

How do Unconventional Monetary Policy Surprises Affect U.S. Stock Returns at the Zero Lower Bound?

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Outline:

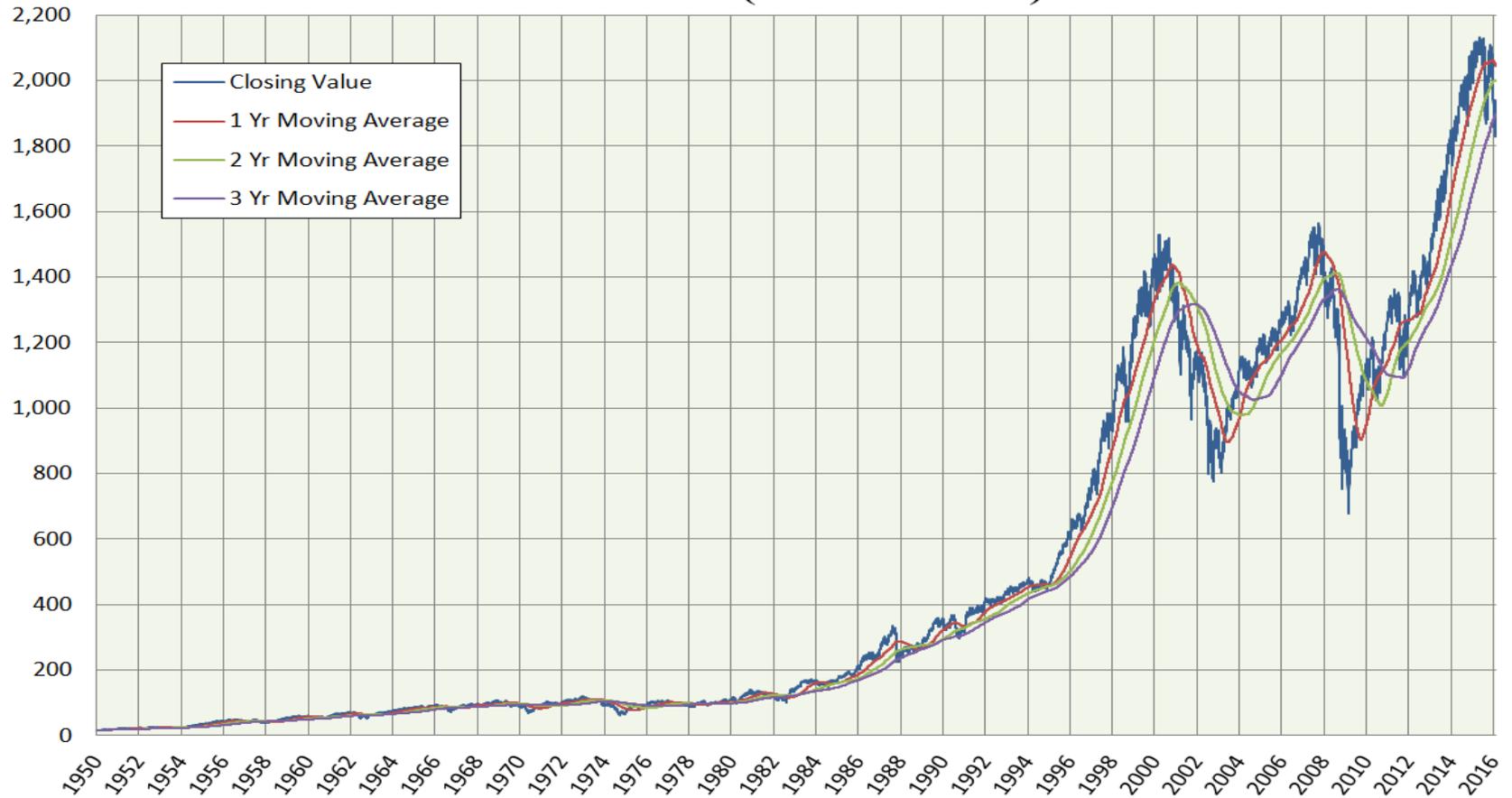
- The Impact of Financial Crisis in U.S.
- Research Introduction
- Previous Literature
- Data and Empirical Econometric Specifications
- Empirical Results
- Conclusions

U.S. Recessions in 21 Century

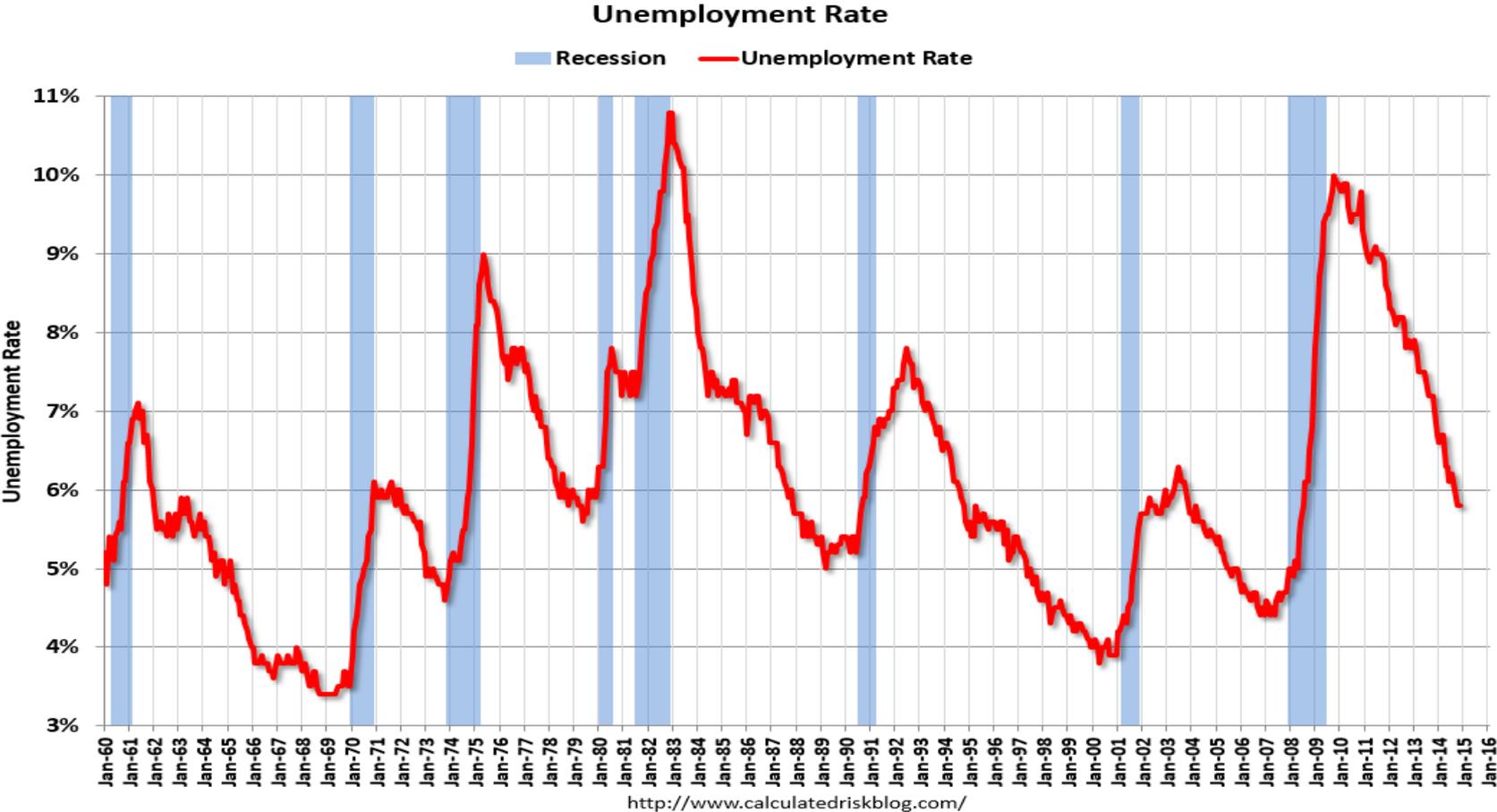
- 2001 – dot-com bubble
- 2007–08 – Global financial crisis
Subprime mortgage crisis,

S&P 500 Index

S&P 500 (1950-2016)



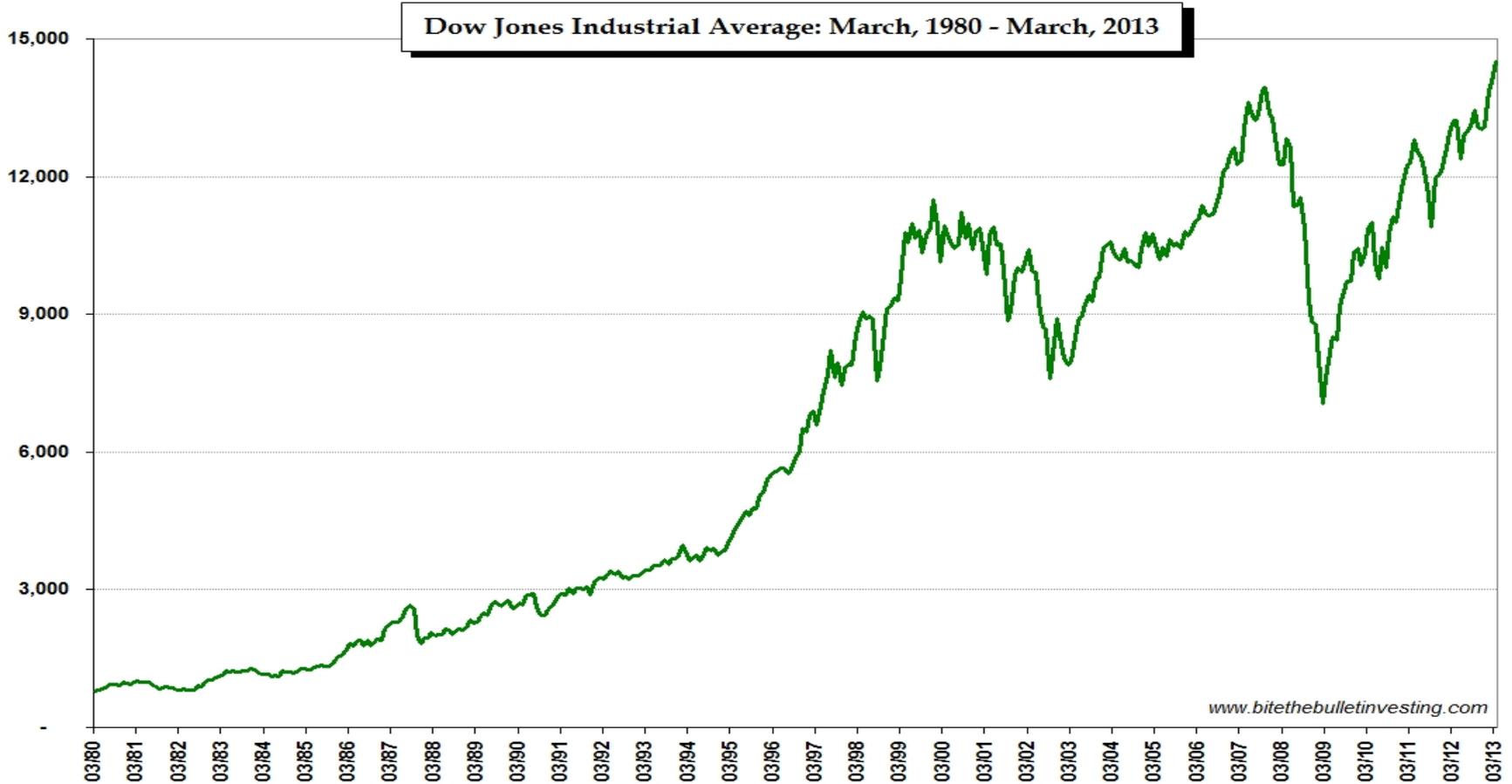
Unemployment Rate



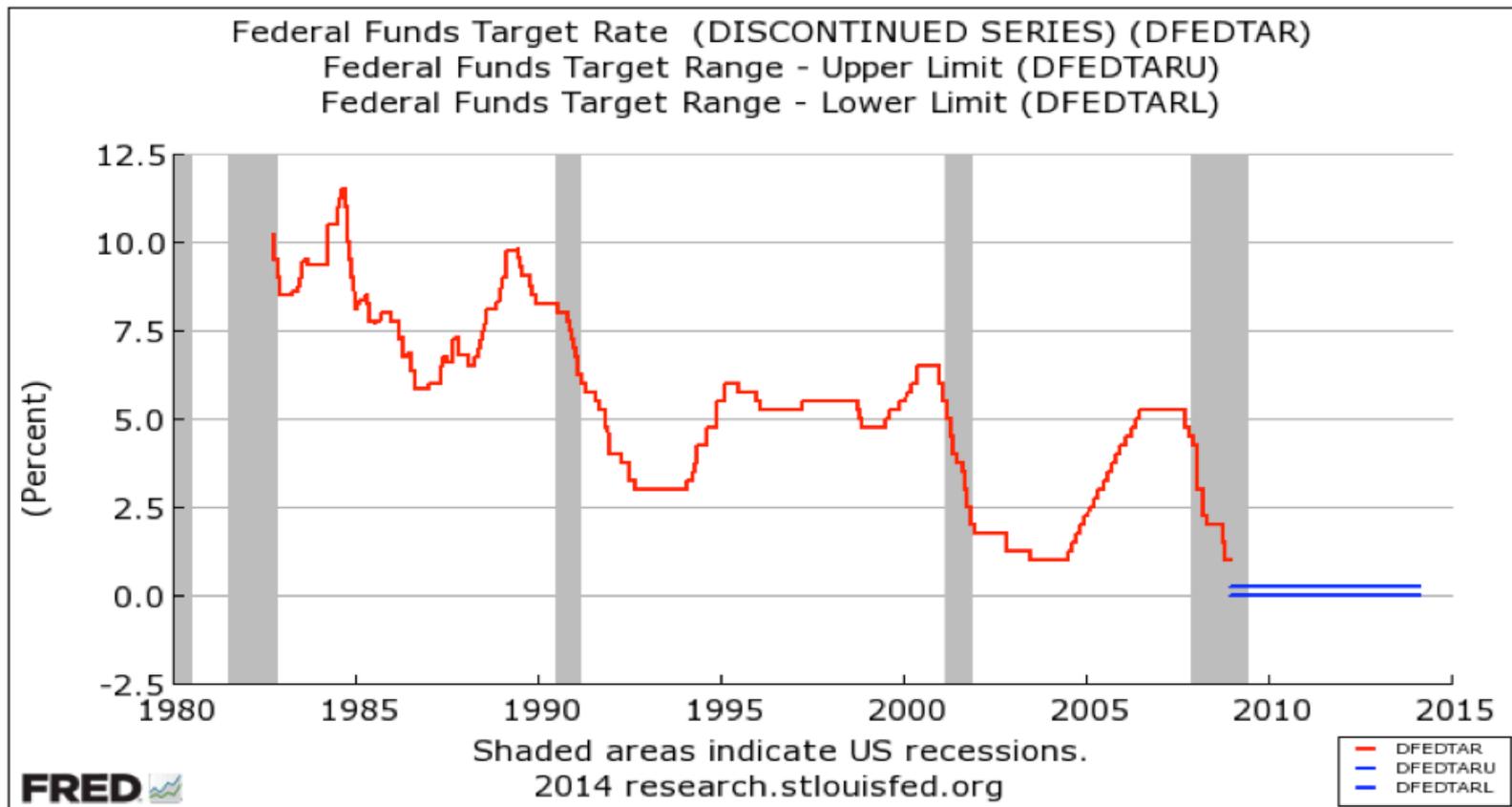
Real GDP Growth



Dow Jones Index



Federal Funds Rate Target



The Impact of Monetary Policy Shock on Stock Market

- Conventional Monetary Policy

- Federal Funds Rate

- Unconventional Monetary Policy

When the monetary policy is stuck at the zero lower bound, conventional monetary policy seems unable to effectively stimulate aggregate demand,

therefore, the FOMC started using an unconventional approach to stimulate aggregate demand by implementing the Large-Scale Asset Purchases (LSAP) program.

QE (Quantitative Easing)

- QE is simply LSAP by the central bank.
- LSAP program is Fed purchases housing agency debt, agency mortgage-backed securities, and longer term Treasury securities.
- The main goal of the Fed's LSAP program is to put downward pressure on longer-term yields, ease financial conditions, and effectively stimulate economic growth.

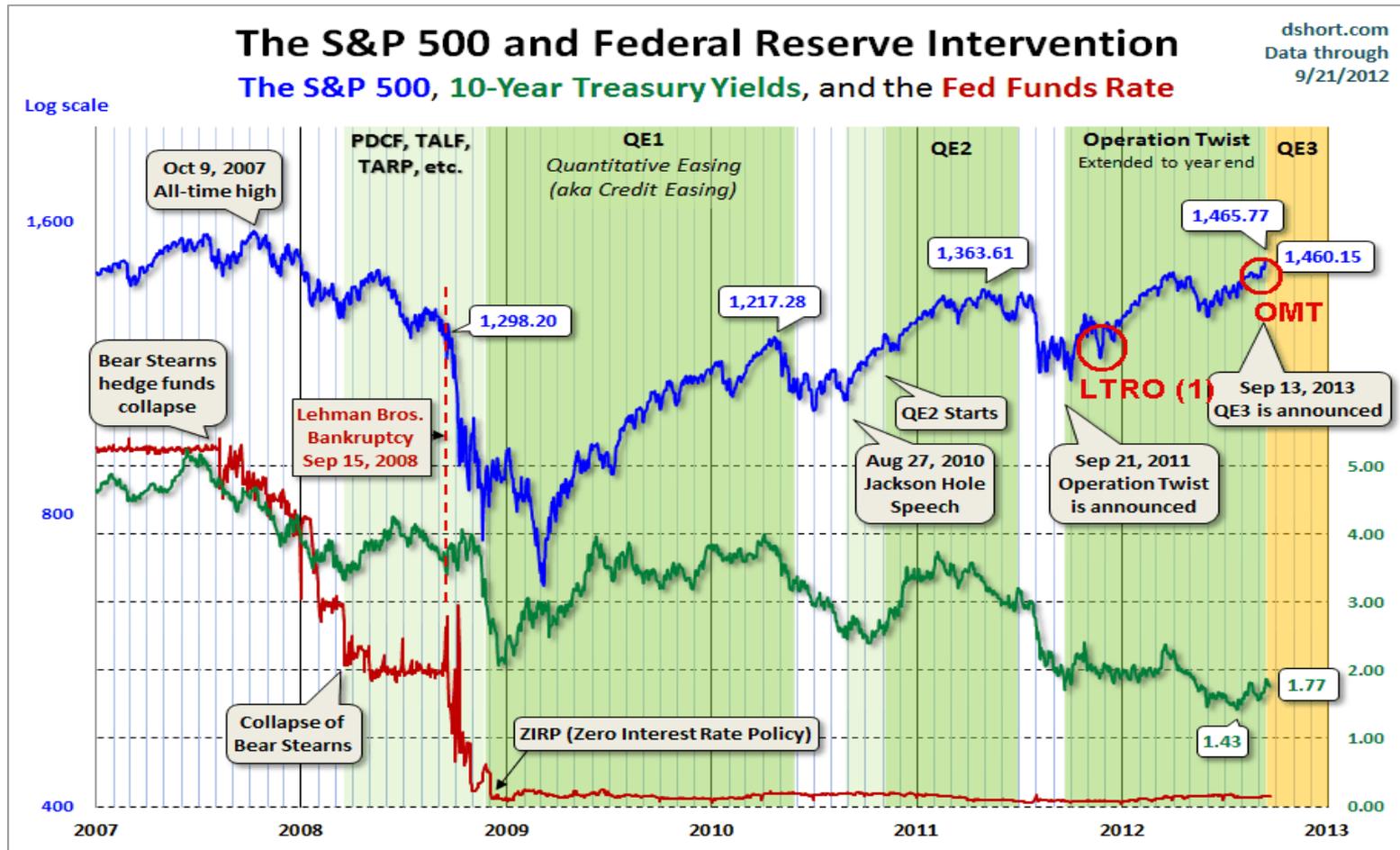
歷次美國量化寬鬆實施概況

項目	實施期間	規模(美元)	每月債券購買金額(美元)
QE1	2009年3月~ 2010年3月	1.55兆	買進560億MBS 買進235億債券
QE2	2010年8月底~ 2012年6月	6000億	買進750億債券
OT1	2011年9月~ 2012年6月	4000億	買長債賣短債(相同金額)
OT2	2012年7月~ 2012年12月	2670億	買長債賣短債(相同金額)
QE3	2012年9月起~ 無限期	無上限，直至 就業市場改善	買進400億MBS
QE4	2013年1月起~ 無限期	無上限，直至 就業市場改善	買進450億債券

資料來源: Bloomberg、元大寶來投信整理

■ 聯合晚報

Various Round QE



Previous Literature

- The impact of conventional monetary shock:

Some studies provided empirical evidences unconventional monetary policy has an immediate impact on stock returns.

[Tsai, 2014, Tsai, 2013, Jansen and Tsai, 2010, Basistha and Kurov (2008), Bernanke and Kuttner (2005), Ehrmann and Fratzscher (2004), and Guo (2004)]

Conventional monetary policy may have asymmetric impacts on stock returns

- Basistha and Kurov (2008) also find that stock returns respond more strongly to surprise changes in monetary policy during recessions, and in tight credit market conditions.
- Jansen and Tsai (2010) and Kurov (2010) provide evidence that the stock returns of firms in a bear market exhibit a higher magnitude response to monetary policy actions than those same firms in a bull market.
- Scharler (2008) find stock returns of the higher exposure of bank-dependent firms respond more to monetary policy shocks.
- Ehrmann and Fratzscher (2004) report that as firms are more financially constrained, they are more strongly influenced by monetary policy shocks.

The Impact of LSAP on financial markets

- The implement of LSAP motivates many studies to investigate how the transmission mechanism of LSAP affects financial markets.
 - Bond Market
 - Exchange Rate
 - Commodity Market
 - Borrowing Cost
 - Stock Market

The Impact of LSAP on interest rates

- Some studies provide evidence that suggests that the Fed's LSAP announcements have a significant impact in terms of lowering the interest rates on various kinds of bonds through the signal channel and portfolio balance channel.

[Bauer and Neely (2014); Glick and Leduc (2012); Wright (2012), Hamilton and Wu, (2012); Krishnamurthy and Vissing-Jorgenson (2011)].

The Impact of LSAP on commodity market and exchange rate.

- Glick and Leduc(2012) examined the impact of LSAP announcements on the commodity market and exchange rate.
- Glick and Leduc(2012) proposed that LSAP announcements likely involved signaling effects about future growth that led investors to downgrade their U.S. growth forecasts
 - * lowering long-term US yields,
 - * depreciating the value of the U.S. dollar,
 - * triggering a decline in commodity prices.

the impact of unconventional monetary policy on stock market--1

- Glick and Leduc (2012) investigate the stock market's reaction to LSAP announcements days,
- and find the average daily movements in S&P 500 stock prices rose on average following LSAP announcements.

the impact of unconventional monetary policy on stock market--2

- control for market expectations to assess the impact of the announcements on stock market,
- Rogers et. al.,(2014), Wright (2012) regress monetary policy surprises on S&P 500 intraday returns , and found an easing monetary surprise significantly boosted the stock returns.

the impact of unconventional monetary policy surprises on stock market--3

- Glick and Leduc (2012) use S&P 500 daily price, and also find the effect of unconventional monetary surprise on daily stock returns at the 10% significance level.
- Bowman et al. (2015) focus on emerging market economies to investigate the effects of U.S. unconventional monetary policies on foreign headline daily stock index, and find stock returns in some emerging markets responded strongly to U.S. unconventional monetary policy announcements.

Firm-level data--1

- The impact of monetary surprises on individual stocks appears to be strongly heterogeneous.
- Prior crisis, some studies already used firm-data to investigate the impact of conventional monetary policy shocks on stock returns.

[Tsai,2014, Tsai,2010, Ehrmann and Fratzscher, 2004]

In contrast, few studies have used firm-level data to look at the impact of unconventional policy surprises on stock returns.

Firm-level data--3

- Few studies have used firm-level data to look at the impact of unconventional policy surprises on stock returns.
- While we use firm-level data, then we can investigate the industry-effect, and financial-constraint effect of unconventional monetary surprise on stock returns.
- We also can investigate the impact of unconventional monetary surprise on stock returns volatility.

the impact of monetary policy on stock returns

Event Study---daily data

- Farka (2009) proposed
 1. “omitted variable bias,”
 2. “endogeneity bias”

the impact of conventional monetary policy on stock returns

Event Study---Intraday data

- In order to correctly identifying the monetary policy shock, some papers use higher frequency data.

[Hausman and Wongswan (2011), Ammer, Vega, and Wongswan (2010), Chulia, Martens, and van Dijk (2010), and Farka (2009)].

- Using intraday stock returns
allows the construction of a narrower window around the FOMC announcement, and mitigates the impact of other news occurring on the same day as the FOMC announcement.

Intraday firm-level data

- we use intraday firm-level data to examine the impact of unconventional monetary policy surprises on stock return.
- We use the high-frequency monetary surprise in one 30-minutes width around the FOMC announcement.
- This window is 10 minutes before to 20 minutes after the announcement.

Some research questions we concern --1

- We estimate

1. the impact of a conventional monetary policy surprise on stock returns.
2. the responses of stock returns are dependent on the sign of the unconventional monetary policy surprise.
3. whether the stock returns respond differently to unconventional monetary surprises across LSAP announcement days and non-LASP announcement days.

Some research questions we concern--2

4. whether the stock returns respond differently to positive and negative unconventional monetary surprises across LSAP and non-LASP announcement days.
5. the industry-specific effects to an unconventional monetary policy on stock returns are different?
6. the possible asymmetries for industries in terms of the impact of an unconventional monetary policy announcement surprise across LSAP and non-LSAP announcement days.

Some research questions we concern --3

7. whether the responses of intraday stock returns differ between easing and tightening unconventional monetary surprises across various industries.
8. the impacts of various LSAP announcements on stock returns are different?
9. the impact of an unconventional monetary announcement surprise on stock returns for a financially constrained firm is different from that of financially unconstrained firm?

Some research questions we concern --4

10. the effects of unconventional monetary surprises on intraday stock returns volatility
11. the impacts of various LSAP announcements on intraday stock returns volatility are different?

Data

- Data set contains 40 announcement days between November 2008 and January 2013.
- 5 LSAP1; 5 LSAP2; 3 OT, 3 LSAP3
- The samples cover 658 firms for a total of 26,320 observations.

Measurement of Monetary Announcement Surprises

- Based on Wright (2012), we measured the surprise component of monetary announcements, which is computed as the first principal component of yield changes from 10 minutes before each of these announcements to 20 minutes after the announcements.
- These surprises are rescaled to have a standard deviation of one, and adjusted so that a positive surprise represents falling yields.
- In other words, a positive surprise represents an expansionary monetary shock and a negative surprise represents a contractionary monetary shock.

Measurement of Intraday Stock Returns

- Stock market data used in our paper include the Trade and Quote (TAQ) database, and the Compustat database.
- Intraday returns are calculated within 30-minutes window surrounding FOMC announcement time,

$$R_{i,t} = 100 * (\log P_{i,t,\tau+20} - \log P_{i,t,\tau-10})$$

Econometric methodology--1

- The methodology is that for an event study.
- The impact of a unconventional monetary policy surprise on stock returns is estimated by pooling data in the manner suggested by Ehrmann and Fratzscher (2004).
- We assumes that the disturbances are heteroskedastic and contemporaneously correlated across panels.

Econometric methodology--2

$$R_{i,t} = \beta_0 + \beta_1 \text{MPS}_t + \beta_2 \text{VIX}_t + \varepsilon_{i,t}$$

$$R_{i,t} = \beta_0 + \beta_{1,P} \text{MPS}_t * D_t(\text{MPS}_t > 0) + \beta_{1,N} \text{MPS}_t * D_t(\text{MPS}_t < 0) + \beta_2 \text{VIX}_t + \varepsilon_{i,t}$$

VIX represents the Chicago Board Options Exchange Market Volatility Index of the implied volatility of the S&P 500 index options.

Date	LSAP Round	Announcement Time	Policy Surprises	Daily Returns (%)	30-window Stock returns(%)
2008/11/25	LSAP1	08:15	0.35		N/A
2008/12/1	LSAP1	13:45	1.25	-0.068(0.079)	-0.295(0.880)
2008/12/16	LSAP1	14:15	2.06	0.035(0.050)	1.500(0.972)
2009/1/28	LSAP1	14:15	-0.21	0.019(0.043)	-0.533(0.849)
2009/3/18	LSAP1	14:15	4.52	0.046(0.057)	1.857(1.521)
2009/4/29		14:15	-1.15	0.019(0.055)	0.672(0.702)
2009/6/24		14:15	-1.58	0.007(0.022)	-0.739(0.574)
2009/8/12		14:15	-0.37	0.016(0.022)	-0.378(0.461)
2009/9/23		14:15	1.44	-0.013(0.021)	0.634(0.424)
2009/11/4		14:15	-0.13	-0.006(0.022)	0.194(0.422)
2009/12/16		14:15	-0.51	0.002(0.018)	-0.152(0.323)
2010/1/27		14:15	-0.76	0.003(0.022)	0.123(0.417)
2010/3/16		14:15	0.52	0.009(0.015)	0.187(0.296)
2010/4/28		14:15	-0.15	0.001(0.023)	0.312(0.364)
2010/6/23		14:15	0.18	-0.004(0.015)	0.343(0.300)
2010/8/10	LSAP2	14:15	0.84	-0.004(0.018)	0.788(0.397)
2010/8/27	LSAP2	10:00	-0.46	0.016(0.016)	-0.059(0.599)
2010/9/21	LSAP2	14:15	0.23	-0.005(0.016)	0.773(0.579)
2010/10/15	LSAP2	08:15	-0.09		N/A
2010/11/3	LSAP2	14:15	-0.55	0.001(0.015)	-0.341(0.377)

2010/12/14		14:15	-0.01	-0.003(0.017)	0.032(0.246)
2011/1/26		14:15	0.13	0.008(0.021)	-0.032(0.293)
2011/3/15		14:15	-0.53	0.019(0.023)	0.262(0.291)
2011/4/27		12:30	0.36	0.004(0.018)	0.173(0.328)
2011/6/22		14:15	-0.43	-0.002(0.012)	0.078(0.225)
2011/8/9	OT	14:15	1.22	0.045(0.037)	-0.979(0.668)
2011/8/26	OT	10:00	-0.08	0.024(0.019)	0.103(0.612)
2011/9/21	OT	14:15	0.01	-0.033(0.024)	-0.795(0.435)
2011/11/2		12:30	-0.19	0.003(0.023)	-0.225(0.334)
2011/12/13		14:15	0.08	-0.021(0.025)	-0.998(0.496)
2012/1/25		12:30	0.78	0.013(0.024)	0.274(0.563)
2012/3/13		14:15	-0.55	0.013(0.016)	-0.052(0.269)
2012/4/25		12:30	-0.16	0.013(0.016)	-0.005(0.311)
2012/6/20		12:30	0.14	0.005(0.024)	0.063(0.394)
2012/8/1		14:15	-0.48	-0.002(0.016)	-0.145(0.451)
2012/8/31	LSAP3	10:00	0.24	-0.007(0.022)	0.238(0.610)
2012/9/13	LSAP3	12:30	-1.11	-0.001(0.014)	0.797(0.657)
2012/10/24		14:15	0.11	0.017(0.017)	-0.054(0.347)
2012/12/12	LSAP3	12:30	-0.21	-0.009(0.023)	0.424(0.335)
2013/1/30		14:15	0.16	-0.001(0.016)	-0.099(0.277)

Table2: Descriptive Statistics (Sample Period: November 2008–September2013)

Number of Firms	658
Number of Monetary Policy Announcements	40
Total Observations	26,320
Monetary Surprises	0.122(1.011)
Monetary Surprises on LSAP Days	0.554(1.365)
Monetary Surprises on Non-LSAP Days	-0.129(0.602)
VIX	25.421(11.202)
Intraday Stock Returns(%)	0.106(0.796)
Intraday Stock Returns on Non-LSAP Days	0.023(0.538)
Intraday Stock Returns on LSAP Days	0.248(1.091)
Intraday Stock Returns on LSAP1 Days	0.632(1.519)
Intraday Stock Returns on LSAP2 Days	0.290(0.706)
Intraday Stock Returns on OT Days	-0.557(0.748)
Intraday Stock Returns on LSAP3 Days	0.486(0.599)

stock returns respond differently to positive and negative monetary surprises?--1

- **Prior to the financial crisis:**

- * Bernanke and Kuttner (2005) found no evidence of asymmetric effects of positive and negative news on daily stock returns.

- * Tsai (2014), Chulia et al. (2010) found that negative target surprises have significantly stronger impacts on intraday stock returns compared to positive target surprises.

Investors respond more rationally to good news than to bad news.

stock returns respond differently to positive and negative monetary surprises? --2

- At the zero lower bound:

Glick and Leduc(2012) found easing monetary shocks tend to lower daily S&P 500 stock returns, and contractionary monetary shocks tend to boost daily stock returns, and then suggest that LSAP announcements signaled more pessimistic economic conditions to stock market participants.

However, few papers use intraday firm-level stock returns to examine the asymmetric effect of unconventional easing and contractionary monetary surprises on stock returns.

This motivates us to reexamine if intraday stock returns differently respond to unconventional easing monetary surprises from unconventional contractionary monetary surprises.

stock returns differently respond to monetary surprises on LSAP from on non-LSAP announcement days?

- LSAP improve the availability of bank credit (Joyce et al. ,2012), and lower real borrowing costs(Gilchrist et al, 2015), therefore LSAP make easier for firms to obtain a bank loan.
- We should presumably observe a significant rise in stock returns through easing monetary surprises on LSAP announcement days.

Table 3: The Impact of Unconventional Monetary Policy Surprises on Stock Returns

	Eq.(2)	Eq.(3)	Eq.(4)	Eq.(5)
Constant	0.327 (0.206)	0.249 (0.190)	0.399* (0.210)	0.231 (0.211)
Monetary Surprises	0.340*** (0.085)			
Positive Surprises		0.518*** (0.101)		
Negative Surprises		-0.169 (0.202)		
Difference P value		0.006***		
Monetary Surprises On non-LSAP Days			0.170 (0.161)	
Monetary Surprises On LSAP Days			0.418*** (0.105)	
Difference P value			0.220	
Positive Surprises On non-LSAP Days				0.487* (0.279)
Positive Surprises On LSAP Days				0.518*** (0.104)
Difference P value				0.916
Negative Surprises On non-LSAP Days				-0.089 (0.219)
Negative Surprises On LSAP Days				-0.432 (0.358)
Difference P value				0.359
VIX	-0.010 (0.008)	-0.015** (0.007)	-0.014* (0.008)	-0.014* (0.008)
Adjusted R square	0.157	0.217	0.171	0.224

the effect of a monetary policy surprise on stock returns varies across industries?

- Prior to the financial crisis:
- Stock returns for capital-intensive industries respond more to conventional monetary surprises.
- up until now, few research papers have examined the impact of monetary policy surprises on stock returns across industries at the zero lower bound.

Table 6: The Impact of Unconventional Monetary Policy Surprises on Stock Returns by Industrial Groups

	Service	Mining	Construction	Manufacturing	Transportation	Wholesale Trade	Retail Trade	Finance	Agriculture	Public Administration
Number of Firms	66	78	13	239	70	9	49	131	1	2
Equation(6)										
Monetary Surprises	0.226***	0.491***	0.647***	0.280***	0.333***	0.218**	0.262***	0.425***	0.231***	0.568***
	(0.082)	(0.109)	(0.149)	(0.082)	(0.072)	(0.093)	(0.082)	(0.092)	(0.083)	(0.090)
Equation(7)										
Monetary Surprises	0.288***	0.522***	0.790***	0.346***	0.413***	0.275**	0.336***	0.557***	0.325***	0.674***
on LSAP Days	(0.104)	(0.132)	(0.2172)	(0.102)	(0.091)	(0.114)	(0.102)	(0.109)	(0.102)	(0.109)
Monetary Surprises	0.106	0.469**	0.274	0.149	0.158	0.114	0.106	0.087	0.016	0.314*
on non-LSAP Days	(0.159)	(0.217)	(0.293)	(0.156)	(0.132)	(0.180)	(0.156)	(0.171)	(0.155)	(0.109)
Equation(8)										
Positive Monetary Surprises	0.358***	0.665***	0.943***	0.438***	0.505***	0.382***	0.427***	0.663***	0.430***	0.777***
	(0.103)	(0.133)	(0.174)	(0.099)	(0.085)	(0.113)	(0.099)	(0.105)	(0.097)	(0.105)
Negative Monetary Surprises	-0.127	-0.004	-0.260	-0.161	-0.153	-0.246	-0.204	-0.287	-0.348*	-0.043
	(0.206)	(0.278)	(0.375)	(0.197)	(0.161)	(0.230)	(0.197)	(0.212)	(0.190)	(0.211)

Analyze the effectiveness of LSAP1, LSAP2, OT, and LSAP3 on stock returns

- Without controlling the monetary surprises of LSAP announcements,
- Krishnamurthy and Vissing-Jorgenson (2011) found the impacts of LSAP1 announcements on 10-year Treasury rate and corporate bond rates are significantly larger than those of LSAP2.
- Click and Leduc (2012) found that the unconditional effects of LSAP1 on commodity prices are significantly larger than those of LSAP2.
- and explains that LSAP1 occurred when financial markets were deeply impaired, thus had a larger impact compared to during LSAP2, which took place during a relatively more tranquil period.

Analyze the effectiveness of LSAP1, LSAP2, OT, and LSAP3 on stock returns

- controlling the monetary surprises of LSAP announcements,
- Click and Leduc (2012) indicate that LSAP2 announcements actually had a larger effect on the 10-year Treasury rate than did LSAP1 announcements.
- So far, few papers have compared the effectiveness of the impact that these announcements regarding the LSAP have had on stock returns.

Table 6: The Impact of Monetary Policy Surprises on Stock Returns for Various LSAP announcements

Equation (8)	Monetary Surprises on Non-LSAP Days	Monetary Surprises on LSAP 1	Monetary Surprises on LSAP 2	Monetary Surprises on OT	Monetary Surprises on LSAP 3
Monetary Surprises	0.210* (0.120)	0.545*** (0.099)	0.815*** (0.299)	-0.540* (0.328)	-0.414 (0.347)

Considering financial constraints

- The firms with financial constraints generally have lower debt capacity, which in turn makes it more difficult for them to gain access to external finance.
- Prior to the financial crisis:

The stock returns of financially constrained firms were more strongly and negatively influenced by the surprise change in a tight monetary policy through the balance sheet channel.

[Tsai, (2014); Jansen and Tsai, (2010); Ehrmann and Fratzscher, (2004)].

we are concerned with

- whether the stock returns of financially unconstrained firms respond more positively to a easing monetary policy surprise compared to financially constrained firms?

Measurement of financially constraints

- S&P Debt Rating
- Cash Dividend Payout

Table 7: Summary Statistics for Measures of Financial Constraints

		Number of firms	Mean	Standard deviation	Minimum	Maximum
S&P Rating	Debt	350	0.139	0.346	0	1
Cash Dividend Payout		290	0.036	0.532	0	1

The ability of a firm's external debt capacity and the effect of monetary policy.

	Financially unconstrained	Financially constrained	Difference P value
Panel (a): Debt Rating			
Monetary Surprise	0.355***(0.087)	0.343***(0.090)	0.579
Positive Monetary Surprise	0.551***(0.102)	0.497***(0.109)	0.039**
Negative Monetary Surprise	-0.203(0.318)	-0.098(0.225)	0.104
Panel (b): Cash Dividend Payout			
Monetary Surprise	0.343***(0.083)	0.322***(0.089)	0.310
Positive Monetary Surprise	0.525***(0.010)	0.472***(0.108)	0.031**
Negative Monetary Surprise	-0.173(0.198)	-0.114(0.219)	0.356

FOMC announcements affect stock returns volatilities-1

- There are several studies already examined how FOMC announcements prior crisis significantly affect stock returns volatilities.
- Most these studies find conventional monetary policy announcements as an important source of short-run volatility in the stock market.

[Gospodinov and Jamali, 2012, Hussain, 2011, Chulia, 2010, Anderson, 2010, Farka, 2009, Lunde and Zebedee, 2009, Chen, and Clements,2007].

FOMC announcements affect stock returns volatilities-2

- Some papers provide the evidences the effect of conventional monetary policy shocks on stock returns volatility is significant.
- Bomfim(2003) proposed “News Effect” channel for which how monetary policy shocks affects stock market volatility.
- Since the announcement of the monetary policy might reveal and conveys new information about the economics and financial environments, market participants immediately process newly received information.

the asymmetric impact of monetary policy shocks on stock returns volatility

- Chulia et al (2010), Andersen et al. (2007) find the stock returns volatilities respond more to monetary surprises in recessions than in expansions states.
- Farka (2009) find the volatility of stock returns in response to conventional monetary surprises in monetary easy cycle is higher than that in tightening one.

How unconventional monetary announcements affect stock returns volatilities?

- Few studies examine the impact of unconventional monetary policy surprises at ZLB on stock returns volatility.
- We use firm-level data to investigate the effect of unconventional monetary surprises on returns volatility.
- We examine if the impact of an easing monetary announcement surprise on stock volatilities is larger than a contractionary surprise at ZLB.
- We compare how stock returns volatility responds among three rounds of LSAP announcements and OT.

Measure of Returns Volatilities

- We follow Chulia et al (2010) to compute the realized volatility for the announcement.
- Our paper here calculates the RV for 60-minutes window between 10 minutes before the announcement until 50 minutes thereafter as

$$RV_{i,t} = \sqrt{\sum_{k=m, k \neq 0}^u (R_{i,t,k})^2}$$

Table : The Impact of Unconventional Monetary Policy Surprises on Stock Returns Volatility

	Eq.()	Eq.()	Eq.()	Eq.()
Constant	0.128 (0.129)	0.160 (0.137)	0.259*** (0.132)	0.263* (0.143)
[Monetary Surprises]	0.244*** (0.072)			
[Positive Surprises]		0.254*** (0.073)		
[Negative Surprises]		0.159 (0.145)		
Difference P value		0.503		
[Monetary Surprises] On non-LSAP Days			-0.027 (0.128)	
[Monetary Surprises] On LSAP Days			0.289*** (0.070)	
Difference P value			0.013**	
[Positive Surprises] On non-LSAP Days				-0.126 (0.189)
[Positive Surprises] On LSAP Days				0.290*** (0.071)
Difference P value				0.033**
[Negative Surprises] On non-LSAP Days				0.033 (0.149)
[Negative Surprises] On LSAP Days				0.335 (0.243)
Difference P value				0.236

Table : The Impact of Unconventional Monetary Policy Surprises on Stock Returns Volatility by Industrial Groups

	Service	Mining	Construction	Manufacturing	Transportation	Wholesale Trade	Retail Trade	Finance	Agriculture	Public Administration
Equation()										
Monetary Surprises	0.110 (0.075)	0.312*** (0.081)	0.649*** (0.112)	0.131* (0.070)	0.196*** (0.066)	0.056 (0.062)	0.175*** (0.062)	0.533*** (0.092)	0.099 (0.087)	0.413*** (0.095)
Equation()										
Monetary Surprises on LSAP Days	0.149** (0.075)	0.363*** (0.077)	0.716*** (0.108)	0.172** (0.069)	0.236*** (0.066)	0.091 (0.060)	0.212*** (0.062)	0.594*** (0.087)	0.145* (0.085)	0.464*** (0.092)
Monetary Surprises on non-LSAP Days	-0.098 (0.141)	-0.012 (0.144)	0.160 (0.214)	-0.092 (0.127)	-0.021 (0.120)	-0.102 (0.106)	-0.005 (0.110)	0.106 (0.167)	-0.171 (0.163)	0.087 (0.179)
Equation()										
Positive Monetary Surprises	0.116 (0.077)	0.325*** (0.081)	0.665*** (0.113)	0.138* (0.071)	0.205*** (0.068)	0.065 (0.063)	0.179*** (0.064)	0.552*** (0.092)	0.109 (0.088)	0.436*** (0.092)
Negative Monetary Surprises	0.080 (0.155)	0.190 (0.166)	0.479** (0.241)	0.092 (0.142)	0.125 (0.132)	-0.005 (0.119)	0.178 (0.122)	0.315 (0.191)	0.015 (0.183)	0.155 (0.197)

Table: The Impact of Unconventional Monetary Policy Surprises on Stock Returns Volatility for Various LSAP announcements

Monetary Surprises on Non-LSAP Days	Monetary Surprises on LSAP 1	Monetary Surprises on LSAP 2	Monetary Surprises on OT	Monetary Surprises on LSAP 3
0.028 (0.104)	0.270*** (0.057)	0.520** (0.228)	1.217*** (0.201)	0.116 (0.219)

Conclusions--1

- easing change in monetary announcement surprises tends to lead to an increase in stock returns within 30 minutes, and a tightening change in monetary surprises tends to lead to a insignificantly decline in stock returns.
- monetary easing surprise statistically and positively impacts the stock returns during LSAP announcement days.

Conclusions--2

- Capital-sensitive firms in the construction, and finance sectors were impacted the most.
- the impacts during the LSAP2 are more than LSAP1.
- a easing monetary surprise positively stimulate more stock returns for financially unconstrained firms than for financially constrained firms.

Conclusions--3

- Easing in absolute monetary announcement surprises tends to increase in stock returns volatility, and a tightening in monetary surprises tends a insignificantly effect in stock returns volatility .
- absolute monetary announcement surprises on LSAP day significantly increase in stock returns volatility.
- Stock returns volatility respond more on LSAP2 and OT.
- Stock returns volatility on construction, and finance sectors respond the most.

THANK YOU!