*****	**-0.58*****	**-0.56*****	**-0.57*****	**-0.60*****	**-0.70*****	**-0.81*****	**-0.86*****	**-0.93*****	**-1.04*****	**-0.53*****	**-0.44*****	**-0.40*****
	(0.173)	(0.153)	(0.144)	(0.147)	(0.158)	(0.172)	(0.192)	(0.209)	(0.238)	(0.279)	(0.174)	(0.160)	(0.152)
Line 7/Line 6	3.1	2.8	2.6	3.1	2.9	2.8	3.0	4.2	4.0	4.4	6.4	6.5	7.3
Line 8/Line 6	1.0	1.1	1.0	1.1	1.0	1.1	1.2	1.3	1.2	1.3	1.7	1.6	1.7

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods. The set of policy days during the unconventional period is segregated between the LSAP-1 round (captured by I^{LSAP1} dummy) and other phases of LSAPs (I^{Other}). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 9b
Robustness: Disaggregating LSAP-1 Announcements -- Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.43*****	**-0.49*****	**-0.61*****	**-0.65*****	**-0.63*****	**-0.56*****	**-0.43*****	**-0.37*****	**-0.32****	**-0.25****	**-0.18***	**-0.18***	**-0.20****
	(0.118)	(0.125)	(0.136)	(0.137)	(0.141)	(0.138)	(0.122)	(0.125)	(0.134)	(0.109)	(0.101)	(0.105)	(0.098)
(2) FG (β_1)	**-0.33*****	**-0.31*****	**-0.30****	**-0.28****	**-0.30****	**-0.29****	**-0.26***	**-0.22***	**-0.21***	**-0.19***	**-0.14**	**-0.12**	**-0.10**
	(0.106)	(0.113)	(0.123)	(0.124)	(0.127)	(0.133)	(0.134)	(0.123)	(0.124)	(0.098)	(0.086)	(0.082)	(0.077)
(3) I^{LSAP1} * FG (β_{12})	**-2.19*****	**-2.09*****	**-1.75*****	**-1.73*****	**-1.54****	**-1.45****	**-1.51****	**-1.50****	**-1.33***	**-1.41****	**-0.78***	**-0.77***	**-0.60**
	(0.573)	(0.611)	(0.663)	(0.668)	(0.685)	(0.708)	(0.760)	(0.753)	(0.750)	(0.553)	(0.459)	(0.440)	(0.416)
(4) I^{LSAP1} * LSAP (γ_{12})	**-0.49****	**-0.46****	**-0.56***	**-0.49****	**-0.63****	**-0.69****	**-0.68****	**-0.73****	**-0.85*****	**-0.79*****	**0.30***	**0.34***	**0.29***
	(0.245)	(0.247)	(0.269)	(0.272)	(0.279)	(0.289)	(0.312)	(0.309)	(0.307)	(0.241)	(0.180)	(0.177)	(0.162)
(4) I^{Other} * FG (β_{22})	**-0.50*****	**-0.55*****	**-0.46*****	**-0.43*****	**-0.36****	**-0.28***	**-0.26***	**-0.26***	**-0.22**	**-0.20**	**-0.28*****	**-0.31*****	**-0.27*****
	(0.130)	(0.145)	(0.166)	(0.168)	(0.175)	(0.168)	(0.136)	(0.142)	(0.152)	(0.122)	(0.102)	(0.099)	(0.092)
(4) I^{Other} * LSAP (γ_{22})	**-0.24****	**-0.22****	**-0.18**	**-0.19**	**-0.20**	**-0.24***	**-0.22***	**-0.27****	**-0.30****	**-0.29****	**0.05**	**0.06**	**0.07**
	(0.118)	(0.110)	(0.130)	(0.132)	(0.124)	(0.135)	(0.135)	(0.127)	(0.146)	(0.137)	(0.122)	(0.112)	(0.100)
(6) $\alpha_1 + \beta_1$	**-0.76*****	**-0.79*****	**-0.91*****	**-0.93*****	**-0.93*****	**-0.86*****	**-0.69*****	**-0.59*****	**-0.53*****	**-0.44*****	**-0.32****	**-0.29****	**-0.30****
	(0.162)	(0.172)	(0.187)	(0.189)	(0.194)	(0.195)	(0.185)	(0.180)	(0.186)	(0.150)	(0.135)	(0.135)	(0.127)
(7) $\beta_1 + \beta_{12} + \gamma_{12}$	**-3.00*****	**-2.86*****	**-2.60*****	**-2.50*****	**-2.47*****	**-2.44*****	**-2.45*****	**-2.44*****	**-2.38*****	**-2.38*****	**-0.62***	**-0.55***	**-0.42**
	(0.562)	(0.594)	(0.645)	(0.650)	(0.667)	(0.690)	(0.740)	(0.731)	(0.729)	(0.543)	(0.360)	(0.331)	(0.304)
(8) $\beta_1 + \beta_{22} + \gamma_{22}$	**-1.05*****	**-1.07*****	**-0.94*****	**-0.91*****	**-0.87*****	**-0.81*****	**-0.75*****	**-0.73*****	**-0.72*****	**-0.68*****	**-0.37****	**-0.36****	**-0.31****
	(0.189)	(0.198)	(0.227)	(0.230)	(0.232)	(0.235)	(0.215)	(0.208)	(0.227)	(0.194)	(0.170)	(0.161)	(0.147)
Line 7/Line 6	3.9	3.6	2.9	2.7	2.6	2.8	3.5	4.2	4.6	5.4	1.9	1.8	1.4
Line 8/Line 6	1.4	1.4	1.0	1.0	0.9	1.0	1.1	1.3	1.4	1.5	1.2	1.2	1.0

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods. The set of policy days during the unconventional period is segregated between the LSAP-1 round (captured by I^{LSAP1} dummy) and other phases of LSAPs (I^{Other}). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 10a
Robustness: Omitting non-FOMC Announcements - Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.38*****	**-0.45*****	**-0.49*****	**-0.48*****	**-0.50*****	**-0.51*****	**-0.56*****	**-0.50*****	**-0.63*****	**-0.59*****	**-0.20***	**-0.19***	**-0.13**
	(0.130)	(0.115)	(0.108)	(0.129)	(0.137)	(0.126)	(0.154)	(0.174)	(0.201)	(0.237)	(0.120)	(0.111)	(0.106)
(2) FG (β_1)	**-0.11**	**-0.15**	**-0.17**	**-0.18***	**-0.20***	**-0.16***	**-0.18***	**-0.19***	**-0.22***	**-0.24***	**-0.13**	**-0.10**	**-0.07**
	(0.093)	(0.095)	(0.103)	(0.106)	(0.105)	(0.097)	(0.103)	(0.096)	(0.124)	(0.130)	(0.108)	(0.098)	(0.089)
(3) I^U * FG (β_2)	**-0.46*****	**-0.49*****	**-0.46*****	**-0.46*****	**-0.52*****	**-0.54*****	**-0.62*****	**-0.75*****	**-0.70*****	**-0.60*****	**-0.14**	**-0.17***	**-0.21****
	(0.111)	(0.107)	(0.122)	(0.137)	(0.132)	(0.122)	(0.112)	(0.099)	(0.104)	(0.122)	(0.113)	(0.108)	(0.098)
(4) I^U * LSAP (γ_1)	**-0.13**	**-0.14**	**-0.14**	**-0.16***	**-0.13**	**-0.17***	**-0.21****	**-0.23****	**-0.32****	**-0.43*****	**-0.30*****	**-0.24****	**-0.19****
	(0.097)	(0.106)	(0.107)	(0.092)	(0.085)	(0.096)	(0.104)	(0.115)	(0.126)	(0.137)	(0.110)	(0.099)	(0.094)
(5) $\beta_1 + \beta_2$	**-0.57*****	**-0.64*****	**-0.63*****	**-0.64*****	**-0.71*****	**-0.70*****	**-0.80*****	**-0.94*****	**-0.91*****	**-0.84*****	**-0.27***	**-0.27****	**-0.28****
	(0.115)	(0.118)	(0.136)	(0.144)	(0.137)	(0.127)	(0.114)	(0.105)	(0.130)	(0.136)	(0.145)	(0.124)	(0.118)
(6) $\alpha_1 + \beta_1$	**-0.49*****	**-0.60*****	**-0.65*****	**-0.66*****	**-0.70*****	**-0.67*****	**-0.74*****	**-0.68*****	**-0.84*****	**-0.83*****	**-0.33****	**-0.29****	**-0.20**
	(0.141)	(0.131)	(0.133)	(0.148)	(0.153)	(0.141)	(0.165)	(0.176)	(0.212)	(0.243)	(0.142)	(0.133)	(0.126)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-0.70*****	**-0.78*****	**-0.77*****	**-0.80*****	**-0.84*****	**-0.87*****	**-1.01*****	**-1.17*****	**-1.23*****	**-1.27*****	**-0.57*****	**-0.51*****	**-0.47*****
	(0.143)	(0.150)	(0.166)	(0.165)	(0.156)	(0.152)	(0.147)	(0.139)	(0.157)	(0.170)	0.158	0.142	0.126
(8) Post/Pre ZLB	**-0.20**	**-0.18**	**-0.12**	**-0.14**	**-0.14**	**-0.20**	**-0.27**	**-0.48*****	**-0.39****	**-0.44****	**-0.24***	**-0.22***	**-0.27***
	(0.151)	(0.153)	(0.167)	(0.172)	(0.167)	(0.158)	(0.165)	(0.165)	(0.198)	(0.223)	(0.141)	(0.138)	(0.143)
Line 7/Line 6	1.4	1.3	1.2	1.2	1.2	1.3	1.4	1.7	1.5	1.5	1.7	1.8	2.3

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods when unscheduled policy announcements (intermeetings, speeches, and Congressional testimony) are removed from the full set of policy dates. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 10b
Robustness: Omitting non-FOMC Announcements - Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.55*****	**-0.60*****	**-0.73*****	**-0.81*****	**-0.84*****	**-0.75*****	**-0.56*****	**-0.46****	**-0.42****	**-0.39****	**-0.16***	**-0.17***	**-0.21****
	(0.129)	(0.137)	(0.160)	(0.158)	(0.164)	(0.184)	(0.205)	(0.203)	(0.204)	(0.156)	(0.092)	(0.089)	(0.087)
(2) FG (β_1)	**-0.24****	**-0.24****	**-0.22***	**-0.26****	**-0.25****	**-0.25***	**-0.20***	**-0.18**	**-0.18**	**-0.16**	**-0.08**	**-0.07**	**-0.06**
	(0.108)	(0.112)	(0.124)	(0.124)	(0.127)	(0.131)	(0.118)	(0.127)	(0.127)	(0.102)	(0.085)	(0.083)	(0.078)
(3) I^U * FG (β_2)	**-0.74*****	**-0.76*****	**-0.65*****	**-0.72*****	**-0.68*****	**-0.70*****	**-0.43*****	**-0.43*****	**-0.36*****	**-0.42*****	**-0.32*****	**-0.36*****	**-0.31*****
	(0.161)	(0.162)	(0.159)	(0.147)	(0.153)	(0.129)	(0.139)	(0.128)	(0.140)	(0.130)	(0.108)	(0.100)	(0.093)
(4) I^U * LSAP (γ_1)	**-0.18****	**-0.18***	**-0.14**	**-0.14**	**-0.21***	**-0.16**	**-0.22***	**-0.22****	**-0.25****	**-0.29*****	**0.10**	**0.09**	**0.09**
	(0.089)	(0.094)	(0.109)	(0.108)	(0.112)	(0.125)	(0.118)	(0.108)	(0.111)	(0.081)	(0.078)	(0.073)	(0.065)
(5) $\beta_1 + \beta_2$	**-0.98*****	**-1.00*****	**-0.87*****	**-0.98*****	**-0.93*****	**-0.95*****	**-0.63*****	**-0.60*****	**-0.55*****	**-0.58*****	**-0.40*****	**-0.42*****	**-0.37*****
	0.138	0.139	0.136	0.128	0.132	0.111	0.103	0.102	0.110	0.113	0.106	0.102	0.096
(6) $\alpha_1 + \beta_1$	**-0.79*****	**-0.83*****	**-0.96*****	**-1.07*****	**-1.09*****	**-1.01*****	**-0.76*****	**-0.63*****	**-0.60*****	**-0.55*****	**-0.24****	**-0.24****	**-0.27*****
	0.148	0.156	0.180	0.178	0.184	0.201	0.210	0.213	0.214	0.167	0.109	0.106	0.102
(7) $\beta_1 + \beta_2 + \gamma_1$	**-1.16*****	**-1.17*****	**-1.02*****	**-1.12*****	**-1.15*****	**-1.11*****	**-0.85*****	**-0.82*****	**-0.80*****	**-0.87*****	**-0.29*****	**-0.33*****	**-0.29*****
	0.178	0.181	0.186	0.178	0.184	0.173	0.164	0.158	0.166	0.151	0.113	0.106	0.097
(8) Post/Pre ZLB	**-0.38****	**-0.34***	**-0.06**	**-0.05**	**-0.06**	**-0.11**	**-0.09**	**-0.19**	**-0.20**	**-0.32***	**-0.05**	**-0.10**	**-0.02**
	0.177	0.183	0.198	0.191	0.199	0.199	0.196	0.194	0.201	0.174	0.114	0.109	0.102
Line 7/Line 6	1.5	1.4	1.1	1.0	1.1	1.1	1.1	1.3	1.3	1.6	1.2	1.4	1.1

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods when unscheduled policy announcements (intermeetings, speeches, and Congressional testimony) are removed from the full set of policy dates. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 11a

Robustness: Alternative Sample Break Between Conventional/Unconventional Period: Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.30*****	**-0.33*****	**-0.35*****	**-0.35*****	**-0.42*****	**-0.44*****	**-0.49*****	**-0.46*****	**-0.52*****	**-0.49*****	**-0.20****	**-0.19****	**-0.16****
	(0.100)	(0.120)	(0.115)	(0.109)	(0.114)	(0.119)	(0.122)	(0.124)	(0.128)	(0.132)	(0.099)	(0.096)	(0.082)
(2) FG (β_1)	**-0.18****	**-0.19****	**-0.20****	**-0.16***	**-0.16***	**-0.22****	**-0.19****	**-0.22****	**-0.25****	**-0.30****	**-0.12**	**-0.09**	**-0.07**
	(0.090)	(0.089)	(0.092)	(0.087)	(0.089)	(0.101)	(0.092)	(0.112)	(0.122)	(0.126)	(0.096)	(0.092)	(0.087)
(3) I^U * FG (β_2)	**-0.27*****	**-0.31*****	**-0.27*****	**-0.26*****	**-0.37*****	**-0.34*****	**-0.45*****	**-0.42*****	**-0.40*****	**-0.35*****	**-0.09**	**-0.09**	**-0.11**
	(0.100)	(0.094)	(0.098)	(0.110)	(0.105)	(0.102)	(0.096)	(0.087)	(0.069)	(0.095)	(0.088)	(0.069)	(0.075)
(4) I^U * LSAP (γ_1)	**-0.14**	**-0.17***	**-0.19****	**-0.18****	**-0.14****	**-0.21****	**-0.28*****	**-0.29*****	**-0.36*****	**-0.49*****	**-0.35*****	**-0.27*****	**-0.21*****
	(0.084)	(0.093)	(0.092)	(0.074)	(0.068)	(0.083)	(0.087)	(0.095)	(0.077)	(0.120)	(0.076)	(0.077)	(0.075)
(5) $I^{11/25/2008}$	**-0.64**	**0.02**	**-0.44**	**1.19**	**1.55**	**1.85***	**1.30**	**1.32**	**3.16****	**4.23*****	**4.87*****	**4.01*****	**3.26*****
	(1.138)	(1.055)	(1.008)	(1.081)	(1.126)	(1.111)	(1.227)	(1.341)	(1.371)	(1.561)	(1.134)	(0.874)	(0.777)
(6) $I^{12/01/2008}$	**-1.06**	**-0.83**	**-1.13**	**-2.09***	**-2.29***	**-2.01**	**-2.70****	**-4.60*****	**-4.11****	**-5.33*****	**-4.27*****	**-3.44*****	**-2.30****
	(1.249)	(1.153)	(1.108)	(1.210)	(1.320)	(1.277)	(1.361)	(1.662)	(1.600)	(1.930)	(1.322)	(1.214)	(1.118)
(7) $I^{12/16/2008}$	**3.44*****	**3.29*****	**3.22*****	**3.89*****	**3.94*****	**4.16*****	**4.27*****	**6.58*****	**7.24*****	**7.77*****	**4.33*****	**4.14*****	**3.88*****
	(1.219)	(1.130)	(1.080)	(1.158)	(1.206)	(1.190)	(1.315)	(1.437)	(1.469)	(1.672)	(1.215)	(0.936)	(0.833)
(8) $\beta_1 + \beta_2$	**-0.45*****	**-0.50*****	**-0.47*****	**-0.42*****	**-0.52*****	**-0.57*****	**-0.64*****	**-0.65*****	**-0.65*****	**-0.66*****	**-0.20*****	**-0.18*****	**-0.18****
	(0.071)	(0.071)	(0.079)	(0.080)	(0.076)	(0.082)	(0.065)	(0.068)	(0.064)	(0.072)	(0.068)	(0.066)	(0.071)
(9) $\alpha_1 + \beta_1$	**-0.48*****	**-0.53*****	**-0.55*****	**-0.51*****	**-0.58*****	**-0.67*****	**-0.68*****	**-0.68*****	**-0.77*****	**-0.80*****	**-0.31****	**-0.28****	**-0.23***
	(0.138)	(0.152)	(0.150)	(0.142)	(0.148)	(0.159)	(0.156)	(0.171)	(0.181)	(0.187)	(0.141)	(0.135)	(0.122)
(10) $\beta_1 + \beta_2 + \gamma_1$	**-0.59*****	**-0.67*****	**-0.66*****	**-0.60*****	**-0.67*****	**-0.78*****	**-0.91*****	**-0.94*****	**-1.01*****	**-1.14*****	**-0.55*****	**-0.45*****	**-0.39*****
	(0.107)	(0.111)	(0.117)	(0.109)	(0.102)	(0.115)	(0.103)	(0.110)	(0.097)	(0.127)	(0.099)	(0.098)	(0.101)
(11) Post/Pre ZLB	**-0.10**	**-0.15**	**-0.11**	**-0.09**	**-0.09**	**-0.11**	**-0.23**	**-0.25***	**-0.24***	**-0.34****	**-0.24***	**-0.17**	**-0.16**
	(0.133)	(0.150)	(0.153)	(0.140)	(0.139)	(0.156)	(0.142)	(0.148)	(0.146)	(0.169)	(0.131)	(0.135)	(0.130)
Line 10/Line 9	1.2	1.3	1.2	1.2	1.1	1.2	1.3	1.4	1.3	1.4	1.8	1.6	1.7

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises controlling for specific announcements during the transition from conventional to unconventional period. The three announcements for which we use dummy variables are: 11/25/2008, 12/01/2008 and 12/16/2008. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 11b

Robustness: Alternative Sample Break Between Conventional/Unconventional Period: Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.43*****	**-0.49*****	**-0.61*****	**-0.65*****	**-0.63*****	**-0.56*****	**-0.43*****	**-0.37*****	**-0.32****	**-0.25****	**-0.18***	**-0.18***	**-0.20****
	(0.118)	(0.125)	(0.136)	(0.137)	(0.141)	(0.138)	(0.122)	(0.125)	(0.134)	(0.109)	(0.101)	(0.105)	(0.098)
(2) FG (β_1)	**-0.33*****	**-0.31*****	**-0.30****	**-0.28****	**-0.30****	**-0.29****	**-0.26***	**-0.22***	**-0.21***	**-0.19***	**-0.14**	**-0.12**	**-0.10**
	(0.106)	(0.113)	(0.123)	(0.124)	(0.127)	(0.133)	(0.134)	(0.123)	(0.124)	(0.098)	(0.086)	(0.082)	(0.077)
(3) I^U * FG (β_2)	**-0.50*****	**-0.56*****	**-0.48*****	**-0.51*****	**-0.45*****	**-0.39*****	**-0.32*****	**-0.32****	**-0.29****	**-0.24***	**-0.26****	**-0.27****	**-0.23****
	(0.164)	(0.172)	(0.168)	(0.162)	(0.168)	(0.136)	(0.143)	(0.132)	(0.143)	(0.135)	(0.119)	(0.118)	(0.111)
(4) I^U * LSAP (γ_1)	**-0.27*****	**-0.29*****	**-0.22****	**-0.21****	**-0.26****	**-0.27****	**-0.30*****	**-0.29*****	**-0.38*****	**-0.36*****	**0.09**	**0.09**	**0.08**
	(0.082)	(0.091)	(0.105)	(0.107)	(0.111)	(0.118)	(0.109)	(0.099)	(0.101)	(0.098)	(0.070)	(0.080)	(0.076)
(5) $I^{11/25/2008}$	**1.68***	**1.78***	**1.84***	**1.92***	**2.10***	**2.50***	**2.14**	**1.37**	**1.03**	**0.33**	**1.35***	**1.05**	**0.86**
	(0.994)	(1.071)	(1.112)	(1.158)	(1.226)	(1.280)	(1.366)	(1.354)	(1.355)	(0.950)	(0.813)	(0.891)	(0.858)
(6) $I^{12/01/2008}$	**-1.73***	**-1.80***	**-1.96***	**-1.85***	**-1.96***	**-1.97***	**-1.94**	**-1.81**	**-1.97**	**-1.37**	**-0.37**	**-0.10**	**-0.12**
	(0.935)	(1.015)	(1.125)	(1.125)	(1.175)	(1.192)	(1.320)	(1.308)	(1.309)	(1.190)	(0.867)	(0.823)	(0.802)
(7) $I^{12/16/2008}$	**4.79*****	**4.41*****	**4.08*****	**3.79****	**3.84****	**4.01****	**4.38*****	**3.93****	**3.59****	**3.13****	**1.66**	**1.24**	**0.88**
	(1.279)	(1.362)	(1.476)	(1.497)	(1.528)	(1.585)	(1.678)	(1.665	(1.666)	(1.232)	(1.014)	(0.972)	(0.920)
(8) $\beta_1 + \beta_2$	**-0.83*****	**-0.87*****	**-0.78*****	**-0.79*****	**-0.75*****	**-0.69*****	**-0.58*****	**-0.54*****	**-0.51*****	**-0.43*****	**-0.40*****	**-0.38*****	**-0.33*****
	(0.129)	(0.135)	(0.132)	(0.126)	(0.132)	(0.108)	(0.110)	(0.095)	(0.103)	(0.104)	(0.094)	(0.093)	(0.087)
(9) $\alpha_1 + \beta_1$	**-0.76*****	**-0.79*****	**-0.91*****	**-0.93*****	**-0.93*****	**-0.86*****	**-0.69*****	**-0.59*****	**-0.53*****	**-0.44*****	**-0.32****	**-0.29****	**-0.30****
	(0.162)	(0.172)	(0.187)	(0.189)	(0.194)	(0.195)	(0.185)	(0.180)	(0.186)	(0.150)	(0.135)	(0.135)	(0.127)
(10) $\beta_1 + \beta_2 + \gamma_1$	**-1.10*****	**-1.16*****	**-1.00*****	**-1.01*****	**-1.01*****	**-0.96*****	**-0.88*****	**-0.83*****	**-0.89*****	**-0.79*****	**-0.31*****	**-0.29****	**-0.25****
	(0.157)	(0.167)	(0.170)	(0.167)	(0.173)	(0.156)	(0.153)	(0.135)	(0.144)	(0.141)	(0.119)	(0.123)	(0.116)
(11) Post/Pre ZLB	**-0.34***	**-0.37***	**-0.09**	**-0.08**	**-0.08**	**-0.10**	**-0.19**	**-0.24**	**-0.36****	**-0.35****	**0.01**	**0.00**	**0.05**
	(0.182)	(0.193)	(0.202)	(0.201)	(0.207)	(0.196)	(0.183)	(0.168)	(0.178)	(0.164)	(0.146)	(0.150)	(0.140)
Line 10/Line 9	1.4	1.5	1.1	1.1	1.1	1.1	1.3	1.4	1.7	1.8	1.4	1.5	1.1

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises controlling for specific announcements during the transition from conventional to unconventional period. The three announcements for which we use dummy variables are: 11/25/2008, 12/01/2008 and 12/16/2008. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 12a
Robust Regressions: Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.36*****	**-0.35*****	**-0.33*****	**-0.32*****	**-0.29*****	**-0.38*****	**-0.36*****	**-0.48*****	**-0.50*****	**-0.54*****	**-0.24****	**-0.25*****	**-0.24*****
	(0.095)	(0.118)	(0.114)	(0.106)	(0.109)	(0.115)	(0.118)	(0.112)	(0.121)	(0.117)	(0.096)	(0.077)	(0.063)
(2) FG (β_1)	**-0.19****	**-0.22****	**-0.24*****	**-0.23*****	**-0.27*****	**-0.22****	**-0.22****	**-0.28*****	**-0.32*****	**-0.35*****	**-0.19****	**-0.14***	**-0.13****
	(0.086)	(0.088)	(0.092)	(0.084)	(0.084)	(0.097)	(0.088)	(0.101)	(0.115)	(0.112)	(0.088)	(0.070)	(0.057)
(3) I^U * FG (β_2)	**-0.31*****	**-0.34*****	**-0.28****	**-0.27****	**-0.39*****	**-0.45*****	**-0.39*****	**-0.42*****	**-0.36*****	**-0.34*****	**-0.04**	**-0.05**	**-0.04**
	(0.106)	(0.106)	(0.120)	(0.129)	(0.121)	(0.121)	(0.125)	(0.127)	(0.122)	(0.129)	(0.091)	(0.088)	(0.090)
(4) I^U * LSAP (γ_1)	**-0.15***	**-0.16**	**-0.18***	**-0.19****	**-0.22*****	**-0.24****	**-0.24****	**-0.42*****	**-0.42*****	**-0.56*****	**-0.37*****	**-0.30*****	**-0.27*****
	(0.092)	(0.108)	(0.111)	(0.084)	(0.071)	(0.093)	(0.114)	(0.107)	(0.121)	(0.141)	(0.110)	(0.088)	(0.072)
(5) $\beta_1 + \beta_2$	**-0.49*****	**-0.56*****	**-0.52*****	**-0.51*****	**-0.66*****	**-0.67*****	**-0.61*****	**-0.70*****	**-0.68*****	**-0.70*****	**-0.20*****	**-0.12***	**-0.17****
	(0.071)	(0.076)	(0.091)	(0.090)	(0.083)	(0.090)	(0.081)	(0.097)	(0.092)	(0.095)	(0.076)	(0.070)	(0.070)
(6) $\alpha_1 + \beta_1$	**-0.55*****	**-0.57*****	**-0.57*****	**-0.56*****	**-0.55*****	**-0.60*****	**-0.59*****	**-0.76*****	**-0.82*****	**-0.90*****	**-0.44*****	**-0.38*****	**-0.37*****
	(0.131)	(0.150)	(0.149)	(0.138)	(0.140)	(0.153)	(0.150)	(0.153)	(0.170)	(0.165)	(0.133)	(0.106)	(0.060)
(7) $\beta_1 + \beta_2 + \gamma_1$	**-0.65*****	**-0.72*****	**-0.71*****	**-0.70*****	**-0.88*****	**-0.91*****	**-0.85*****	**-1.12*****	**-1.10*****	**-1.25*****	**-0.60*****	**-0.49*****	**-0.44*****
	(0.111)	(0.125)	(0.139)	(0.124)	(0.111)	(0.128)	(0.133)	(0.142)	(0.146)	(0.160)	(0.127)	(0.110)	(0.119)
(8) Post/Pre ZLB	**-0.10**	**-0.15**	**-0.13**	**-0.15**	**-0.32****	**-0.31***	**-0.27***	**-0.36****	**-0.28***	**-0.35****	**-0.16**	**-0.10**	**-0.07**
	(0.130)	(0.155)	(0.165)	(0.145)	(0.137)	(0.158)	(0.155)	(0.168)	(0.163)	(0.174)	(0.123)	0.113	0.109
Line 7/Line 6	1.2	1.3	1.2	1.3	1.6	1.5	1.5	1.5	1.3	1.4	1.4	1.3	1.2

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods. Estimates are obtained using robust regression (MM-weighted least squares of Yohari (1987). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread₁* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread₂* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread₃* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 12b
Robust Regressions: Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
(1) TS (α_1)	**-0.48*****	**-0.53*****	**-0.64*****	**-0.73*****	**-0.74*****	**-0.63*****	**-0.48*****	**-0.39*****	**-0.31****	**-0.31*****	**-0.21*****	**-0.20*****	**-0.21*****
	(0.100)	(0.110)	(0.125)	(0.123)	(0.127)	(0.132)	(0.116)	(0.120)	(0.130)	(0.099)	(0.082)	(0.073)	(0.069)
(2) FG (β_1)	**-0.37*****	**-0.35*****	**-0.38*****	**-0.30*****	**-0.34*****	**-0.34*****	**-0.31****	**-0.23***	**-0.26****	**-0.22****	**-0.13***	**-0.10**	**-0.09**
	(0.090)	(0.099)	(0.113)	(0.111)	(0.114)	(0.128)	(0.129)	(0.118)	(0.121)	(0.089)	(0.075)	(0.067)	(0.063)
(3) I^U * FG (β_2)	**-0.55*****	**-0.53*****	**-0.58*****	**-0.71*****	**-0.57*****	**-0.53*****	**-0.39*****	**-0.34*****	**-0.23***	**-0.23****	**-0.25***	**-0.30****	**-0.27****
	(0.148)	(0.155)	(0.153)	(0.142)	(0.141)	(0.139)	(0.139)	(0.131)	(0.126)	(0.112)	(0.131)	(0.118)	(0.111)
(4) I^U * LSAP (γ_1)	**-0.31*****	**-0.31*****	**-0.32*****	**-0.26****	**-0.39*****	**-0.36*****	**-0.45*****	**-0.44*****	**-0.48*****	**-0.41*****	**0.02**	**0.09**	**0.06**
	(0.088)	(0.099)	(0.116)	(0.114)	(0.118)	(0.135)	(0.126)	(0.115)	(0.119)	(0.086)	(0.093)	(0.084)	(0.079)
(5) $\beta_1 + \beta_2$	**-0.92*****	**-0.88*****	**-0.96*****	**-1.01*****	**-0.91*****	**-0.87*****	**-0.70*****	**-0.57*****	**-0.48*****	**-0.45*****	**-0.38*****	**-0.40*****	**-0.36*****
	0.110	0.116	0.113	0.105	0.105	0.104	0.099	0.088	0.085	0.080	0.108	0.097	0.091
(6) $\alpha_1 + \beta_1$	**-0.86*****	**-0.88*****	**-1.01*****	**-1.03*****	**-1.08*****	**-0.97*****	**-0.79*****	**-0.62*****	**-0.57*****	**-0.53*****	**-0.35*****	**-0.30*****	**-0.30*****
	0.138	0.151	0.172	0.169	0.174	0.187	0.177	0.172	0.181	0.136	0.112	0.101	0.095
(7) $\beta_1 + \beta_2 + \gamma_1$	**-1.23*****	**-1.19*****	**-1.28*****	**-1.26*****	**-1.29*****	**-1.23*****	**-1.15*****	**-1.01*****	**-0.96*****	**-0.86*****	**-0.37****	**-0.31****	**-0.30****
	0.143	0.154	0.161	0.152	0.154	0.163	0.155	0.139	0.139	0.116	0.143	0.129	0.121
(8) Post/Pre ZLB	**-0.37****	**-0.31***	**-0.27**	**-0.24**	**-0.22**	**-0.26**	**-0.36****	**-0.39****	**-0.4******0**	**-0.32****	**-0.02**	**-0.01**	**0.00**
	0.158	0.172	0.187	0.179	0.183	0.194	0.178	0.165	0.171	0.138	0.154	0.139	0.130
Line 7/Line 6	1.2	1.3	1.2	1.3	1.6	1.5	1.5	1.5	1.3	1.4	1.3	1.1	1.2

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods. Estimates are obtained using robust regression (MM-weighted least squares of Yohari (1987). Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$; *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$. Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to December 2015.

Table 13a
Robustness: Non-Nested Regressions - Book-to-Market Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
Conventional Period													
(1) TS (α_1)	**-0.30*****	**-0.33*****	**-0.35*****	**-0.35*****	**-0.42*****	**-0.44*****	**-0.49*****	**-0.46*****	**-0.52*****	**-0.48*****	**-0.19****	**-0.19****	**-0.16****
	(0.106)	(0.123)	(0.119)	(0.106)	(0.116)	(0.118)	(0.123)	(0.118)	(0.106)	(0.129)	(0.087)	(0.080)	(0.074)
(2) FG (β_1)	**-0.20***	**-0.21****	**-0.22****	**-0.18***	**-0.17***	**-0.24****	**-0.20****	**-0.24****	**-0.27****	**-0.33*****	**-0.13**	**-0.09**	**-0.07**
	(0.107)	(0.103)	(0.106)	(0.094)	(0.103)	(0.111)	(0.105)	(0.120)	(0.114)	(0.106)	(0.113)	(0.087)	(0.081)
Unconventional Period													
(3) FG (β_2)	**-0.50*****	**-0.54*****	**-0.54*****	**-0.56*****	**-0.59*****	**-0.68*****	**-0.71*****	**-0.72*****	**-0.75*****	**-0.73*****	**-0.23***	**-0.22****	**-0.21****
	(0.102)	(0.100)	(0.095)	(0.108)	(0.104)	(0.116)	(0.115)	(0.146)	(0.158)	(0.162)	(0.125)	(0.105)	(0.093)
(4) LSAP (γ_1)	**-0.14***	**-0.18***	**-0.18***	**-0.15***	**-0.15****	**-0.22****	**-0.28****	**-0.33****	**-0.39****	**-0.48*****	**-0.34*****	**-0.28****	**-0.23****
	(0.089)	(0.104)	(0.104)	(0.093)	(0.074)	(0.099)	(0.118)	(0.130)	(0.131)	(0.157)	(0.121)	(0.119)	(0.107)
(5) $\alpha_1 + \beta_1$	**-0.50*****	**-0.54*****	**-0.57*****	**-0.52*****	**-0.59*****	**-0.68*****	**-0.69*****	**-0.70*****	**-0.79*****	**-0.81*****	**-0.31****	**-0.28****	**-0.23****
	(0.154)	(0.164)	(0.163)	(0.145)	(0.159)	(0.166)	(0.166)	(0.173)	(0.160)	(0.171)	(0.146)	(0.120)	(0.113)
(6) $\beta_2 + \gamma_1$	**-0.64*****	**-0.72*****	**-0.72*****	**-0.71*****	**-0.74*****	**-0.90*****	**-0.99*****	**-1.05*****	**-1.14*****	**-1.21*****	**-0.57*****	**-0.50*****	**-0.44*****
	(0.139)	(0.146)	(0.141)	(0.148)	(0.133)	(0.158)	(0.173)	(0.210)	(0.206)	(0.203)	(0.141)	(0.131)	(0.115)
Line 6/Line 5	1.3	1.3	1.3	1.4	1.2	1.3	1.4	1.5	1.4	1.5	1.8	1.8	1.9

Notes: This table show the response of book-to-market excess portfolio returns to various policy surprises during the conventional and unconventional periods. Estimates are obtained separately for the conventional and unconventional periods. Policy shocks are also orthogonalized and standardized separately for each period. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to October 2008 for the conventional period and November 2008-December 2015 for the unconventional period.

Table 13b
Robustness: Non-Nested Regressions - Size Portfolios

	(i) *Lowest decile*	*(ii)* *2nd*	*(iii)* *3rd*	*(iv)* *4th*	*(v)* *5th*	*(vi)* *6th*	*(vii)* *7th*	*(viii)* *8th*	*(ix)* *9th*	*(x)* *Highest decile*	*(xi)* *Spread1*	*(xii)* *Spread2*	*(xiii)* *Spread3*
Conventional Period													
(1) TS (α_1)	**-0.43*****	**-0.49*****	**-0.61*****	**-0.65*****	**-0.63*****	**-0.56*****	**-0.43*****	**-0.37*****	**-0.32*****	**-0.25****	**-0.18****	**-0.18****	**-0.20*****
	(0.112)	(0.118)	(0.130)	(0.132)	(0.133)	(0.129)	(0.111)	(0.114)	(0.121)	(0.116)	(0.087)	(0.077)	(0.069)
(2) FG (β_1)	**-0.35*****	**-0.33*****	**-0.33*****	**-0.31****	**-0.33*****	**-0.32****	**-0.29****	**-0.24****	**-0.24****	**-0.21****	**-0.15***	**-0.12**	**-0.11**
	(0.107)	(0.111)	(0.125)	(0.126)	(0.125)	(0.130)	(0.128)	(0.115)	(0.112)	(0.082)	(0.083)	(0.075)	(0.067)
Unconventional Period													
(3) FG (β_2)	**-0.89*****	**-0.94*****	**-0.91*****	**-0.95*****	**-0.81*****	**-0.76*****	**-0.65*****	**-0.52*****	**-0.50*****	**-0.48*****	**-0.41*****	**-0.42*****	**-0.41*****
	(0.146)	(0.151)	(0.142)	(0.134)	(0.142)	(0.110)	(0.117)	(0.105)	(0.116)	(0.119)	(0.109)	(0.112)	(0.110)
(4) LSAP (γ_1)	**-0.27****	**-0.25****	**-0.23***	**-0.22***	**-0.27***	**-0.28***	**-0.31***	**-0.30****	**-0.38****	**-0.36*****	**0.09**	**0.11**	**0.10**
	(0.123)	(0.127)	(0.136)	(0.131)	(0.156)	(0.166)	(0.162)	(0.151)	(0.157)	(0.131)	(0.097)	(0.107)	(0.105)
(5) $\alpha_1 + \beta_1$	**-0.79*****	**-0.82*****	**-0.94*****	**-0.95*****	**-0.96*****	**-0.88*****	**-0.72*****	**-0.61*****	**-0.55*****	**-0.46*****	**-0.33*****	**-0.30*****	**-0.31*****
	(0.159)	(0.166)	(0.185)	(0.187)	(0.187)	(0.187)	(0.174)	(0.167)	(0.169)	(0.145)	(0.123)	(0.110)	(0.098)
(6) $\beta_2 + \gamma_1$	**-1.16*****	**-1.19*****	**-1.14*****	**-1.17*****	**-1.09*****	**-1.05*****	**-0.96*****	**-0.82*****	**-0.88*****	**-0.84*****	**-0.32****	**-0.31****	**-0.32****
	(0.191)	(0.197)	(0.197)	(0.187)	(0.211)	(0.199)	(0.200)	(0.184)	(0.196)	(0.177)	(0.147)	(0.155)	(0.152)
Line 6/Line 5	1.5	1.5	1.2	1.2	1.1	1.2	1.3	1.3	1.6	1.8	1.0	1.1	1.0

Notes: This table show the response of size-sorted excess portfolio returns to various policy surprises during the conventional and unconventional periods. Estimates are obtained separately for the conventional and unconventional periods. Policy shocks are also orthogonalized and standardized separately for each period. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Policy surprises are measured using intraday interest rates data 15 minutes before and 1 hour and 45 minutes after a policy announcement. *Spread1* denotes the difference in slopes across extreme deciles ($d^{10} - d^1$); *Spread2* denotes the difference in average responses between the four extreme deciles ($\frac{1}{2}(d^{10} + d^9) - \frac{1}{2}(d^1 + d^2)$); *Spread3* denotes the difference in average responses between the six extreme deciles ($\frac{1}{3}(d^{10} + d^9 + d^8) - \frac{1}{3}(d^1 + d^2 + d^3)$). Robust standard errors in parenthesis. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Sample period is May 1999 to October 2008 for the conventional period and November 2008-December 2015 for the unconventional period.

Appendix A

Major LSAP Announcements

Date	Time EST	Program	Announcement	Description	News Excerpts
11/25/2008	8:15am	LSAP-1	Initial Announcement of LSAP	Purchase up to $500 billion in MBS and $100 billion of agency debt	Stocks gained after the government said it was preparing to buy billions in bad mortgage debt.
12/1/2008	1:45pm	LSAP-1	Bernanke speech in Austin, Texas	Fed could purchase longer-term Treasury or agency securities in substantial quantities.	U.S. Treasury prices rose sharply, pushing yields to their lowest in five decades, as expectations built the Fed would become a large buyer.
12/16/2008	2:21 pm	LSAP-1	FOMC Statement	Evaluating the potential benefits of purchasing longer-term Treasury securities.	Stocks were rallying after the announcement on both the surprise element and the realization that the Fed is willing to do whatever it takes to battle deflation and get the economy "off the mat."
1/28/2009	2:15pm	LSAP-1	FOMC Statement	Ready to expand agency debt and MBS purchases and purchase longer-term Treasury securities	There was disappointment among some bond traders that the Fed did not announce specific plans Wednesday to buy Treasuries.
3/18/2009	2:17pm	LSAP-1	FOMC Statement	Purchase $750 billion of MBSs, increase purchases of agency debt by $100 billion; purchase up to $300 billion in long-term Treasuries.	Stocks rallied after the Federal Reserve said it would buy up to $300 billion in long-term government bonds.
8/10/2010	2:19pm	LSAP-2	FOMC Statement	Reinvest principal payments from MBS in longer-term Treasury securities.	The key take away is that Fed is keenly aware of the current economic situation and is both ready and willing to act aggressively
8/27/2010	10am	LSAP-2	Bernanke speech at Jackson Hole	Prepared to provide additional "unconventional measures"	The fact that Bernanke outlined some options about what the Fed could still do and is willing to do has helped an uptrend.
9/21/2010	2:18pm	LSAP-2	FOMC Statement	Maintain existing policy of reinvesting principal payments and is prepared to provide additional accommodation if needed	Investors looking for references to quantitative easing, cheered after Federal Reserve said it was "prepared to provide additional accommodation if needed to support the economic recovery."
10/15/2010	8:15am	LSAP-2	Bernanke Speech at Boston Fed	"there would appear...to be a case for further action."	Investors reacted positively to Fed chair Ben Bernanke's comments about the central bank's plans to pump more money into the economy.
11/3/2010	2:16pm	LSAP-2	FOMC Statement	Purchase $600 billion more in longer-term Treasury securities by Q2 2011	The real surprise was in the bond market, where yields on the longer term 10-year and 30-year rose, after traders realized the Fed's plan called for 91% of its purchases at shorter maturities than expected.

8/26/2011	10:00am		Bernanke speech at Jackson Hole	"The Fed will do all that it can to help restore high rates of growth and employment	Stocks saw a Ben Bernanke-fueled rally Friday. It looks like they're open to doing QE3, but they're going to wait for more data before taking action.
9/21/2011	2:24pm	MEP	FOMC Statement	Purchase $400 billion of long-term and sell an equal amount of short-term Treasury Securities	Stocks plunged after the Federal Reserve made Operation Twist a go. "Operation Twist was priced into the market, and investors needed a twist on the twist, something more.
6/20/2012	12:32pm	MEP	FOMC Statement	MEP extended until end 2012	The 10-year yield slid to 1.63% as traders signaled disappointment in Bernanke's comments.
8/31/2012	10:00am	LSAP3	Bernanke speech at Jackson Hole	"Provide additional policy accommodation as needed	The stock market initially ceded most of its gains but then bounced back on speculation that Bernanke may be building the case for more easing further down the road.
9/13/2012	12:31pm	LSAP3	FOMC Statement	Purchase additional agency MBS at a pace of $40 billion per month.	A rally on Wall Street gained momentum Thursday afternoon, sending stocks to fresh multi-year highs, as investors welcomed the Federal Reserve's new bond-buying plan.
12/12/2012	12:30pm	LSAP3	FOMC Statement	Purchase longer-term Treasury securities at a pace of $45 billion per month.	Stock prices jumped after the Fed released its policy statement
5/22/2013	12:30pm	Taper Tantrum	Bernanke Testimony	FOMC likely to slow asset purchases later in 2013 if economy continues to improve.	U.S. stocks slid Wednesday, reversing gains after comments from the Fed chief suggested the central bank may begin tapering its bond-buying program in coming months.
6/19/2013	12:30pm	Taper Tantrum	FOMC Statement	Bernanke (news conference): The Fed will start cutting back later this year and may stop entirely by the middle of 2014	Markets freaked out on the news. The Dow Jones industrial average closed down by more than 200 points, or 1.3%. The S&P 500 dropped 1.4% and the Nasdaq sank 1.1%.
9/18/2013	2:15pm	Taper Hold	FOMC Statement	Await more evidence that progress will be sustained before adjusting the pace of purchases.	Investors largely assumed that taper would begin this month, and have sent bond yields and mortgage rates soaring. But Wednesday's announcement caused stocks to rally as bond yields fell.
12/18/2013	2:00pm	Exit	FOMC Statement	Reduce monthly purchases of Treasuries and MBS to $35 billion and $40 billion.	The Dow Jones industrial average jumped more than 290 points after the Federal Reserve surprised some experts Wednesday by announcing a modest reduction, or tapering, in its bond buying program.
1/29/2014	2:0pm	Exit	FOMC Statement	Reduce monthly purchases of Treasuries and MBS to $30 billion and $35 billion.	Stocks sank more than 1% on Wednesday after the Federal Reserve announced plans to further reduce its monthly bond buying program.
3/19/2014	2:0pm	Exit	FOMC Statement	Reduce monthly purchases of Treasuries and MBS to $25 billion and $30 billion.	The Dow fell as many as 180 points before recovering after Yellen said the Fed's stimulus program would most likely be finished by the fall and that a rate hike could come as soon as early 2015.

Appendix B

Major Forward Guidance Announcements

12/16/2008	2:21 PM	FOMC Statement	exceptionally low rates… for some time	In its latest effort to try and stimulate the U.S. economy, the Federal Reserve said it expects to keep rates near that unprecedented low level for some time to come.
3/18/2009	2:17pm	FOMC Statement	exceptionally low rates… for an extended period	
8/9/2011	2:19pm	FOMC Statement	exceptionally low rates... at least through mid-2013.	The new two-year time horizon was an unusual move because the Fed doesn't typically signal its policies that far in advance
1/25/2012	12:28pm	FOMC Statement	exceptionally low rates... at least through late-2014	U.S. stocks shaved early losses and ended higher Wednesday afternoon after the Federal Reserve said it plans to keep interest rates near historic lows through late 2014.
9/13/2012	12:28pm	FOMC Statement	exceptionally low rates... at least through mid-2015	The Dow Jones Industrial Average, tacked on 206.51 points, or 1.5%, to 13539.86, its highest level since December 2007. With the Fed saying it planned to continue bond purchases and pledging to keep rates low until mid-2015, these trends could potentially play out for years to come.
12/12/2012	12:30pm	FOMC Statement	exceptionally low rates...at least as long as the unemployment rate remains above 6.5 percent	This was the first time the Fed has issued an exact target for the unemployment rate, and it marked the end of the Fed's calendar guidance, One economist called it an "historic move,"
12/18/2013	2:00pm	FOMC Statement	maintain current target range … well past the time that the unemployment rate declines below 6.5 percent	
3/19/2014	2:00pm	FOMC Statement	…dropped reference to unemployment rate	The Fed also said in its statement that was dropping its 6.5% unemployment threshold for hiking interest rates, instead saying that it will strive for maximum employment and 2% inflation before any rate change.
9/17/2014	2:00pm	FOMC Statement	maintain current target range ... for a considerable time after the asset purchase program ends,	Investors and economists had been debating whether the Fed would keep the "considerable time" language in its statement. If the Fed had dropped those two words, it could have been a signal from the central bank that it might look to hike interest rates in the spring of next year ... earlier than expected. Investors were pleased. They sent the Dow to a record level in the afternoon -- crossing 17,200 for the first time ever
10/29/2014	2:00pm	FOMC Statement	maintain current target rate for a considerable time following the end of asset purchase program. However, if incoming	Many economists found the statement more “hawkish,” easing off concerns about progress in the labor market. While the Fed did maintain its promise to keep rates low for a considerable

			information indicates faster progress ... then increases in the target range are likely to occur sooner than currently anticipated	time after this meeting, the rest of the statement sounds positive about the economy and thus reads more hawkishly from a market perspective.
12/17/2014	2:00pm	FOMC Statement	maintain current target rate...for a considerable time. Patient in beginning to normalize the stance of monetary policy.	The Federal Reserve is going to take its sweet time raising interest rates. And the market couldn't be happier.
1/28/2015	2:00pm	FOMC Statement	Patient in beginning to normalize the stance of monetary policy.	The Fed dropped the term "considerable time" it has been using to describe when it will start to hike rates. Stocks were up slightly ahead of the Fed announcement but lost those gains after the statement was released.
3/18/2015	2:00pm	FOMC Statement	an increase in the target range...unlikely at the April FOMC meeting.	The central bank reassured the market that a rate increase was "unlikely" at its next meeting in April. Stocks surged after the Fed's latest statement was released Wednesday afternoon.
6/17/2015	2:00pm	FOMC Statement/Press Conference	"No decision has been made about the right timing of an increase, but certainly an increase this year is possible," Janet Yellen , press conference	America's first interest rate hike in almost a decade could come on September 17 when the Fed holds its next meeting. It's being dubbed a "liftoff" moment, since interest rates are currently close to 0%.
9/17/2015	2:00pm	FOMC Statement/Press Conference	“we want to take a little bit more time to evaluate the likely rate hikes,” Janet Yellen press conference	The decision to leave rates unchanged, after months of discussion about raising them, reflected in part Ms. Yellen’s cautious nature as an individual and leader. Traders seemed unsure how to react to the news. Stocks zigzagged between big gains and modest losses on Thursday .
10/28/2015	2:00pm	FOMC Statement/Press Conference	consider raising interest rates… in the next meeting	The Fed opened the door more explicitly than they have before to raising rates at their final 2015 meeting.