The Disappearing Pre-FOMC Announcement Drift *

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Abstract

Lucca and Moench (2015) document large average excess returns in the S&P500 index before scheduled Federal Open Market Committee (FOMC) meetings from September 1994 to March 2011, leading to a puzzle not explained by standard asset pricing theory. We replicate and then extend their analysis to December 2017. We find that U.S. and major international equity indices did not experience statistically significant average excess returns in the more recent period; the puzzle has, therefore, disappeared. We discuss possible explanations for this change, with the most plausible one being that the drift has been arbitraged away since its discovery.

Keywords: FOMC, drift
JEL classification: E44; G14

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1 Introduction

In their influential paper, Lucca and Moench (2015), henceforth LM, document large average excess returns in the S&P500 index before scheduled FOMC meetings. Over the sample period from September 1994 to March 2011, the index on average increases by 49 basis points during the 24 hours before the scheduled 2:15 pm FOMC announcements (2:00 pm to 2:00 pm window). These pre-FOMC returns account for approximately 80% of the annual realized excess stock returns in this period. This finding is deemed a puzzle because standard asset pricing theories cannot explain such asset behavior.\(^1\)

In this paper, we first replicate the original LM result over their sample period. We then extend the sample from April 2011 to December 2017 and find that the S&P500 index, as well as other major international equity indices, did not experience statistically significant excess returns over this more recent period. The puzzle has, therefore, disappeared in recent times. The Quandt-Andrews test based on Andrews (1993) and the Bai and Perron (2003) test identify April 2010 as the date of the structural break when the S&P500 index stopped experiencing positive pre-FOMC announcement returns.

We discuss four possible explanations for this disappearance of the pre-FOMC drift: economic and market conditions, uncertainty surrounding monetary policy and the zero lower bound, changes in FOMC communication policies, and the fact that the LM finding has been public since 2011. Building on the results in LM, we conclude that the most plausible explanation is also the simplest one: investors have learned about the drift, taken advantage of it, and arbitrated the return away.

\(^1\)LM discuss and reject explanations based on risk, the stock market receiving good news, information leakage, volatility shocks, and liquidity shocks. LM point to rational inattention or behavioral biases as potential explanations, and a few papers have explored alternative explanations: differences of opinion (Cocoma (2017)), constrained institutional buying pressure (Kaul and Watanabe (2015)), among others. In a related paper, Cieslak, Morse, and Vissing-Jorgensen (2018) find that the realized equity premium is entirely earned in weeks 0, 2, 4, and 6 in FOMC cycle time.
2 Analysis

Our data and method are the same as those used by LM. There are 131 scheduled FOMC announcements from September 1994 to March 2011, the LM sample period, and 54 announcements from April 2011 to December 2017, our new sample period. All announcements from September 1994 to March 2011 were released within a few minutes of the scheduled 2:15 pm release time. The period from April 2011 to December 2017 includes eight announcements released at 12:30 pm, 39 announcements released at 2:00 pm, and seven announcements released at 2:15 pm.

Using intraday index price data, we denote price at time $t$ by $P_t$, compute the return as $R_t = (P_t - P_{t-1})/P_{t-1}$, subtract the risk-free rate, and compute the log excess return $er_t$. Following LM, we focus on the return in the 24 hours ending 15 minutes before the scheduled announcement. For example, for announcements released at 2:15 pm, the return is computed from 2:00 pm on the day preceding the announcement day to 2:00 pm on the announcement day. The S&P500 index returns on non-announcement days are computed in the same 2:00 pm-to-2:00 pm window during the period from September 1994 to March 2011 and in the 1:45 pm-to-1:45 pm window during the period from April 2011 to December 2017.\(^2\)

Table 1 presents summary statistics. The first column shows statistics for log excess returns on announcement days from September 1994 to March 2011. The second column shows statistics for log excess returns on all other (non-announcement) days during the same period. The third and fourth columns report the same statistics for the updated period from April 2011 to December 2017. The pre-FOMC mean return in the updated sample is close to zero and close to the mean return on all other days. This stands in contrast with the original LM sample, where the pre-FOMC mean return is positive and much higher than the mean return on all other days.\(^3\) This suggests that the pre-FOMC announcement drift has

\(^2\)Using other windows for the non-announcement days in the more recent sample, such as 2:00 pm-to-2:00 pm, does not affect our results.

\(^3\)The small difference in the point estimates between LM (0.488) and us (0.484) is due to LM using
this table presents summary statistics for the log excess return of the S&P500 index. The Pre-FOMC columns use returns for the 24 hours ending 15 minutes before the scheduled FOMC announcements. The Other columns use returns on all other (non-announcement) days. Standard errors for the mean are reported in parentheses.

disappeared in recent times.

Focusing on the announcement days, we compute cumulative excess returns over a three-day window around the FOMC announcements (from one day before the announcement to the day after the announcement). The top panel of Figure 1 shows the average cumulative returns from September 1994 to March 2011, replicating the main LM result: U.S. equities exhibit a large positive drift in the 24 hours before scheduled FOMC announcements. The bottom panel shows the average cumulative returns from April 2011 to December 2017. In contrast to the top panel, no substantial pre-FOMC announcement drift is visible.

We present the time-series of the pre-FOMC announcement drift in Figure 2. Following LM, we show a one-year moving average, which corresponds to eight FOMC announcements. This figure also suggests that the pre-announcement drift has disappeared in the recent period.

In Table 2, we report the estimation results of the key LM regression:

\[
er_t = \beta_0 + \beta_1 I_t(preFOMC) + \epsilon_t,
\]

where the explanatory variable is an indicator variable equal to one during the 24-hour

4Unreported figures show no qualitative differences between the three subgroups of announcement times in our sample (12:30, 2:00, and 2:15 pm).

5Like LM, we omit an outlier return of 9.55% on October 29, 2008 when constructing this figure.
This figure shows the S&P500 index cumulative excess returns during three days around scheduled FOMC announcements. The top panel includes 131 announcements from September 1994 to March 2011. The bottom panel includes 54 announcements from April 2011 to December 2017. The gray shaded areas represent 95% confidence bands around the mean returns.
This table shows results of estimating equation (1). The dependent variable in the first column is the log excess return of the S&P500 index computed as explained at the beginning of Section 2. The dependent variable in the last five columns is the daily log close-to-close return on the German DAX, the British FTSE100, the French CAC40, the Spanish IBEX, and the Swiss SMI indices. Sample sizes vary across indices due to data availability. Heteroskedasticity consistent standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 2: Returns on S&P500 Index and International Indices

<table>
<thead>
<tr>
<th></th>
<th>S&amp;P500</th>
<th>DAX</th>
<th>FTSE100</th>
<th>CAC40</th>
<th>IBEX</th>
<th>SMI</th>
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<tbody>
<tr>
<td><strong>09/1994 - 03/2011</strong></td>
<td></td>
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<tr>
<td>Pre-FOMC dummy</td>
<td>0.488***</td>
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<tr>
<td></td>
<td>(0.108)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(0.019)</td>
<td></td>
<td></td>
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<tr>
<td>Obs.</td>
<td>4,141</td>
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<tr>
<td>No. of FOMC</td>
<td>131</td>
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<tr>
<td><strong>04/2011 - 12/2017</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-FOMC dummy</td>
<td>-0.005</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.073)</td>
<td></td>
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<tr>
<td>Constant</td>
<td>0.039*</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td></td>
<td></td>
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<tr>
<td>Obs.</td>
<td>1,699</td>
<td></td>
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<td></td>
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<tr>
<td>No. of FOMC</td>
<td>54</td>
<td></td>
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</tbody>
</table>

The first column in the top panel shows that the coefficient on the pre-FOMC indicator variable is statistically significant for the S&P500 index in the September 1994 to March 2011 period. The magnitude of the coefficient (0.488) matches the key LM result of an average pre-FOMC drift amounting to 49 basis points. In contrast, the coefficient is not statistically significant in the bottom panel for the April 2011 to December 2017 period, showing that the S&P500 index did not experience positive pre-FOMC returns in recent times.

The remaining five columns report the results for five European equity indices (German DAX, British FTSE100, French CAC40, Spanish IBEX, and Swiss SMI) as in LM. For these indices, the dependent variable is the daily log close-to-close return and, because of the time zone differences, these close-to-close returns never include the FOMC announcements. The
This figure shows S&P500 index log excess returns during the 24 hours before scheduled FOMC announcements (black dashed line), their one-year moving average (thick black line), and the effective federal funds rate (thin red line). Shaded areas represent the National Bureau of Economic Research (NBER) recession dating.

results show that the pre-FOMC returns have disappeared in international indices as well, with the exception of the FTSE100 where the drift remains significant although with a lower magnitude.

Finally, we conduct a structural break analysis to find out when the S&P500 index stopped experiencing positive pre-FOMC returns. Both the Quandt-Andrews test based on Andrews (1993) and the Bai and Perron (2003) test identify April 2010 as the date of the structural break in the mean excess return.\(^6\)

\(^6\)The Quandt-Andrews maximum likelihood ratio and Wald statistics are 13.50 and 19.79, respectively, indicating statistical significance at 1% level. The Bai and Perron (2003) test value equals 19.79, which exceeds the critical value of 8.58 and indicates statistical significance at 5% level.
3 Potential Explanations

Summarizing, we replicate the key LM results showing that the S&P500 index experienced positive excess returns before FOMC announcements from September 1994 to March 2011. We then show that these returns have disappeared in the recent period from April 2011 to December 2017, with a structural break in January 2010. We discuss four possible explanations related to the economic and market conditions, uncertainty surrounding monetary policy and the zero lower bound, the FOMC communication policies, and the discovery of the drift by Lucca and Moench.

The first difference between the original LM sample period and our updated sample period is the business cycle. While the LM sample includes both recessions and expansions, our updated sample includes only an expansion because the most recent NBER recession ended in June 2009. The LM results related to the state of the economy are mixed. LM find a weak positive relation between pre-FOMC returns and the NBER recession dummy. LM also find a strong positive relation between pre-FOMC returns and the market conditions measured by the VIX implied volatility index. This suggests a smaller pre-FOMC drift in quieter and more prosperous times.

However, LM find no significant relations between pre-FOMC returns and changes in industrial production, nonfarm payroll, or inflation, concluding that the drift is not countercyclical. Moreover, our updated sample was not as quiet as one may think with notable events such as the European debt crisis peaking in 2012, the worldwide stock market sell-off in 2015, and Brexit in 2016. In Table 3, we replicate and extend the LM test relating pre-FOMC returns to the VIX: the second column shows that the relation has become insignificant in the more recent period. It, therefore, seems unlikely that the state of the economy and market conditions can explain the disappearance of the drift.

The second, although related, difference between the LM sample and our sample is the state of and uncertainty surrounding monetary policy. While the LM sample includes a variety of monetary policy states, our sample covers a period during which the effective
Table 3: Pre-FOMC S&P500 Index Returns – Additional Tests

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>VIX</td>
<td>0.318***</td>
<td>0.033</td>
<td>0.346***</td>
<td>0.033</td>
<td>0.140</td>
</tr>
<tr>
<td></td>
<td>(0.083)</td>
<td>(0.142)</td>
<td>(0.121)</td>
<td>(0.107)</td>
<td>(0.141)</td>
</tr>
<tr>
<td>TYVIX</td>
<td>0.346***</td>
<td>0.033</td>
<td>0.418***</td>
<td>0.035</td>
<td>-0.038</td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.071)</td>
<td>(0.113)</td>
<td>(0.071)</td>
<td>(0.112)</td>
</tr>
<tr>
<td>Press conference &amp; SEP dummy</td>
<td>0.414***</td>
<td>0.035</td>
<td>0.414***</td>
<td>0.035</td>
<td>-0.038</td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.071)</td>
<td>(0.113)</td>
<td>(0.071)</td>
<td>(0.112)</td>
</tr>
<tr>
<td>Constant</td>
<td>130</td>
<td>54</td>
<td>65</td>
<td>54</td>
<td>54</td>
</tr>
</tbody>
</table>

The first and second columns show results from estimating equation: $er_t = \beta_0 + \beta_1 VIX_t + \epsilon_t$, where $er_t$ is the log excess return on the S&P500 index during the pre-FOMC window (24 hours ending 15 minutes prior to the announcement), and $VIX_t$ is the level of the VIX index at the market close two days before the scheduled announcement (standardized to have a mean of zero and a standard deviation of one) following LM. The third and fourth columns show results from estimating equation: $er_t = \beta_0 + \beta_1 TYVIX_t + \epsilon_t$, where $TYVIX_t$ is the level of the TYVIX index at the market close two days before the scheduled announcement (standardized to have a mean of zero and a standard deviation of one). The fifth column shows results from estimating equation: $er_t = \beta_0 + \beta_1 I_t(\text{Press Conference SEP}) + \epsilon_t$ where the independent variable is an indicator variable equal to one if the FOMC meeting is accompanied by a press conference and a SEP release, and zero otherwise. The FOMC announcement of October 29, 2008 is removed from the sample. Heteroskedasticity consistent standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

The federal funds rate was at historical lows, with the zero lower bound in place from December 2008 to December 2015 followed by gradual increases. This may suggest that our sample contains a predictable easing stance by the FOMC and little uncertainty regarding monetary policy.\textsuperscript{7} This in turn could explain the absence of a pre-FOMC drift.

However, LM find that the drift tends to be larger during periods of monetary policy easing, although the difference between the easing and tightening periods is not statistically significant. LM also find no relation between pre-FOMC returns and two different measures of monetary policy surprises.\textsuperscript{8} Moreover, monetary policy remained uncertain during our updated sample, beyond the absolute level of the federal funds rate, because of the unconventional policy measures taken by the Federal Reserve since the financial crisis. These

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\textsuperscript{7}Swanson and Williams (2014) show that the sensitivity of intermediate-maturity Treasury yields to macroeconomic news decreased substantially in late 2011.

\textsuperscript{8}As discussed by LM, good monetary policy news or the notion of a Fed put cannot explain the timing of the drift, i.e., why it occurs only prior to the announcements.
measures included the third round of quantitative easing (QE) in 2012 and the QE tapering in 2013 (with the ensuing bond market tantrum). Furthermore, this period was characterized by continuous uncertainty about the timing of the liftoff from the zero lower bound. In Table 3, we test the relation between the 10-year U.S. Treasury Note Volatility Index (TYVIX), a market-based measure of monetary policy uncertainty, and pre-FOMC returns. The relation is statistically significant during the January 2003 to March 2011 sample period, but the fourth column shows that the relation has disappeared in the more recent period. It, therefore, seems unlikely that the post-2011 monetary policy can explain the disappearance of the pre-FOMC drift.

The third difference between the LM sample and our sample relates to the FOMC communication policies. The FOMC put in place the release of the Summary of Economic Projections (SEP) of the individual meeting participants in October 2007 and the Chair press conference in April 2011. The changes in communication policies could have affected how markets behave around FOMC announcements if these meetings are managed differently with respect to pre-announcement information control or if the markets perceive these meetings as carrying different informational content. However, the fifth column in Table 3 shows that the pre-FOMC drift has disappeared both for regular meetings and for the meetings that are accompanied by a press conference and an SEP release. It is, therefore, unlikely that changes in communication policies can explain the disappearance of the drift.

The fourth possible explanation is that the drift was discovered and made public by Lucca and Moench in 2011 when their working paper became publicly available, and that subsequent action by market participants has led to the disappearance of the drift. LM report that a trading strategy of holding the index only during the 24 hours prior to FOMC meetings would have generated an annualized Sharpe ratio higher than one. Consistent with

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9See Wright (2012) and Lutz (2015) for the timeline of monetary policy events and related FOMC announcements since the 2008 crisis.

10The TYVIX index is available only as of January 2003. Like the VIX, the overall level of the TYVIX is lower during the more recent sample, but it has remained volatile.

11During our sample, these “special” meetings took place in April, June and November of 2011, January, April, September and December of 2012, and March, June, September and December of subsequent years.
the findings in McLean and Pontiff (2016), it is plausible that the pre-FOMC announcement drift was arbitraged away following its discovery by academic researchers.

4 Conclusion

The pre-FOMC announcement drift of Lucca and Moench (2015) has disappeared since its discovery. Building on the findings in LM, it seems unlikely that the state of the business cycle, the state of monetary policy, and changes in the FOMC communication policies can explain this disappearance. The simplest explanation is that investors learned about this mispricing, and it disappeared.

References


