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US monetary policy and the pricing of American Depositary Receipts

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ABSTRACT

I study the pricing of American Depositary Receipts (ADRs) on FOMC announcement days. I add to Savor and Wilson (2014) and Du and Hu (2015) by documenting that ADRs yield a significant fraction of their cumulative excess returns (about 36.16%) on FOMC announcement days characterized by a negative monetary surprise that account for less than 1% of total trading days between January 1997 and December 2016. One potential explanation might be found in the economically and statistically highly significant world market risk premia in the magnitude of 55.81 basis points on FOMC meeting days with negative monetary surprise.

1. Introduction

Savor and Wilson (2014) and Du and Hu (2015) document that stocks in the US as well as cross-listed securities abroad yield significant excess returns on US macroeconomic announcement days. On these days, investors demand significant risk premia as compensation for their systematic risk exposure.

I focus on the pricing of American Depositary Receipts (ADRs) on FOMC announcement days and extent their analysis by differentiating FOMC meetings by their monetary policy decision and by analyzing the impact of US monetary surprises (i.e., unanticipated changes in the FED Funds rate) on the world market risk premium on these days.[1]

US monetary policy uncertainty is one risk that ADR investors might be exposed to. There are at least two channels how US monetary policy decisions potentially affect ADR prices. Several papers show that US monetary policy shocks transmit globally and therefore affect the prices of the underlying stocks of ADRs (e.g., Thorbecke, 1997; Kim, 2001; Ehrmann and Fratzscher, 2004, 2009; Hausman and Wongswan, 2011; Han and Wei, 2018). Also, US monetary policy has significant effects on exchange rates vis-à-vis the US dollar (e.g. Hausman and Wongswan, 2011; Dedola et al., 2017; Mueller et al., 2017). As theoretical ADR returns are governed by the returns of their underlying stocks and the exchange rate of their underlying currency against the US dollar, the impact of US monetary policy shocks on ADR returns could be considered a combination of these two above-mentioned effects.

Negative US monetary surprises characterize a situation where the actual implemented policy rate is below the one anticipated by market participants. For example, market participants might on average expect that there is no change in the FED Funds rate, but the FOMC agrees on a policy rate cut. This would most probably result in positive ADR returns since the negative US monetary surprise leads to a positive return of the underlying stock of the ADR as well as an appreciation of the domestic currency against the US dollar.

I find that ADRs yield significantly higher excess returns on trading days with FOMC announcements. Differentiating FOMC meetings by their monetary policy decision reveals that the effects are strongest for FOMC meeting days with negative monetary surprises which account for less than 1% of overall trading days, but yield about 36.16% of cumulative excess ADR returns for the

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[1] Jackson and Grossmann (2006) also study the pricing of ADRs around FOMC meeting days, but they do not identify potential risk premia.

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period from January 1997 to December 2016. My findings suggest that this result is driven by an economically highly significant world market risk premium in the magnitude of 55.81 basis points for trading days with FOMC meetings and negative US monetary surprises. In contrast, the world market risk premium is insignificant for FOMC meeting days with non-negative monetary surprises.

2. Data & methodology

My sample consists of 250 ADRs[2] from 34 countries[3] over the period from January 1st, 1996 to December 31st, 2016, covering 168 FOMC meetings.[4] I considered ADRs listed in the JP Morgan and Bank of New York Mellon ADR databases and on Thomson Reuters DATASTREAM. Following standard practice in the literature (e.g., Gagnon and Karolyi, 2010), I exclude Level I ADRs as well as SEC Regulation S shares and private placements under SEC Rule 144a.

I download data on ADR prices from Thomson Reuters Tick History. Statements on FOMC announcement days are usually made public at approximately 2:15 p.m. ET. Following Kuttner (2001), US monetary surprises are derived from FED Funds Futures taken from Thomson Reuters DATASTREAM. Excess ADR returns are calculated based on closing prices, which already incorporate the monetary policy decision of the respective day. The return of the world market is also taken from Thomson Reuters DATASTREAM.

Following Savor and Wilson (2014) and Du and Hu (2015), I sort the ADRs in my sample into ten value-weighted portfolios at the beginning of each month based on their International CAPM beta obtained by estimating the following time-series equation for the past 250 trading days:

$$r_{i,t} = \alpha_i + \beta_{i,w} r_{w,t} + \varepsilon_{i,t} \quad (1)$$

where $r_{i,t}$ denotes the excess return of ADR i on the respective trading day t, α_i the intercept, $\beta_{i,w}$ the International CAPM beta, $r_{w,t}$ the excess return of the world market and $\varepsilon_{i,t}$ the error term. ADRs are then ranked into the respective portfolio which is then held for one month and rebalanced at the beginning of each month.

3. FOMC announcement days and excess ADR returns

First, I test whether ADRs exhibit significantly higher excess returns on trading days with FOMC announcements compared to non-announcement days. Following Du and Hu (2015), I regress the time-series of excess returns of each of the ten portfolios either on a FOMC meeting day dummy or a non-meeting day dummy, with no constant. Newey–West HAC standard errors with lag five are used to calculate the respective t-statistics. Table 1 summarizes the results.

In line with Savor and Wilson (2014) and Du and Hu (2015), I find that ADRs yield significantly positive excess returns on trading days with FOMC announcements, whereas this is not the case for trading days without FOMC announcement. On average across the ten beta-sorted portfolios, ADRs exhibit excess returns in the magnitude of 4.36 basis points.[5]

I extend the analysis of Savor and Wilson (2014) and Du and Hu (2015) by not only differentiating between FOMC announcement days and trading days without FOMC announcement, but also by the monetary policy decision made on the respective FOMC meeting.

First, I distinguish between FOMC meetings without an unexpected monetary policy decision (meetings with zero monetary surprise) vs. meetings with a non-zero monetary surprise. For FOMC meetings without a monetary surprise, the evidence is mixed. Only five out of ten ADR portfolios exhibit significantly higher excess returns on trading days with FOMC meetings without monetary surprise compared to non-meeting days.

Second, I split meetings into those with a negative monetary surprise and those with a non-negative monetary surprise. While results are mixed for FOMC meeting days with positive or zero monetary surprise (excess returns are significantly higher for five out of ten portfolios), all portfolios yield significantly higher excess returns on FOMC announcement days with negative monetary surprise. On these days, ADRs on average yield excess returns in the magnitude of 8.55 basis points, which is also economically highly significant.

Also, it might also be interesting to look at cumulative excess returns instead of daily average excess returns (as summarized in Table 2).

Du and Hu (2015) document that ADRs from developed countries over the period from 1974 to 2013 yielded almost 40% of their total excess return on US macroeconomic announcement days (including US inflation, unemployment and interest rate announcements) that only accounted for 12% of all trading days. My analysis suggests that the picture is even more extreme when differentiating FOMC announcement by the surprise character of their monetary policy decision. From 1997 to 2016, about 36.16% of total

[2] A complete list of the ADRs used in this paper is available upon request.

[3] In contrast to Du and Hu (2015) who also investigate the pricing of American Depositary Receipts on US announcement days, I do not restrict my sample to ADRs from developed countries, but also consider ADRs from emerging markets.

[4] My sample effectively starts in January 1997 since the first year of observations starting from January 1996 is needed for the first portfolio sort.

[5] Please note that my results cannot be directly compared to Du and Hu (2015) with respect to their magnitude for a variety of reasons. First, Du and Hu (2015) consider a significantly longer sample period from 1974 to 2013 whereas the length of my sample is restricted by the use of tick data from Thomson Reuters Tick History that only became available by 1996. Second, while Du and Hu (2015) focus on developed countries, I also include ADRs from emerging markets. Finally, Du and Hu (2015) consider announcement days of inflation, unemployment and interest rates while I focus on FOMC announcement days.

Table 1
Mean excess returns of beta-sorted portfolios by trading day.

	All days	FOMC meeting days	Non meeting days	Meetings without monetary surprise	Meeting with non-zero monetary surprise	Meetings with monetary surprise ≥ 0	Meetings with monetary surprise < 0
Low	0.18	1.64**	0.13	0.70	2.51**	1.07	2.97**
	(1.33)	(2.15)	(0.95)	(0.63)	(2.42)	(1.22)	(1.99)
2	0.18	3.25***	0.08	2.82**	3.66**	2.39*	5.29***
	(0.94)	(3.02)	(0.39)	(2.22)	(2.14)	(1.89)	(2.63)
3	0.32	3.34***	0.21	0.88	5.62***	1.94	6.64***
	(1.58)	(3.09)	(1.05)	(0.72)	(3.28)	(1.59)	(3.09)
4	0.12	4.96***	−0.04	2.79**	6.96***	2.44**	10.88***
	(0.49)	(3.77)	(−0.15)	(1.97)	(3.25)	(1.97)	(3.47)
5	0.39	4.78**	0.24	3.18	6.26**	2.56	10.03**
	(1.18)	(2.57)	(0.72)	(1.55)	(1.95)	(1.26)	(2.57)
6	0.22	4.69**	0.07	2.55	6.68*	1.98	11.10**
	(0.73)	(2.40)	(0.22)	(1.53)	(1.95)	(1.25)	(2.09)
7	0.26	5.12***	0.10	4.26***	5.91**	2.63*	10.99***
	(0.94)	(3.67)	(0.35)	(2.89)	(2.55)	(1.77)	(3.75)
8	0.07	4.52***	−0.07	1.88	6.96***	3.59**	6.71***
	(0.26)	(3.41)	(−0.25)	(1.17)	(3.41)	(2.21)	(3.03)
9	0.12	5.48***	−0.06	2.98*	7.79***	3.24	10.77***
	(0.37)	(3.20)	(−0.18)	(1.71)	(2.73)	(1.55)	(3.84)
High	0.41	5.85***	0.23	4.47***	7.12***	4.03**	10.14***
	(1.15)	(4.12)	(0.62)	(2.73)	(3.14)	(2.51)	(3.60)

Results are obtained by regressing the time-series of each of the ten beta-sorted portfolio's excess returns on a dummy for the respective trading day, without constant. T-statistics reported in parentheses are based on Newey–West HAC standard errors with lag five. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2
Log cumulative excess returns by trading day.

	All days	FOMC meeting days	Meeting with non-zero monetary surprise	Meetings with negative monetary surprise
Low	6.80	5.56	5.33	4.94
2	6.77	6.24	5.70	5.52
3	7.34	6.27	6.13	5.74
4	6.39	6.66	6.35	6.24
5	7.55	6.63	6.24	6.16
6	6.97	6.61	6.31	6.26
7	7.17	6.70	6.18	6.25
8	5.89	6.57	6.35	5.75
9	6.37	6.76	6.46	6.23
High	7.60	6.83	6.37	6.17

cumulative excess ADR returns (averaged across the ten beta-sorted portfolios) could be earned on trading days with FOMC meetings and negative monetary surprises that made up for less than 1% of total trading days.[6]

4. The world market risk premium on FOMC announcement days

In this section, I study the world market risk premium on FOMC announcement days. One potential explanation for the findings in the previous section might be that investors take on a larger portion of systematic risk on FOMC announcement days (with negative monetary surprises). To rule this explanation out empirically, I follow Du and Hu (2015) and test whether the world market exposure is significantly higher on FOMC announcement days (with negative monetary surprise) by estimating the following interaction model for each of the ten beta-sorted portfolios separately:

$$r_{i,t} = \alpha_i + \beta_{i,w} r_{w,t} + \beta_{i,FOMC} r_{w,t} \times FOMC_t + \varepsilon_{i,t} \quad (2)$$

$$r_{i,t} = \alpha_i + \beta_{i,w} r_{w,t} + \beta_{i,negative\ MS} r_{w,t} \times negative\ MS_t + \varepsilon_{i,t} \quad (3)$$

where $\beta_{i,FOMC}$ and $\beta_{i,negative\ MS}$ denote the coefficients of the respective interaction terms and $FOMC_t$ ($negative\ MS_t$) a dummy variable that is equal to one if a FOMC meeting (with a negative monetary surprise) takes place on the respective trading day, zero otherwise. Table 3 displays the results.

In line with Du and Hu (2015), I find that ADR returns' exposure to the world market is not generally higher on FOMC meeting days or FOMC meeting days with negative monetary surprises (the interaction is only significant for one of the ten beta-sorted portfolios). If

[6] Between 1997 and 2016, there were 47 FOMC meetings with negative monetary surprises.

Table 3
Test for difference in world market exposure on FOMC meeting days (meeting days with negative monetary surprises).

	$\beta_{i,W}$	$\beta_{i,FOMC}$	Constant	R^2	$\beta_{i,W}$	$\beta_{i,MS<0}$	Constant	R^2
Low	0.05***	0.00	0.10	0.20	0.05***	0.01	0.08	0.19
	(15.31)	(0.12)	(0.83)		(15.05)	(0.49)	(0.68)	
2	0.08***	0.02	0.02	0.34	0.08***	0.00	0.04	0.34
	(21.23)	(1.31)	(0.14)		(21.32)	(0.04)	(0.28)	
3	0.08***	0.02	0.16	0.32	0.08***	0.02	0.13	0.32
	(24.74)	(1.22)	(0.95)		(24.90)	(0.70)	(0.80)	
4	0.12***	0.02	−0.09	0.38	0.12***	0.07***	−0.13	0.38
	(23.47)	(1.40)	(−0.49)		(23.55)	(3.34)	(−0.66)	
5	0.17***	0.03	0.08	0.42	0.17***	0.04	0.01	0.43
	(20.28)	(1.02)	(0.34)		(20.29)	(0.98)	(0.05)	
6	0.13***	0.02	−0.03	0.38	0.13***	0.06	−0.07	0.38
	(29.58)	(0.77)	(−0.14)		(29.73)	(0.86)	(−0.28)	
7	0.14***	0.00	0.02	0.41	0.14***	0.02	0.01	0.41
	(23.96)	(0.22)	(0.10)		(23.94)	(0.52)	(0.06)	
8	0.14***	−0.02	−0.15	0.43	0.14***	−0.04	−0.16	0.44
	(31.39)	(−1.00)	(−0.66)		(31.45)	(−1.54)	(−0.73)	
9	0.16***	0.01	−0.16	0.44	0.16***	−0.01	−0.19	0.45
	(32.28)	(0.29)	(−0.66)		(32.21)	(−0.18)	(−0.80)	
High	0.17***	−0.03*	0.15	0.40	0.17***	−0.03	0.09	0.40
	(26.53)	(−1.85)	(0.55)		(26.55)	(−0.96)	(0.32)	

Results are obtained from regressing the time-series of each of the ten beta-sorted portfolio's excess returns on the excess return of the world market as well as its interaction with a dummy equal to one on FOMC announcement days as described in Eq. (2) (left column), respectively a dummy equal to one on FOMC announcement days with negative monetary surprise as described in Eq. (3) (right column). T-statistics reported in parentheses are based on Newey–West HAC standard errors with lag five. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

the world market exposure is not significantly higher on trading days with FOMC meetings (with negative monetary surprises), another explanation for the significantly higher excess returns on FOMC meeting days (with negative monetary surprises) might be found in the higher world market risk premia on these days as documented by Savor and Wilson (2014) and Du and Hu (2015).

Fig. 1 illustrates the relationship between the full sample world market betas of the ten beta-sorted portfolios and their average excess returns. In line with Savor and Wilson (2014) and Du and Hu (2015), I find that ADRs with a higher world market exposure earn higher excess returns on FOMC announcement days, whereas there is no significant relation between the International CAPM beta and excess ADR returns on regular trading days without FOMC announcements. Again, I extent their analysis by differentiating FOMC meetings by their monetary policy decisions. Empirical evidence presented in the previous section documents that ADRs yield a large fraction of their cumulative excess returns on FOMC announcement days with negative monetary surprises. The graphical illustration in Fig. 1 suggests that the world risk premium is even higher for FOMC announcement days with negative monetary surprise compared to other FOMC announcement days with positive or zero monetary policy surprise.

Again, I follow the methodology introduced by Savor and Wilson (2014) and Du and Hu (2015) and run Fama and Macbeth (1973)

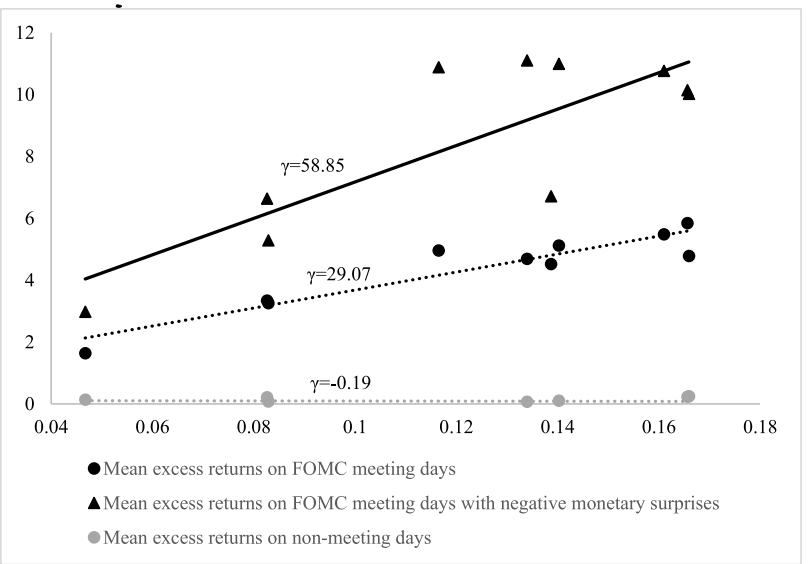

Fig. 1. Full sample world market betas and average excess returns: FOMC meeting days (with negative monetary surprises) vs. non-meeting days.

Table 4
Results from Fama and MacBeth (1973) regressions: FOMC meeting days vs. all other trading days.

	All	FOMC meeting day	Non-meeting day	Difference
Constant	0.24*	1.05	0.21	0.84
	(1.72)	(1.35)	(1.50)	(1.06)
γ_w^j	0.12	26.98***	−0.78	27.76***
	(0.07)	(2.94)	(−0.45)	(2.86)
R^2	0.22	0.21	0.22	

Results are obtained by estimating Fama and MacBeth (1973) two-stage regressions as described in Eq. (4). T-statistics reported in parentheses are based on standard errors calculated as the standard deviation of the time-series of the cross-sectional estimates divided by the square root of their sample length. *** p < 0.01, ** p < 0.05, * p < 0.1

Table 5
Results from Fama and MacBeth (1973) regressions: FOMC meeting days with negative monetary surprise vs. all other FOMC meeting days.

	FOMC meeting days with negative monetary surprise	All other FOMC meeting days	Difference
Constant	1.63	0.80	0.83
	(0.89)	(1.00)	(0.48)
γ_w^j	55.81***	14.78	41.03**
	(2.75)	(1.52)	(2.06)
R^2	0.20	0.21	

Results are obtained by estimating Fama and MacBeth (1973) two-stage regressions as described in Eq. (4). T-statistics reported in parentheses are based on standard errors calculated as the standard deviation of the time-series of the cross-sectional estimates divided by the square root of their sample length. *** p < 0.01, ** p < 0.05, * p < 0.1

two-pass regressions to test whether the world market risk premium differs between regular trading days without FOMC meetings and FOMC meeting days. I add to their analysis by differentiating FOMC meeting days by their monetary policy decision, testing whether the world market risk premium is significantly higher on FOMC announcement days with negative monetary surprise compared to all other FOMC announcement days. Therefore, I estimate the following cross-sectional regression for each trading day t:

$$r_{i,t}^j = \gamma_0^j + \gamma_w^j \hat{\beta}_{i,t,w} + \varepsilon_{i,t} \tag{4}$$

where $r_{i,t}^j$ denotes the excess return of ADR portfolio i on trading day t and $\hat{\beta}_{i,t,w}$ denotes the exposure of ADR portfolio i to the world market estimated using observations from the past 250 trading days. J denotes the subset of trading days under investigation. I first distinguish between trading days with FOMC meetings vs. all other trading days, replicating the results of Savor and Wilson (2014) and Du and Hu (2015). Standard errors are calculated as the standard deviation of the time-series of the cross-sectional estimates divided by the square root of their sample length. Table 4 summarizes the results.

In line with Savor and Wilson (2014) and Du and Hu (2015), I identify a significant world market risk premium for FOMC announcement days, whereas the relation between world market exposure and excess ADR returns is insignificant for regular trading days without FOMC announcements. Next, I test whether this result holds if FOMC meeting days are differentiated by their monetary policy outcome. Therefore, I study whether the world market risk premium differs between FOMC meeting days with negative monetary surprise and all other FOMC meeting days (including those with positive monetary surprises and those where market participants perfectly anticipated the policy rate decision by the FOMC). Table 5 summarizes the results.

Evidence from the Fama and MacBeth (1973) two-stage regressions suggests that the significant relationship between systematic risk (as identified by the ADR portfolio's exposure to the world market) and its excess returns only exists for FOMC announcement days with negative monetary surprise. On these days, investors are compensated for the systematic risk they are exposed to with world market risk premia in the magnitude of 55.81 basis points, which can be considered not only statistically significant, but also highly economically significant.

As a robustness check, I follow Savor and Wilson (2014) and run Fama and Macbeth (1973) two-stage regressions with single ADRs instead of the ten beta-sorted portfolios, now also controlling for each ADR's betas with the Fama and French (2016) factors SMB, HML, RMW, CMA and momentum. Results remain statistically highly significant.[7]

Finally, instead of using a binary approach (differentiating between FOMC meetings with and without negative monetary surprises), I now allow for a continuous impact of the monetary surprise. Therefore, I estimate the following interaction model, now using pooled panel data of all ten ADR portfolios:

$$r_{i,t} = \gamma_0 + \gamma_w \hat{\beta}_{i,t,w} \times FOMC_t \times MS_t + \varepsilon_{i,t} \tag{5}$$

where MS_t is a continuous variable denoting the monetary surprise of the respective FOMC meeting.[8] Standard errors are clustered by

[7] The point estimate of the world market risk premium reduces to about 49.23 basis points. Results are available upon request.
[8] Fig. A1 in the appendix displays a histogram of monetary surprises on FOMC meeting days.

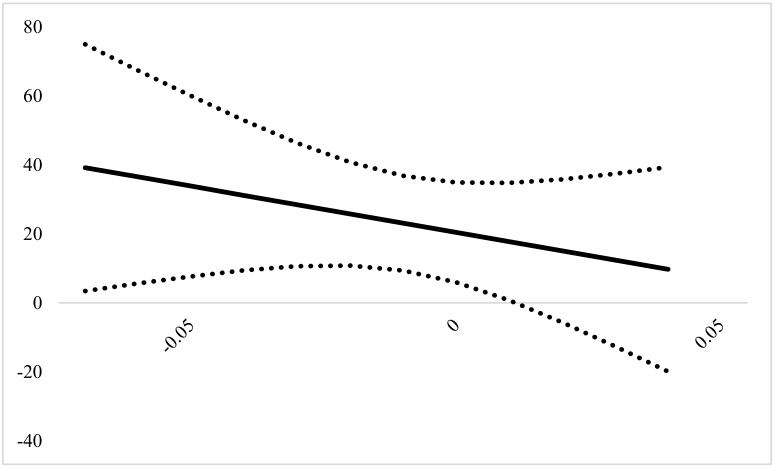

Fig. 2. World market risk premium on FOMC meeting days over 5% to 95% percentiles of US monetary surprise.

trading day. I then assess the marginal effects of the world market risk premium γ_w for FOMC announcement days over the 5% to 95% percentiles of MS_t. Fig. 2 illustrates these marginal effects. The world risk premium on FOMC meeting days is higher, the more negative the monetary surprise of the respective meeting. Also, in line with the empirical evidence previously presented, investors are compensated for their systematic risk exposure with a significant risk premium on FOMC meeting days with negative monetary surprise, whereas this is not the case for the other meeting days.

5. Conclusion

I study the pricing of American Depositary Receipts on FOMC announcement days. I extent the previous work of Savor and Wilson (2014) and Du and Hu (2015) by showing that ADRs yield a large fraction of their cumulative excess returns (about 36.16%) on FOMC announcement days characterized by a negative monetary surprise that account for less than 1% of total trading days between January 1997 and December 2016. One potential explanation for this is the economically and statistically highly significant world market risk premium in the magnitude of 55.81 basis points on FOMC announcement days with negative monetary surprise.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2019.01.006.

Appendix

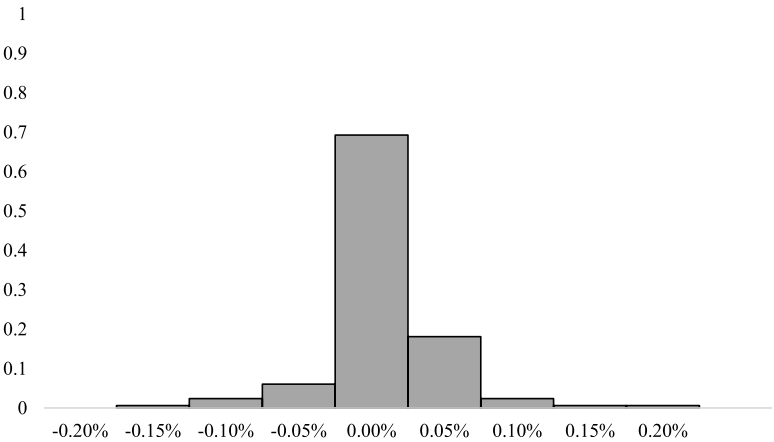

Fig. A1. Histogram of US monetary surprises on FOMC meeting days.

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