

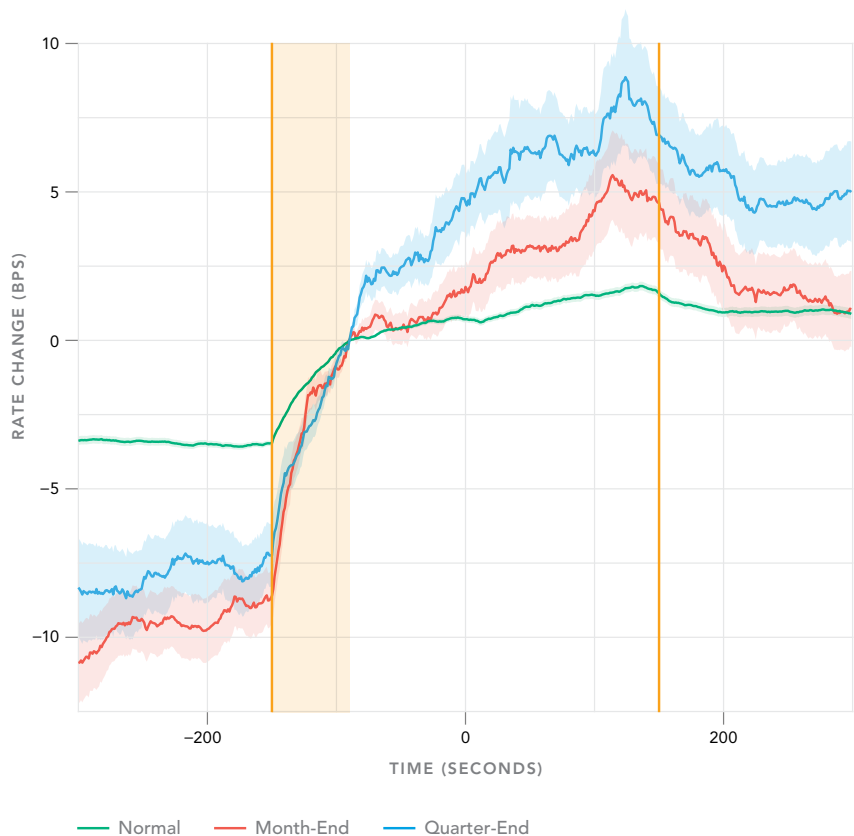
# WM/R Trading Patterns: Month-End and Quarter-End

## Introduction

In a previous Pragma research note we revealed new trading patterns that have developed around the WM/Reuters 4 p.m. Fixing.<sup>1</sup> There is now a predictable momentum in rate changes during the new 5-minute window, and reversion afterwards. This pattern, together with a flat elevated volume pattern, is consistent with reports of widespread adoption of TWAP-style trading within the fixing window.<sup>2</sup>

The previous research note was based on data for the four months from February 15 through June 15, 2015. This update looks at the data through September 30, and addresses two basic questions: (1) has the trading pattern we uncovered in July persisted, and (2) does the same pattern exist in month-end and quarter-end fixings, which are reportedly quite different than ordinary trading days?<sup>3</sup> **We find that the pattern has persisted in Q3, and is markedly more robust at month- and quarter-ends than on ordinary days.**

FIGURE 1 Rate changes around 4 p.m.

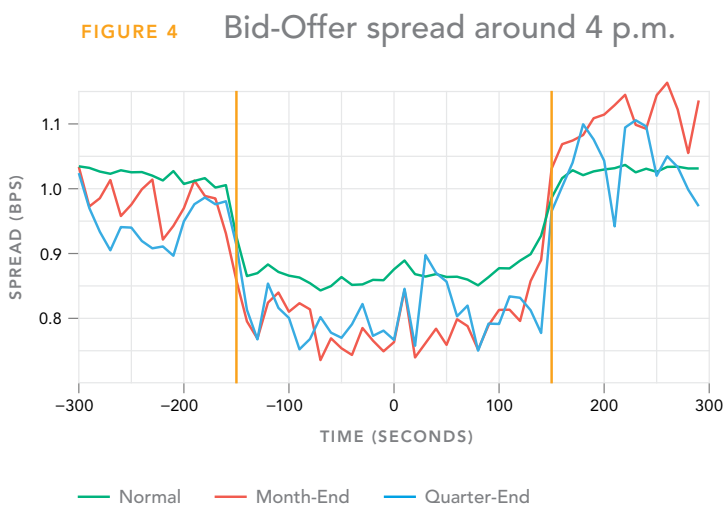
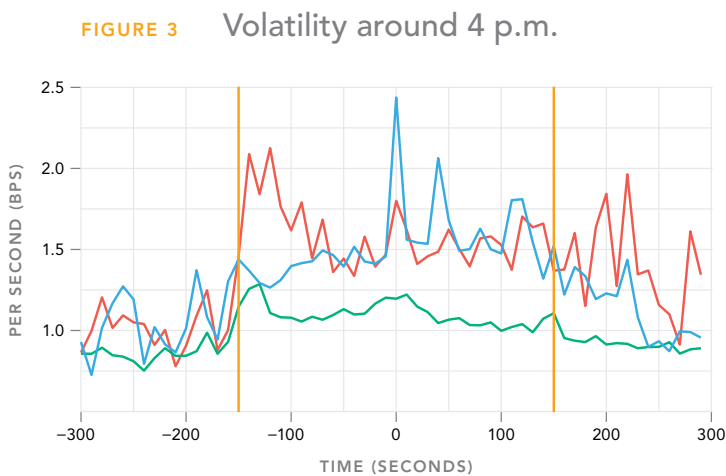
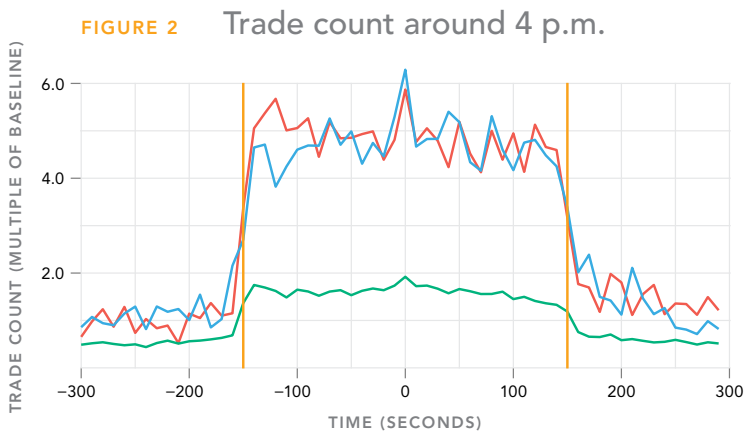


The pattern of momentum during the fixing window followed by reversion afterward is even stronger at month- and quarter-ends than on ordinary days.

1 Pragma Securities LLC, "New Trading Patterns Around the WM/R Fix," 2015.

2 Financial Stability Board, "Foreign Exchange Benchmarks, Report on progress in implementing the September 2014 recommendations," October 1, 2015.

3 M. D. Evans, "Forex Trading and the WMR Fix," 2014.



## Analysis

### MONTH-END AND QUARTER-END

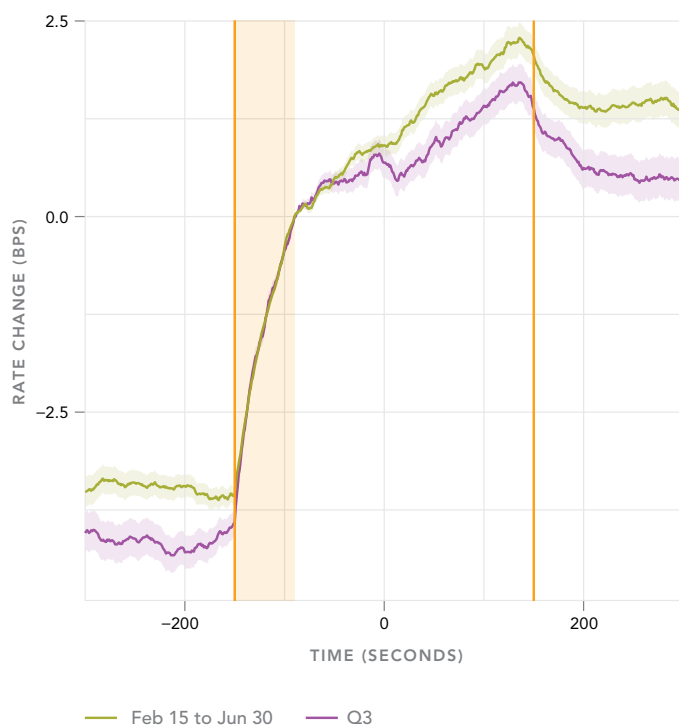
Many buy-side firms reportedly concentrate their rebalancing and hedging activities on month- and quarter-ends, leading to greater volume and volatility around the WM/R Fix than on ordinary days. With a somewhat more substantial data set of 8 month-ends, we now apply the same analysis to these special days.

In Figures 1-4, we separate the days between February 15 and September 30 into three sets: 3 quarter-ends, 5 month-ends that are not also quarter-ends, and the other 153 ordinary days. The X axis of each figure shows the time as seconds relative to 4 p.m. London time, and the fixing window is indicated by vertical orange lines. As in the previous research note, days are classified as “up” or “down” based on the direction of the return during the first minute of the fixing window (shaded), and down days are inverted. We restrict the analysis to nine relatively liquid pairs, EUR, JPY, CHF, GBP, AUD, NZD, MXN, SGD and ZAR in order to avoid the noise from less liquid pairs.

Figure 1 shows that even with only 3 and 5 data points for quarter and month-end respectively, we see the same qualitative pattern of momentum and reversion around the fixing window that we see on ordinary days. **However, the pattern is much stronger at month-end and even more so at quarter-end.** The figure shows that, conditioned on the rate direction over the first minute of the fixing window (shaded), the rates trend in the same direction in the remaining four minutes, and start a significant reversion towards the end of the window. But instead of the 2 basis point magnitude of the effect on ordinary days, we see roughly 5 basis points at month-end, and 8 at quarter-end. The shaded region around each line on the graph represents one standard error.

Figure 2 shows the pattern of trade intensity around the new Fix window. At month and quarter-ends, there is about two and a half times higher trade intensity during the fixing window than on ordinary days, but there appears to be no qualitative difference between

FIGURE 5 Rate changes around 4 p.m.



the pattern of month-end and quarter-ends compared with ordinary days. Both show a sudden step up to a higher trading intensity that stays even throughout the fixing window, and then decays suddenly at the end of the window.

Similarly, Figure 3 shows elevated volatility during the fixing window, spiking at the start of the window and decaying after the end of the window, with perhaps 20% higher volatility on month and quarter-ends than ordinary days.

Figure 4 shows that bid-offer spreads during the fixing window drop suddenly at the start of the fixing window, and widen again at the end, and that spreads are even narrower on month and quarter-ends than on ordinary days, consistent with proportionately greater increase in trading volume than volatility.

## THE PATTERN PERSISTS

Figure 5 shows that the pattern of momentum and reversion that we reported in the previous research note has persisted in the third quarter of 2015. Conditioned on the direction of rate movement during the first minute (shaded), on average the rate continues in the same direction until close to the end of the fixing window, after which it reverts markedly.

The patterns of trade intensity, volatility, and spread are generally consistent between the initial study period and Q3, and are not shown here. Conditional price trend, while showing the same qualitative pattern of momentum and reversion, has weakened somewhat in Q3. The magnitude of the *reversion*, however, has *strengthened* somewhat in Q3. Most of the weakening of the momentum came from September, and whether this represents a persistent evolution of the pattern or a random fluctuation remains to be seen.

## Conclusion

A market-wide shift toward using time-slicing algorithms to trade the WM/Reuters 4 p.m. Fix has led to predictable momentum in rate movements during the fixing window, followed by marked reversion. This pattern has persisted in the third quarter of 2015. Trading volume and volatility around month-end and quarter-end are higher than on ordinary days, presumably the result of many market participants concentrating their liquidity demands at these times in an attempt to achieve the benchmark rate and avoid tracking error. Figure 1 clearly shows the costs for this crowding behavior—the momentum and reversion patterns are much stronger on month and quarter-end than on normal days. Most buy-side market participants are on the wrong side of the demand imbalance, and pay a large premium in market impact in order to reduce their tracking error relative to the benchmark. These observations mark out a path to significantly improved execution for firms that are not required to replicate month- and quarter-end benchmarks.

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