Measuring the Effects of Unconventional Monetary Policy on Asset Prices

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FOMC began to pursue "**unconventional monetary policy**" to try to lower longer-term interest rates and stimulate the economy:

- Forward guidance: information about the future path of the federal funds rate
- Large-scale asset purchases (LSAPs): purchases of hundreds of billions of $ of longer-term Treasury and mortgage-backed securities

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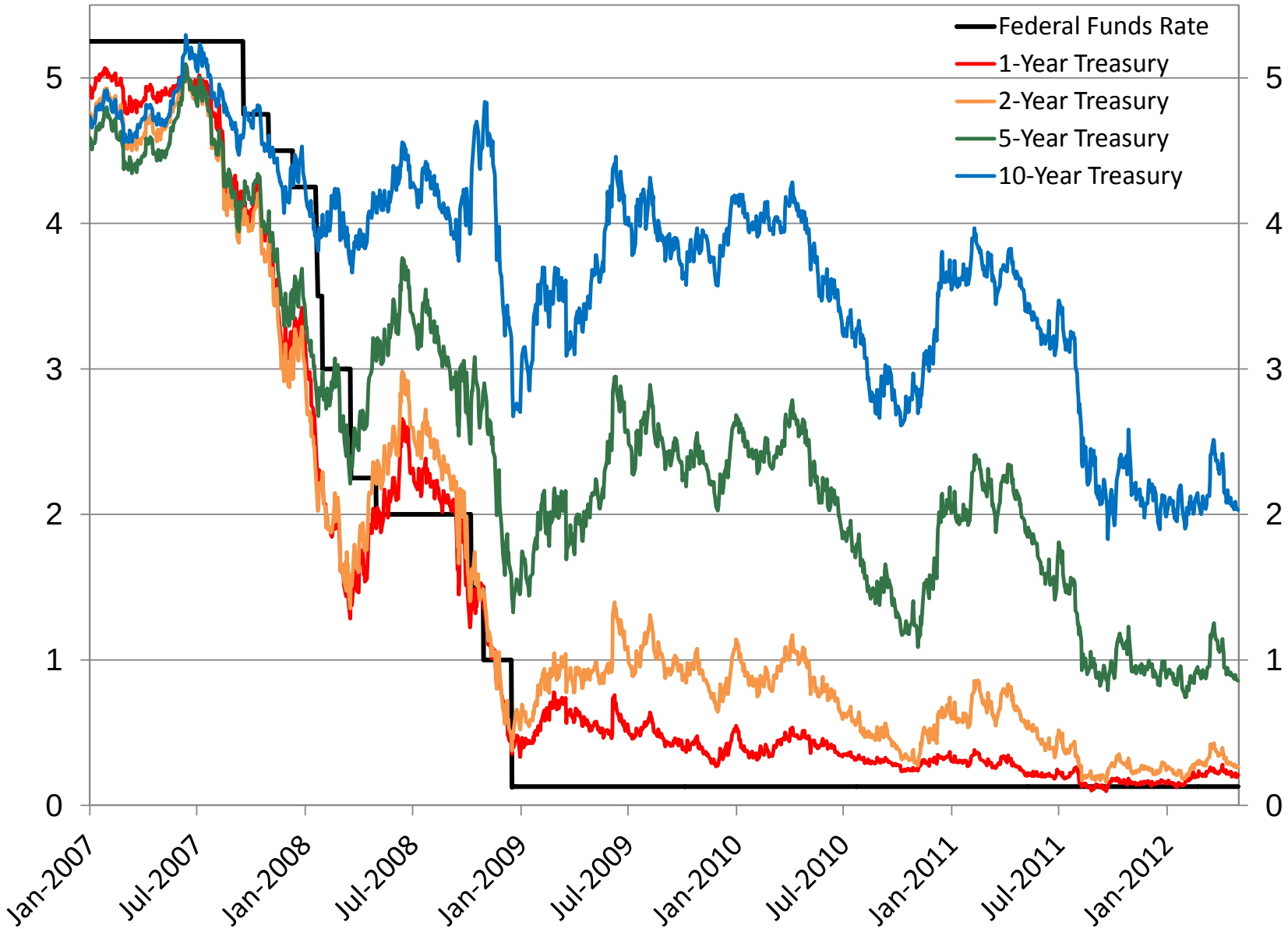
Federal Funds Rate
1-Year Treasury
2-Year Treasury
5-Year Treasury
10-Year Treasury
0
1
2
3
4
5
Jan-2007
Jul-2007
Jan-2008
Jul-2008
Jan-2009
Jul-2009
Jan-2010
Jul-2010
Jan-2011
Jul-2011
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FOMC Statement on March 18, 2009

The Committee will maintain the target range for the federal funds rate at 0 to 1/4 percent and anticipates that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period. To provide greater support to mortgage lending and housing markets, the Committee decided today to increase the size of the Federal Reserve's balance sheet further by purchasing up to an additional $750 billion of agency mortgage-backed securities, bringing its total purchases of these securities to up to $1.25 trillion this year, and to increase its purchases of agency debt this year by up to $100 billion to a total of up to $200 billion. Moreover, to help improve conditions in private credit markets, the Committee decided to purchase up to $300 billion of longer-term Treasury securities over the next six months.

Unconventional Monetary Policy Announcements

Mar. 18, 2009	FOMC announces it expects to keep the federal funds rate between 0 and 25 basis points (bp) for "an extended period", and that it will purchase $750B of mortgage-backed securities, $300B of longer-term Treasuries, and $100B of agency debt (a.k.a. "QE1")
Nov. 3, 2010	FOMC announces it will purchase an additional $600B of longer-term Treasuries (a.k.a. "QE2")
Aug. 9, 2011	FOMC announces it expects to keep the federal funds rate between 0 and 25 bp "at least through mid-2013"
Sep. 21, 2011	FOMC announces it will sell $400B of short-term Treasuries and use the proceeds to buy $400B of long-term Treasuries (a.k.a. "Operation Twist")
Jan. 25, 2012	FOMC announces it expects to keep the federal funds rate between 0 and 25 bp "at least through late 2014"

Unconventional Monetary Policy Announcements

Sep. 13, 2012	FOMC announces it expects to keep the federal funds rate between 0 and 25 bp "at least through mid-2015", and that it will purchase $40B of mortgage-backed securities per month for the indefinite future
Dec. 12, 2012	FOMC announces it will purchase $45B of longer-term Treasuries per month for the indefinite future, and that it expects to keep the federal funds rate between 0 and 25 bp for at least as long as the unemployment remains above 6.5 percent and inflation expectations remain subdued
Dec. 18, 2013	FOMC announces it will start to taper its purchases of longer-term Treasuries and mortgage-backed securities to paces of $40B and $35B per month, respectively
Dec. 17, 2014	FOMC announces that "it can be patient in beginning to normalize the stance of monetary policy"

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- Only **surprise** component of announcement should affect asset prices, but we don't have good data on what markets expected
- One way LSAPs can affect the economy is by signaling FOMC commitment to future fed funds rate path

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Note: Wright (2011) estimates effects of generic "unconventional monetary policy" (effectively averages the two types of policies)

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Collect asset price responses into a $T \times N$ matrix of data X

GSS (2005): Two-Factor Model

Idea: Matrix of asset price responses X is well described by a factor model with 2 factors:

$$\underbrace{X}_{T\times N} = \underbrace{F}_{T\times 2}\ \underbrace{\Lambda}_{2\times N} + \underbrace{\varepsilon}_{T\times N}$$

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- F are 2 **factors** that explain the systematic variation in X (change in fed funds rate & change in forward guidance)
- Λ are the **loadings** of the N different assets on the 2 factors
- ε are white noise residuals

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For example:

- Let U be any 2×2 orthogonal matrix ($U'U = I$)
- Let $\widetilde{F} \equiv FU'$, $\widetilde{\Lambda} \equiv U\Lambda$
- Then $F\Lambda = \widetilde{F}\widetilde{\Lambda}$, so

$$X = \widetilde{F}\widetilde{\Lambda} + \varepsilon$$

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This identifies factors $\widetilde{F}$ and loadings $\widetilde{\Lambda}$ that have the structural interpretation we want

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change in fed funds rate	8.55	5.88	5.59	4.81	3.79	1.91	0.68
change in fwd guidance	0.00	4.23	5.42	6.12	5.08	5.20	4.02

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GSS also show changes in forward guidance factor correspond to notable, market-moving FOMC statements

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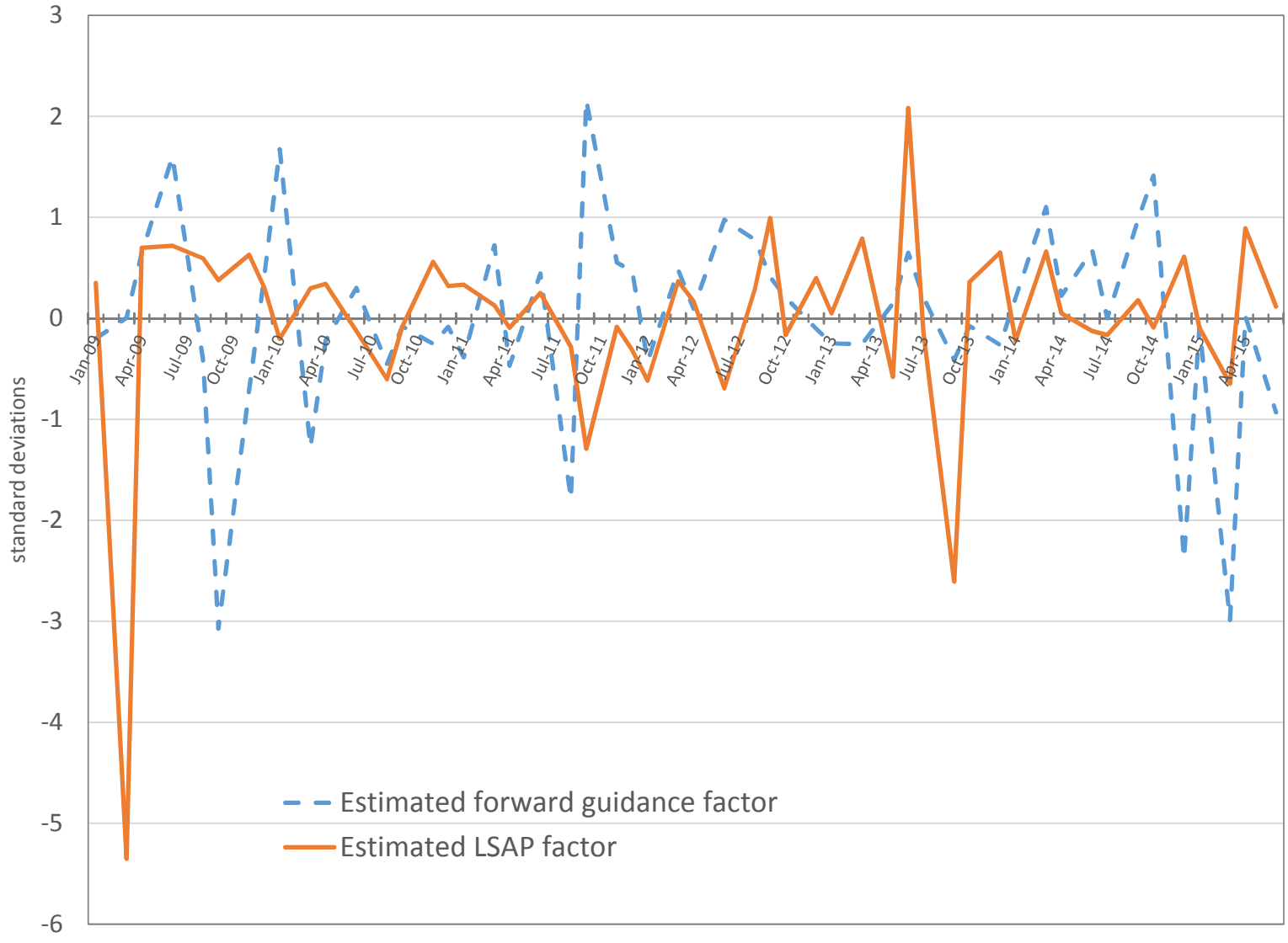
- Effect of forward guidance is hump-shaped
- Effect of LSAPs increases with maturity
- LSAPs are much more important for the longest-maturity yields

Forward Guidance and LSAP Factors, 2009–2015



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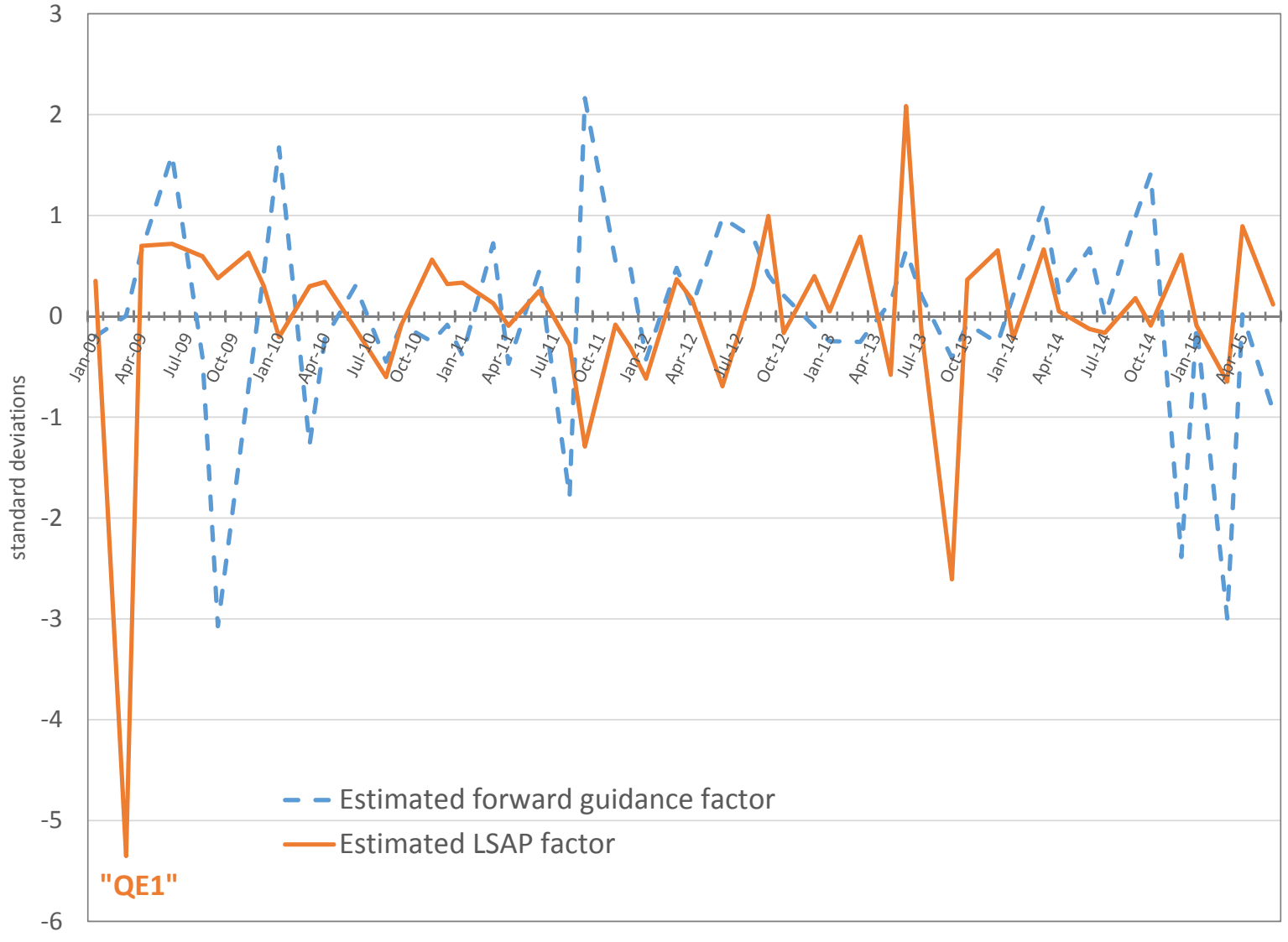

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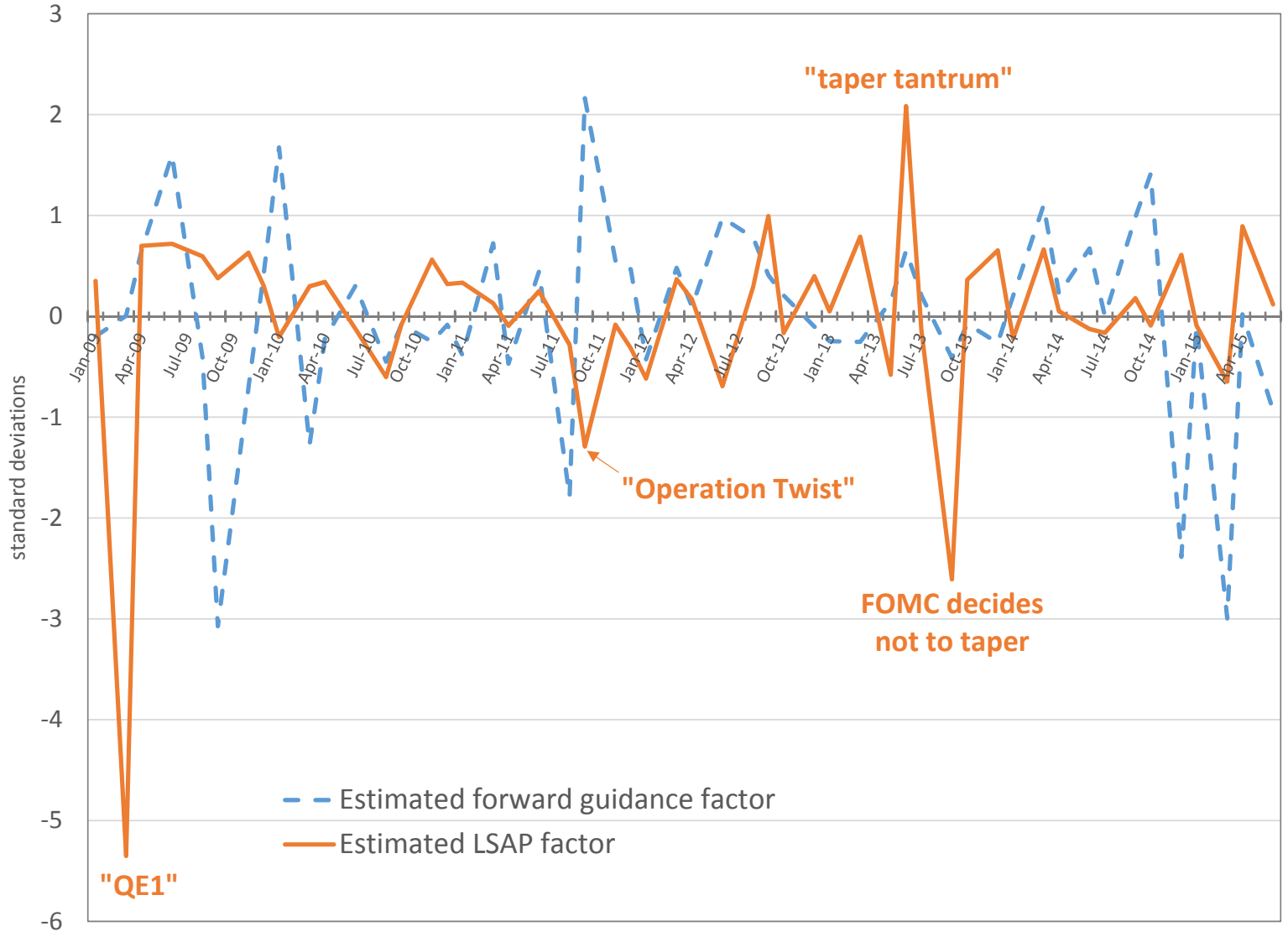

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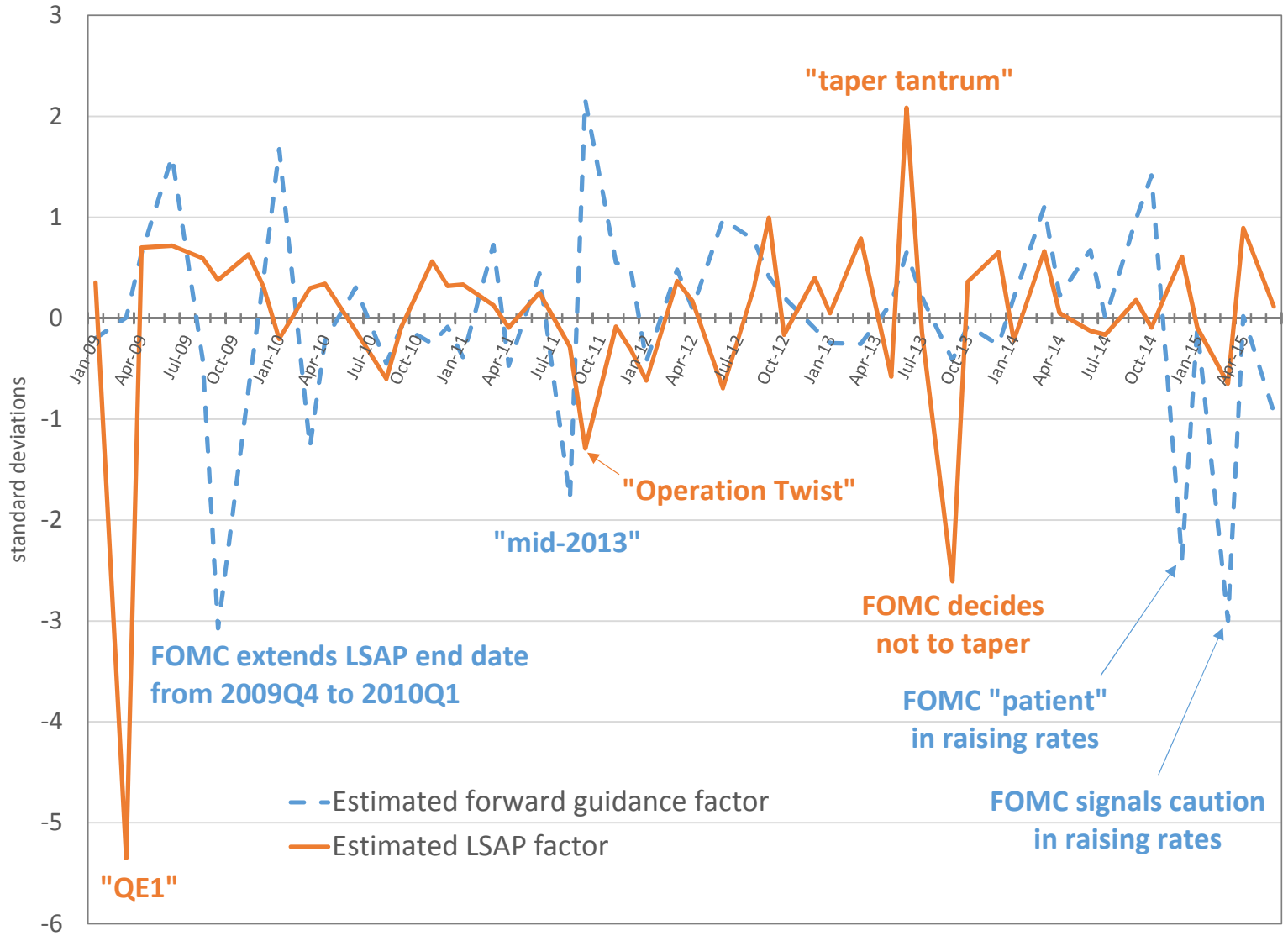

Effects of Fwd Guidance, LSAPs on Treasury Yields

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$$\Delta y_t = \alpha + \beta \widetilde{F}_t + \varepsilon_t$$

from Jan. 2009–June 2015

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	6-month	2-year	5-year	10-year	30-year
change in fwd guidance	0.53^{***}	3.33^{***}	4.24^{***}	2.35^{***}	0.30
[t-stat.]	[5.75]	[15.33]	[16.82]	[8.91]	[0.40]
change in LSAPs	-0.08	-1.27^{***}	-4.90^{***}	-7.46^{***}	-5.78^{***}
[t-stat.]	[-0.99]	[-16.48]	[-8.82]	[-16.47]	[-11.71]
Regression R^2	.47	.93	.94	.97	.77
# Observations	52	52	52	52	52

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from Jan. 2009–June 2015

	6-month	2-year	5-year	10-year	30-year
change in fwd guidance	0.53^{***}	3.33^{***}	4.24^{***}	2.35^{***}	0.30
[t-stat.]	[5.75]	[15.33]	[16.82]	[8.91]	[0.40]
change in LSAPs	-0.08	-1.27^{***}	-4.90^{***}	-7.46^{***}	-5.78^{***}
[t-stat.]	[−0.99]	[−16.48]	[−8.82]	[−16.47]	[−11.71]
Regression R^2	.47	.93	.94	.97	.77
# Observations	52	52	52	52	52

Effects on Stocks and Exchange Rates

Results from regressions

$$\Delta \log x_t = \alpha + \beta \widetilde{F}_t + \varepsilon_t$$

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	S&P 500	$/euro	$/yen
change in forward guidance	-0.19^{***}	-0.25^{***}	-0.20^{***}
[t-stat.]	[−2.68]	[−6.66]	[−5.04]
change in LSAPs	0.20^{***}	0.33^{***}	0.37^{***}
[t-stat.]	[3.66]	[6.65]	[7.32]
Regression R^2	.27	.67	.80
# Observations	52	52	52

Effects on Corporate Bond Yields and Spreads

Results from regressions

$$\Delta y_t = \alpha + \beta \widetilde{F}_t + \varepsilon_t$$

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Results from regressions

$$\Delta y_t = \alpha + \beta \widetilde{F}_t + \varepsilon_t$$

	Corporate Yields		Spreads	
	Aaa	Baa	Aaa−10-yr.	Baa−10-yr.
change in forward guidance	0.28	−0.33	−1.23**	−1.85**
[t-stat.]	[0.49]	[−0.44]	[−2.21]	[−2.49]
change in LSAPs	−4.65***	−5.17***	4.25***	3.74***
[t-stat.]	[−12.48]	[−8.96]	[7.79]	[4.11]
Regression R^2	.44	.49	.56	.55
# Observations	52	52	52	52

Extension: Are the Effects Persistent?

- Interesting question whether one-day effects of LSAPs and forward guidance are persistent

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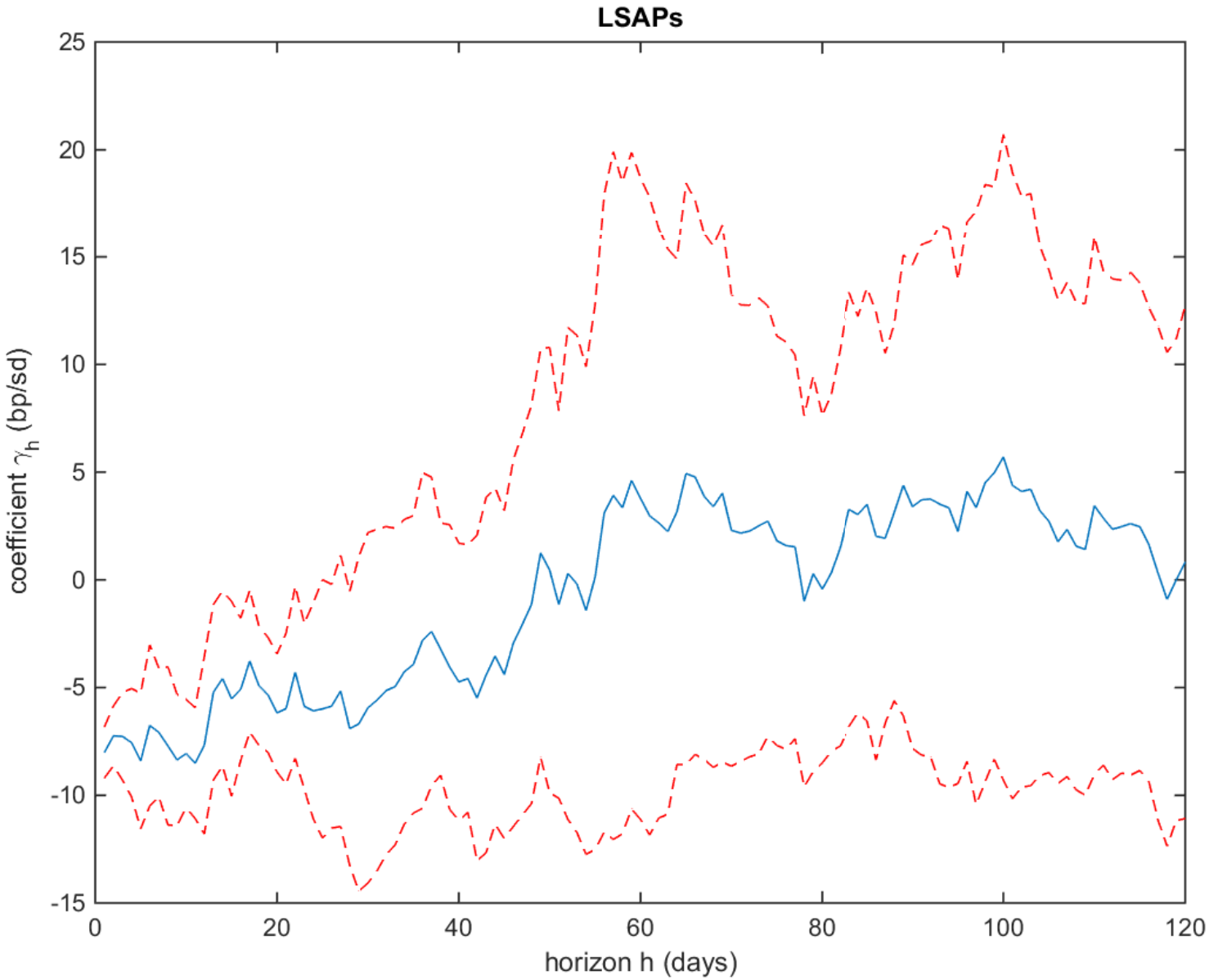
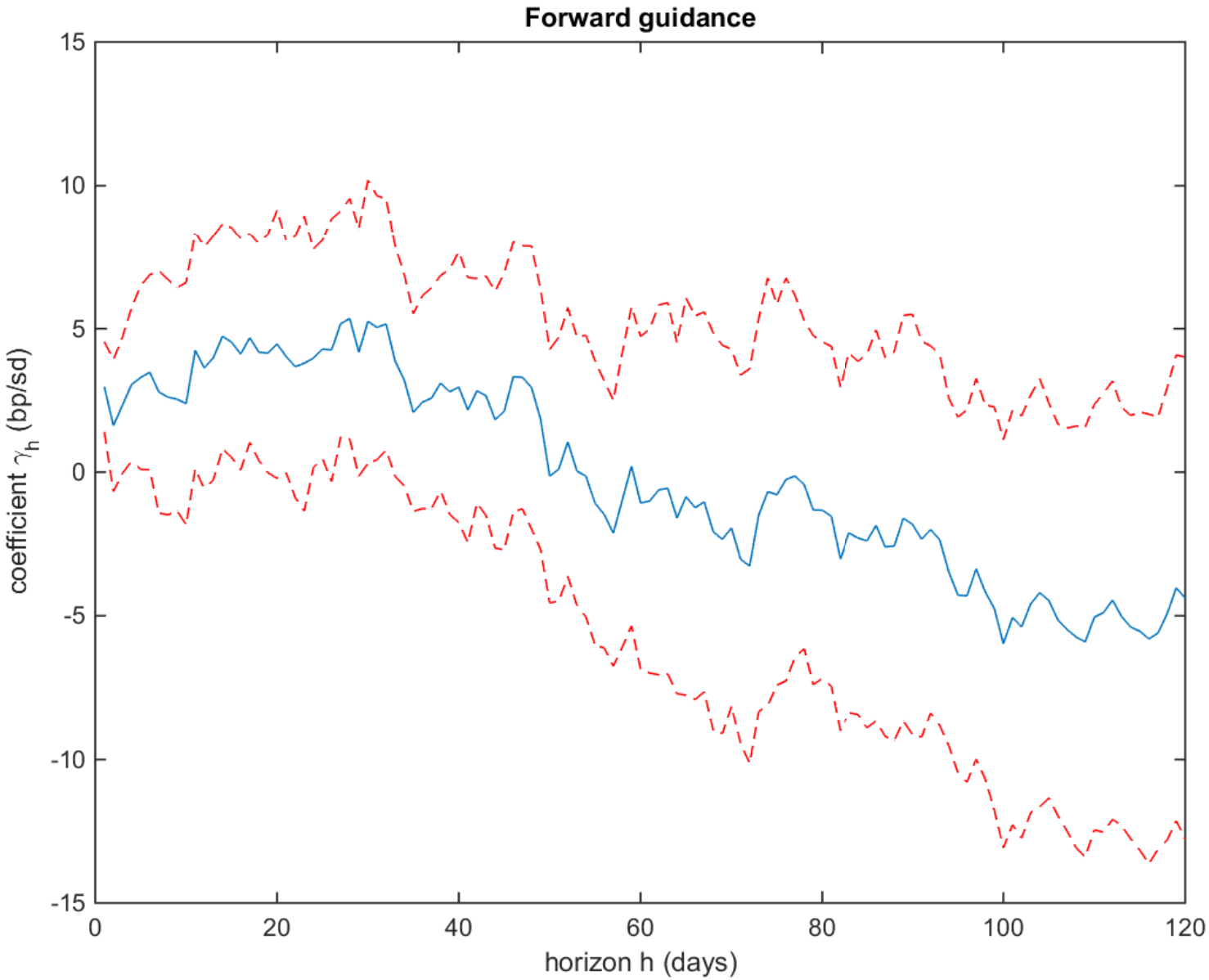
Run daily regressions forecasting h-day change in yields:

$$y_{t+h} = \alpha_h + \beta_h y_t + \gamma_h \widetilde{F}_t + \varepsilon_t$$

Persistence of LSAP Effects (on 5y Treasury)



Persistence of Forward Guidance Effects (on 5y Tr.)



Conclusions

1. Adapted the methods of Gürkaynak, Sack, and Swanson (2005) to the zero lower bound period
2. Estimated forward guidance and LSAP components of every FOMC announcement from Jan. 2009 to June 2015
3. Forward guidance has larger effects on short-term Treasury yields
4. LSAPs have greater effects on very long-term Treasury yields and corporate bond yields
5. Both types of policies have significant effects on medium-term Treasury yields, stock prices, and exchange rates
6. But there is evidence the effects only persist for $\approx$2 months