

WM/REFINITIV FX BENCHMARKS (WMR)

WM/REFINITIV SPOT RATES – MARKET ANALYSIS

Market Dynamics

Market Behaviours around 4pm UK time

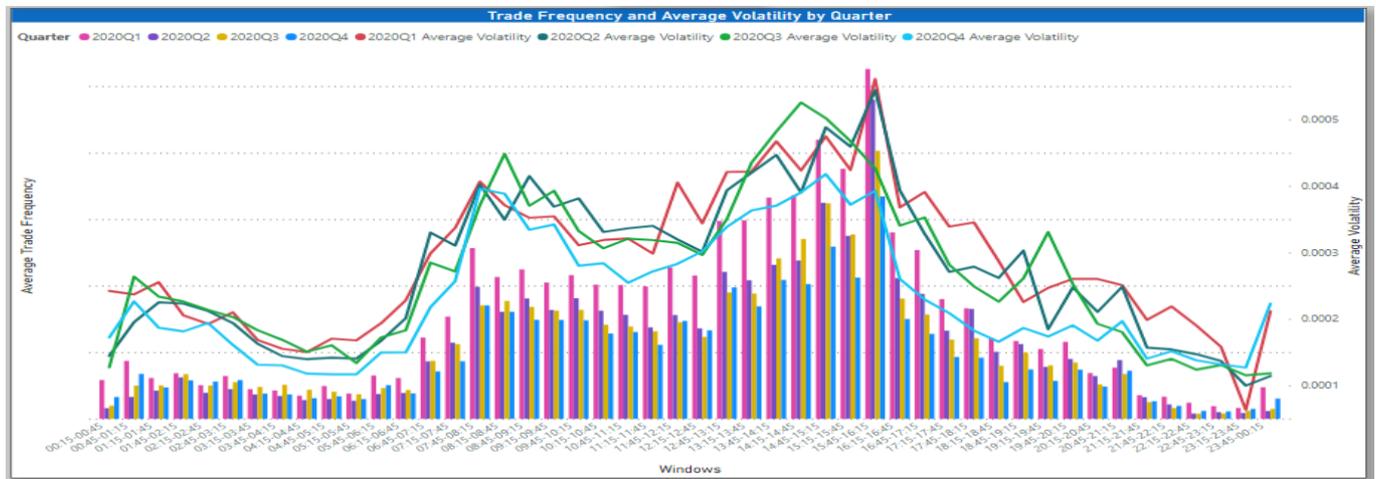
WMR provides a choice of Spot FX benchmarks to be used for a range of financial purposes and to deliver transparency and execution insight. The WMR Intraday service provides the full range of currencies every hour and the top 25 currencies every 30minutes – offering benchmarks to build into analysis and strategies.

The WMR intraday benchmarks are widely used but there is still a significant focus on the WMR Closing Spot rate as at 4pm UK time. We think it is important to ensure our users are objectively informed on the market dynamics around 4pm and as such we have undertaken further data analysis focussing on market dynamics around 4pm during 2020 and 2021 – please see below:

Quarterly Average Daily Trade Frequency & Price Volatility – Sliced by 30-minute time windows

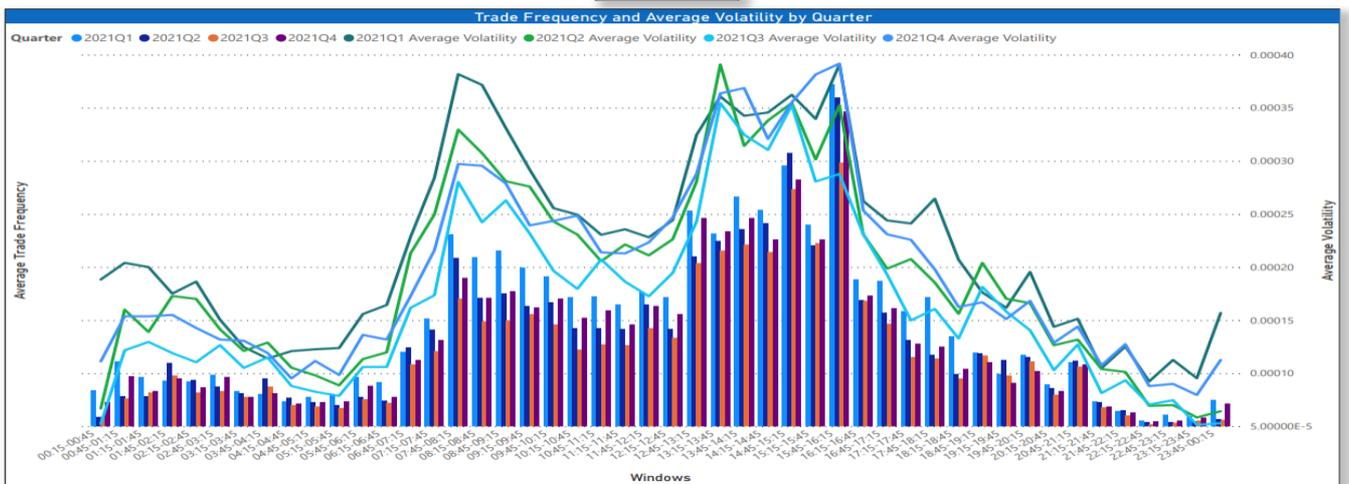
The chart below shows the average trade frequency & price volatility per quarter for each 30-minute time slot over the day.

2020



2021

EUR/USD

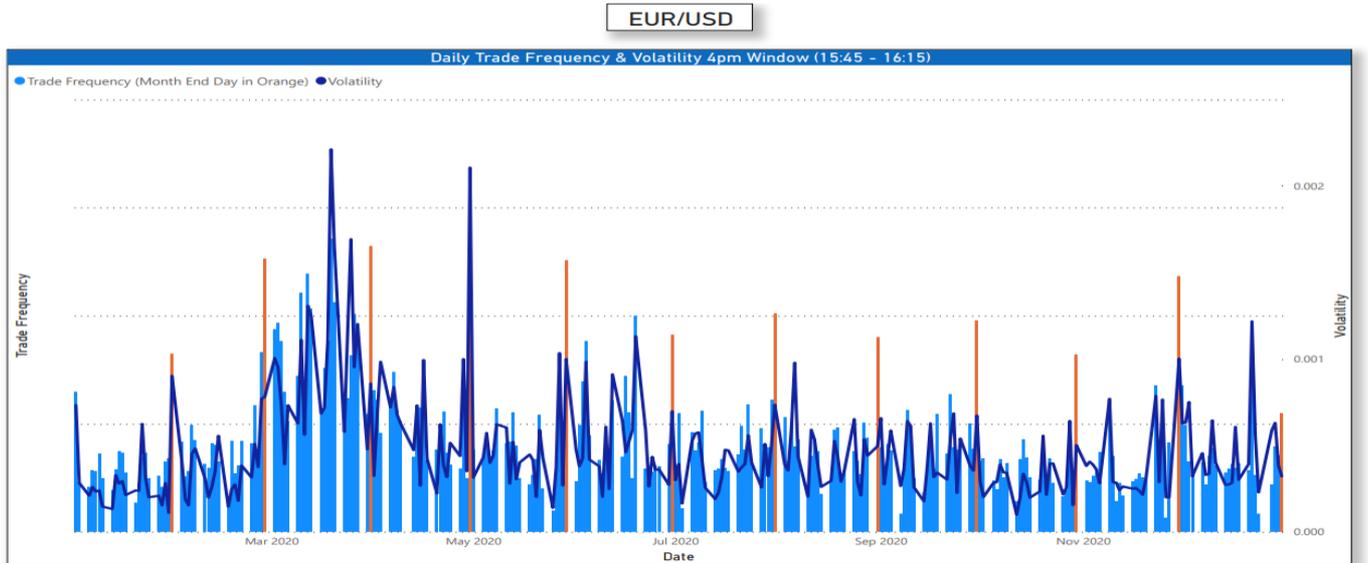


Key Findings - Trading Frequencies, Price Volatility across the trading day:

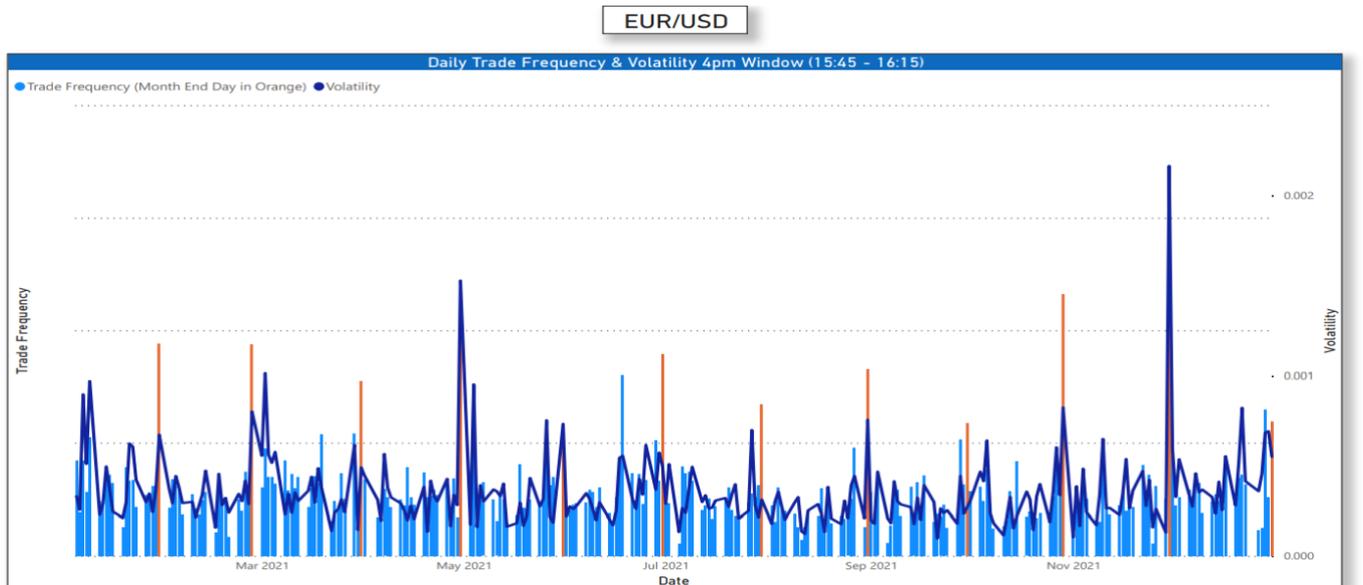
- The increase in Trade Frequency around 4pm does not always result in the same degree of increase in volatility.
- There continues to be external drivers of volatility and trading frequency other than the WMR calculation window, e.g. Central Bank announcements / key market events / daily dynamics.

Daily Trade Frequency & Price Volatility from 15:45 to 16:15 UK - Month End data shown in orange

2020



2021



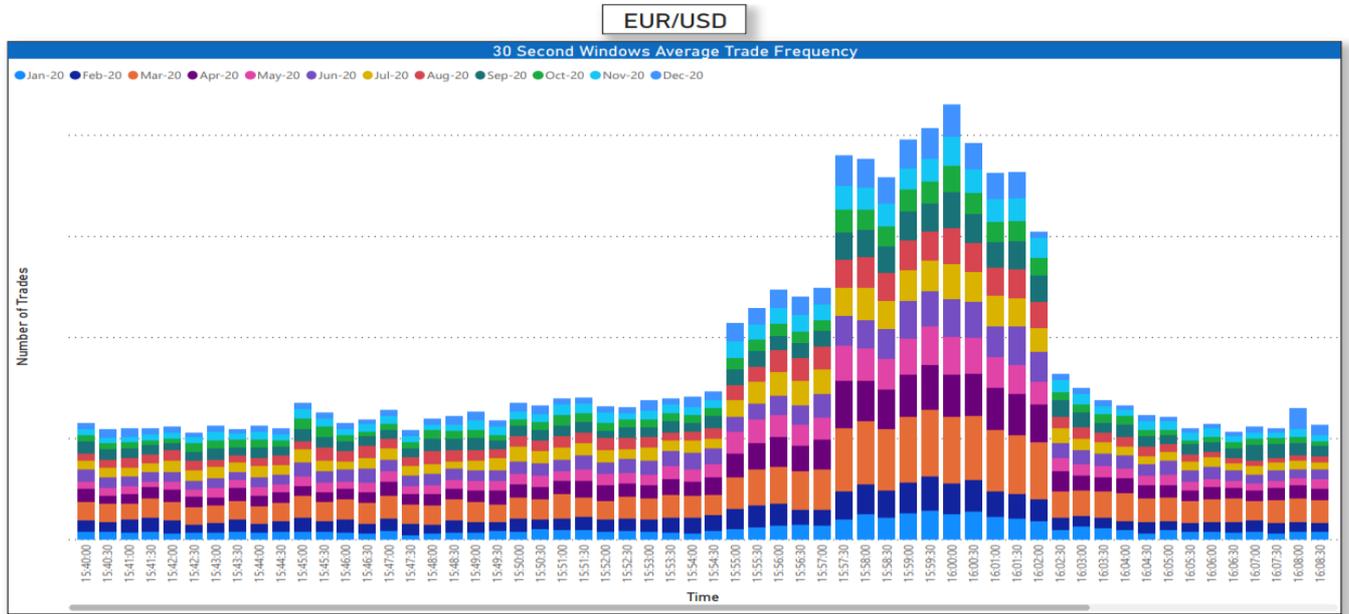
Key Findings - Trading Frequencies, Price Volatility on the time period: 15:45-16:15 (WMR Spot rates at 4pm (UK)):

- Trade frequency at month-end during 2020 and 2021 is consistently higher.
- Q1 2020 is a standout quarter with significantly higher trade frequencies observed across all currencies
- March 2020 stands out over the 15-month period with higher trade frequencies than the “norm” – as a consequence of the COVID pandemic.

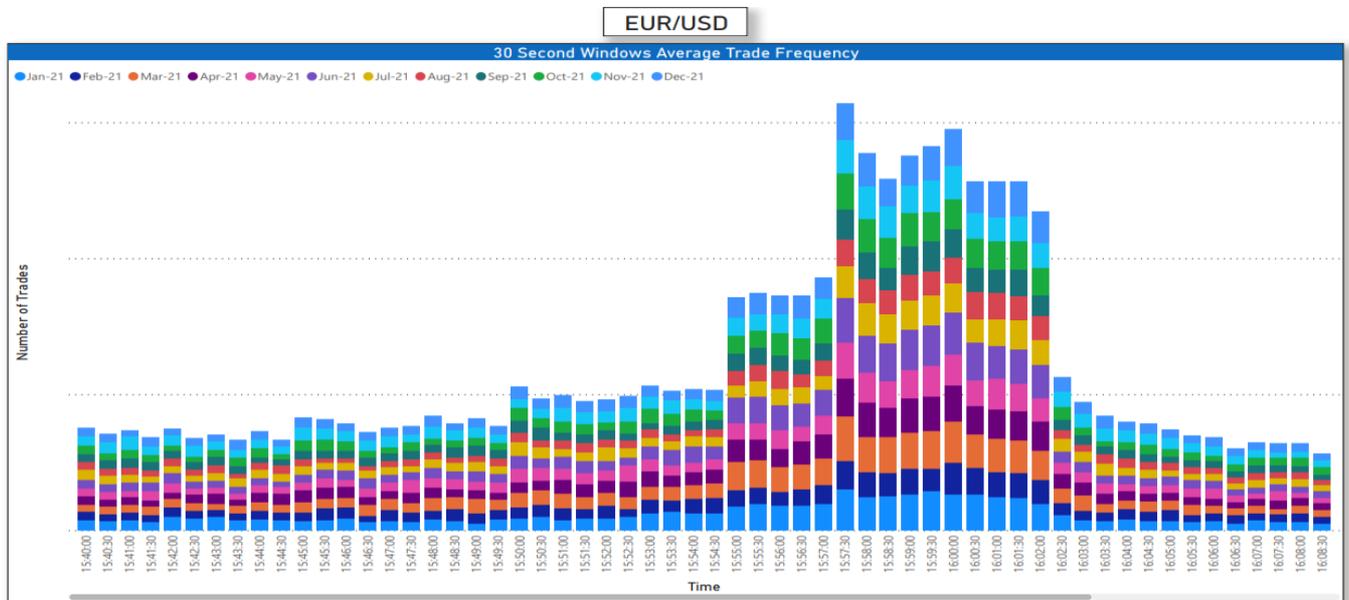
Monthly Average Trade Frequency – Sliced by 30-Second time windows around the 4pm Benchmark Period

The stacked bar chart below shows the average trade frequency per month for each 30-second time window around the 4pm benchmark period

2020



2021

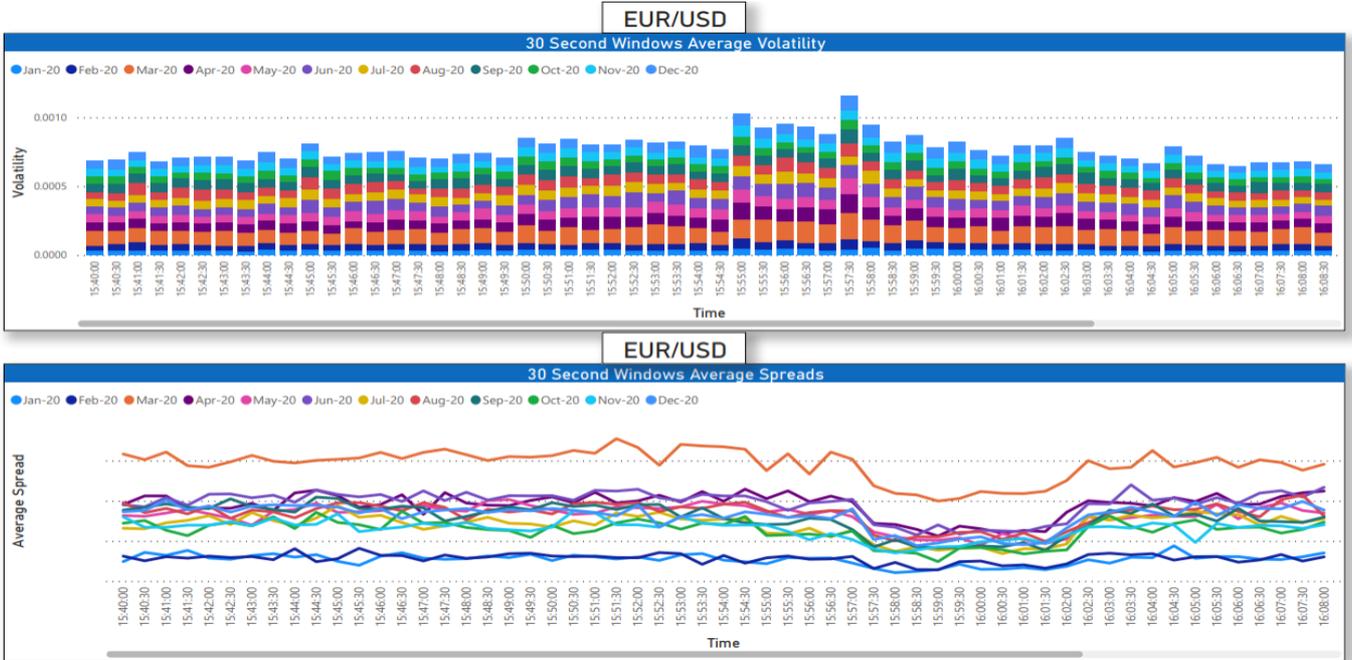


Monthly Average Spreads & Price Volatility – Sliced by 30-Second time windows around the 4pm Benchmark Period

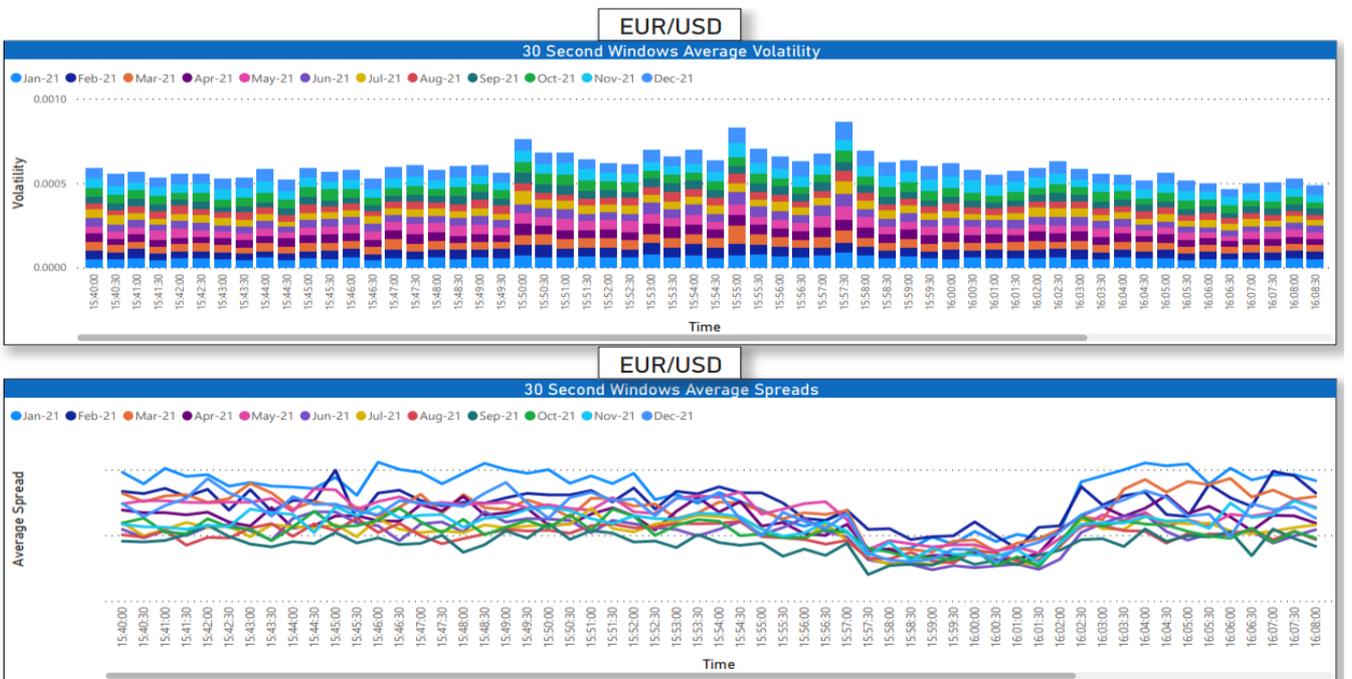
Chart 1 - The stacked bar chart below shows the average Price Volatility per month for each 30-second time window around the 4pm benchmark period.

Chart 2 - The line chart below shows the average Best Bid/Ask Spread per month for each 30-second time window around the 4pm benchmark period.

2020



2021



Key Findings - Trading Frequencies, Price Volatility and Spreads, based on 30-second time slices around WMR 4pm:

- Trade frequency gradually increases from 15:55 through to 15:57:30 (when the benchmark window opens).
- Trade frequency significantly increases as the benchmark window opens at 15:57:30.
- Trade frequency remains consistently high before tailing off in the last 30-60 seconds of the window.
- Trade frequencies return to pre-benchmark window levels immediately post-window
- Spreads tighten and remain reasonably consistent throughout the benchmark window. March 2020 again stands out with consistently wider Spreads observed in response to the market dynamics and changes around the pandemic
- Price volatility increases slightly and peaks in the first 30-seconds of the benchmark window.

In Summary, what does this data analysis of Trade Frequencies, Volatility and Spreads tell us?

There is a discernible and consistent coalescence around 4pm, resulting in higher trade frequencies over the calculation window and tightening of spreads, with other noticeable periods of heightened activity.

User feedback has identified that this increased trading activity can provide some benefits driven by the depth of liquidity, efficient execution, netting opportunities and providing independent verification of FX markets, with lower risk and execution surety. Conversely, it has been suggested that at times, the concentration of demand and supply and/or the potential imbalance of orders at a specific time may impact price.

Ultimately the benefit of executing at the WMR 4pm benchmark rates can vary depending on clients' requirements, risk appetite and investment strategies. A user's decision to execute trades as at the 4pm WMR benchmark should be as a result of an informed choice and considering all potential benefits, risks and of course alternative WMR benchmark rates at different times.

Market Trends

Looking Back from 2015

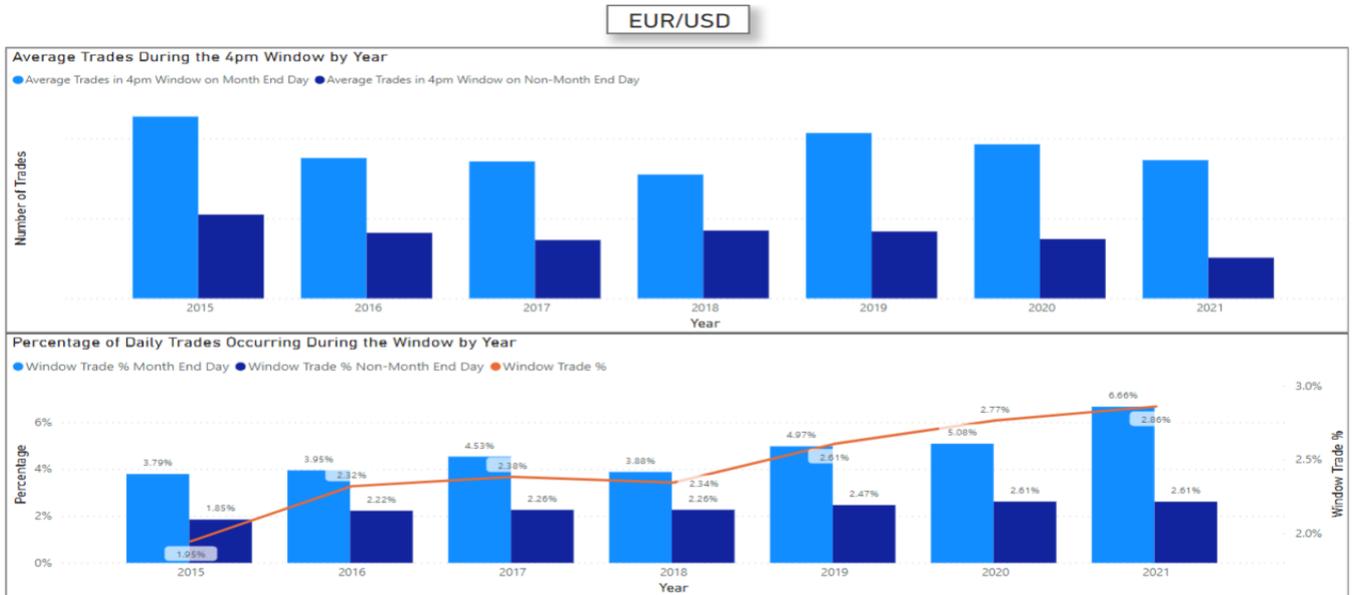
It is expected that market dynamics may change over time, such as the recent increased focus on passive investment strategies and awareness of changes and responding effectively to these is crucial to ensure WMR remains fit for purpose.

Consequently, we have reviewed and charted data from Refinitiv Matching and CME-EBS since 2015 to objectively provide insight as to any market and/or behavioural changes, whilst also breaking into characteristics of month end versus non-month end.

Below are a selection of charts showing EUR (based on EBS data) from 2015 to 2021. Data Analysis for other currencies will be made available on the WMR website.

Chart 1: Average Trade Frequency during the 4pm Window per Year broken down by Month-End Days, Non-Month End Days

Chart 2: % of Total Daily Trades Occurring during the 4pm Benchmark Window broken down by Month-End Days, Non-Month End Days and All days together

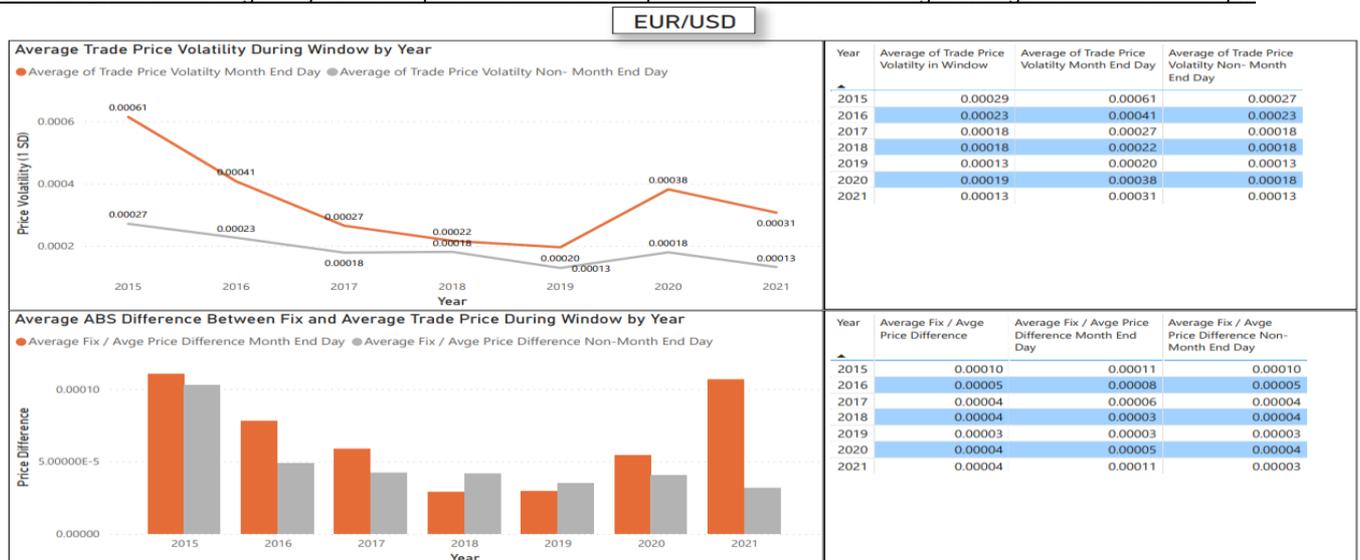


Key Findings:

- Trade frequency in the 4pm window is reasonably consistent from 2015 through to 2021
- The proportion of trades from the trading day that occur in the 4pm window has increased slightly. This indicates a slight increase in trading concentration on the day in the 4pm window for EUR/USD on the CME-EBS platform.

Chart 1: Average Trade Price Volatility during the 4pm Window per Year broken down by Month-End Days, Non-Month End Days

Chart 2: Shows the Average daily difference per Year between the 4pm Fix and a calculated straight average of all trades in the 4pm



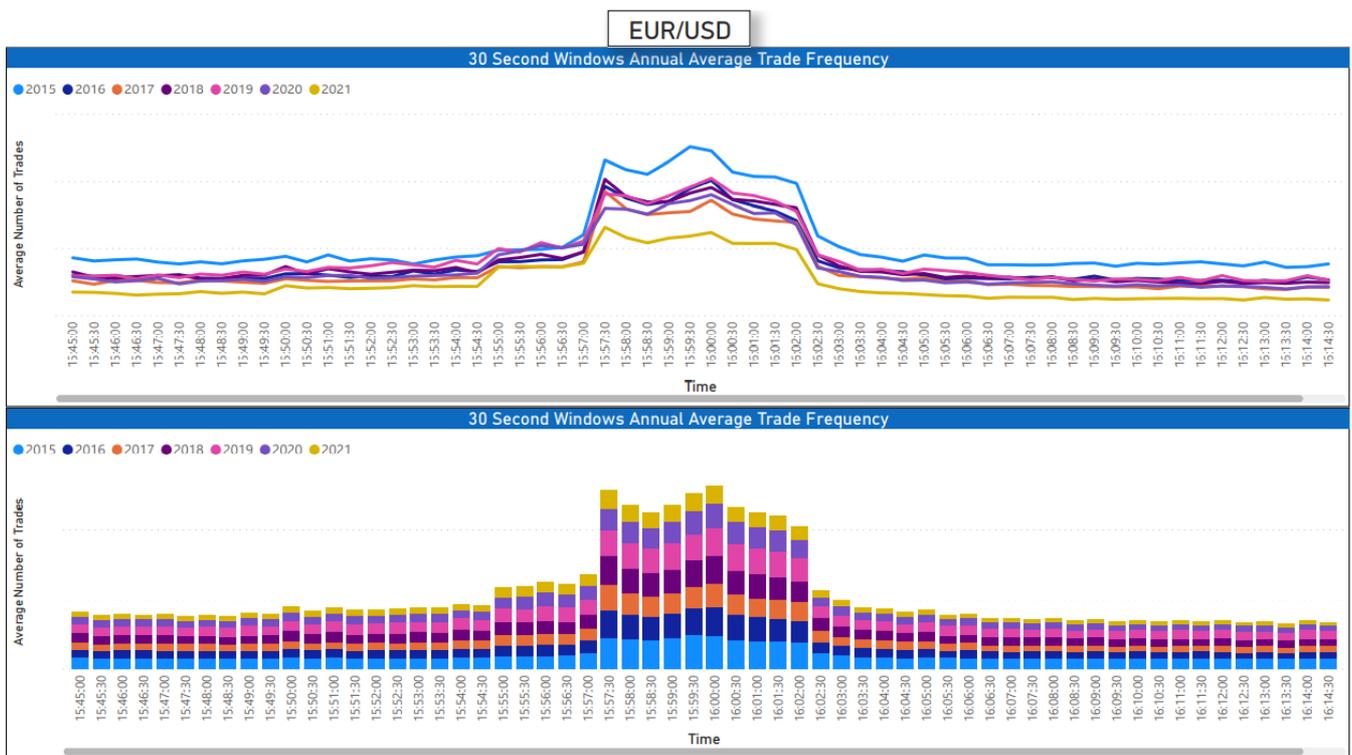
Benchmark window, broken down by Month-End Days and Non-Month End Days.

Key Findings:

- Trade price volatility in the 4pm window is higher at month-end as expected
- Trade price volatility is falling except for 2020 where there is an observed increase from the COVID Pandemic. Notably though, the volatility levels observed in 2020 are not at the levels observed in previous years with 2015 & 2016 having higher month-end volatility.
- The bottom chart looks at comparing a straight average of trade prices in the window vs the Fix. The key observations here are:
 - In nearly all years, we see a greater difference between the WMR rates and the average rate at month-end – essentially when volatility is also higher.
 - The difference between a straight average of trades and the Fix is not deteriorating over time, with a couple of exceptions at month end during 2021 where WMR reflects market activity and movement driven by the market response to key announcements/outlook statements.

Trade Frequency: Yearly Average – Sliced by 30-Second time windows around the 4pm Benchmark Period

Chart 1 – Line chart view. Chart 2 - Stacked bar chart view.



Key Findings:

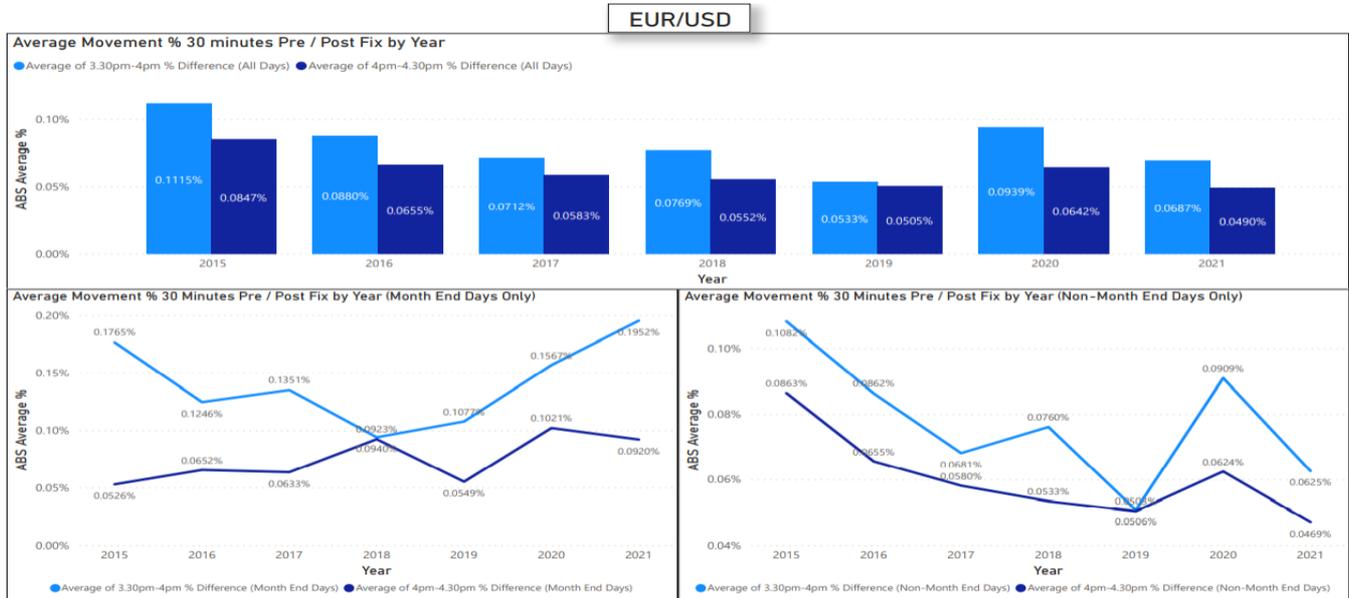
Trading frequency behavior remains unchanged from 2015 through to 2021. 2015 has the highest trade frequency despite the increases observed during COVID. 2021 stands out as having consistently lower averages.

Trading frequency behaviour around the 4pm window remains consistent year on year.

- Trade frequency gradually increases from 15:55 through to 15:57:30 (when the benchmark window opens).
- Trade frequency significantly increases as the benchmark window opens at 15:57:30.
- Trade frequency remains consistently high before tailing off in the last 30-60 seconds of the window.
- Trade frequencies return to pre-benchmark window levels immediately post-window

Price Movement: Yearly Average % Price Movement from the 3:30pm – 4pm Fix and to 4pm – 4:30pm Fix

Chart 1 – Bar chart view per year showing the average daily % movement from 3:30pm to 4pm Fix and 4pm to 4:30pm Fix
 Chart 2 (bottom left) – Line chart view showing the average daily % movement from 3:30pm to 4pm Fix and 4pm to 4:30pm Fix on month-end days only.
 Chart 3 (bottom right) – Line chart view showing the average daily % movement from 3:30pm to 4pm Fix and 4pm to 4:30pm Fix on non-month end days only.



Key Findings:

- Movement of the Fix from 3:30pm through to 4:00pm, consistently shows greater movements compared to the movement from 4pm to 4:30pm. Whilst it's a relatively simplistic way of looking at price movement around the 4pm Fix, there is nothing in the data to suggest that swings in price movement are worsening over time.
- Month End Days – Consistently observe greater movements in the 3:30 to 4pm Fix on month end days compared to non-month end trading days. 2020 & 2021 saw a slight increase in the average movement from 3:30pm to 4pm on Month-End days.

Overall Summary observing the period from 2015 2021

A simple overview indicates there has been little change over the period across data metrics and behaviours:

- Trade frequency and % trading at WMR has been consistent over the period
- Month end vs Non-Month end – indicates similar trends over the period and signals the increased activity at month end
- Limited change in volatility and price movement over the time period.

As indicated above, this paper has only illustrated EUR/USD, analysis for additional currencies has been completed and provides similar trends, it is intended to provide the additional currency analysis on our website.

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