

December 2023

FX Market Structure Monthly

CHANGES IN SPREAD AND VOLATILITY FOR MAJOR MARKET PAIRS

After narrowing marginally for the last few months, FX spreads widened across-the-board in December. While the movement was modest, 22 of the 23 pairs we monitor, including the seven majors, exhibited widening during the 12:00-16:00 GMT trading window.

In the pre-WMR trading window, volatility increased for 19 of the 23 pairs following modest moves over the past four months. Among the majors, volatility rose for GBP.USD, NZD.USD, USD.CAD, USD.CHF and USD.JPY.

READING THE RESULTS

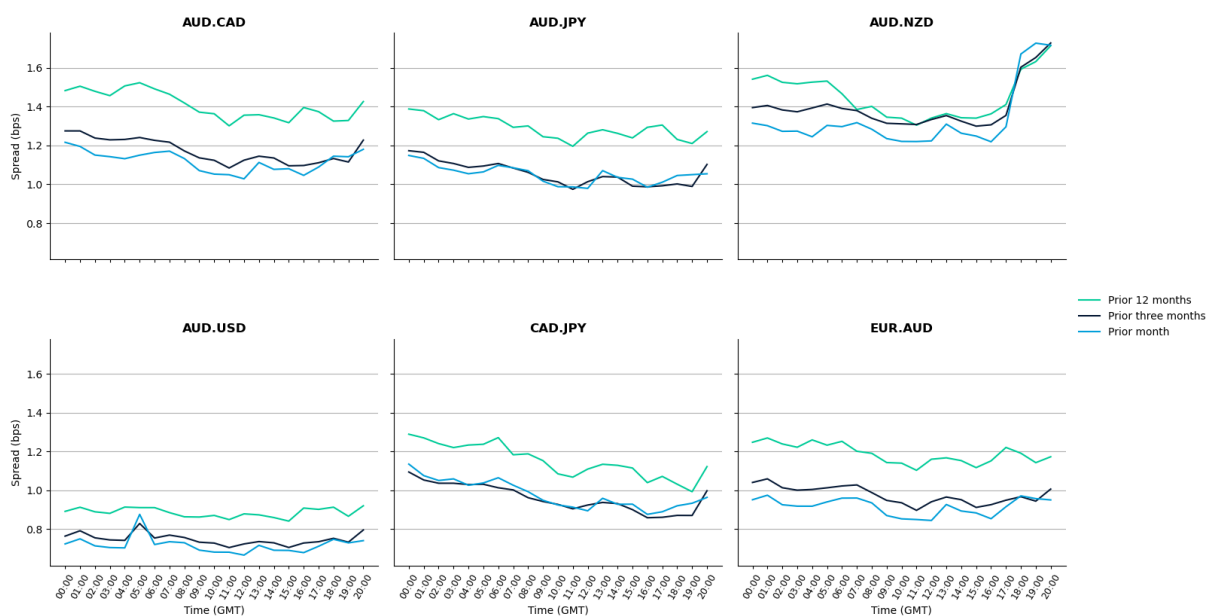
On the intraday charts, the green line represents the average spread or volatility for the past 12 months, the black line represents the past three months, and the blue line represents the past month. On the daily charts, the green area represents the 95th percentile confidence interval for the spread and volatility.

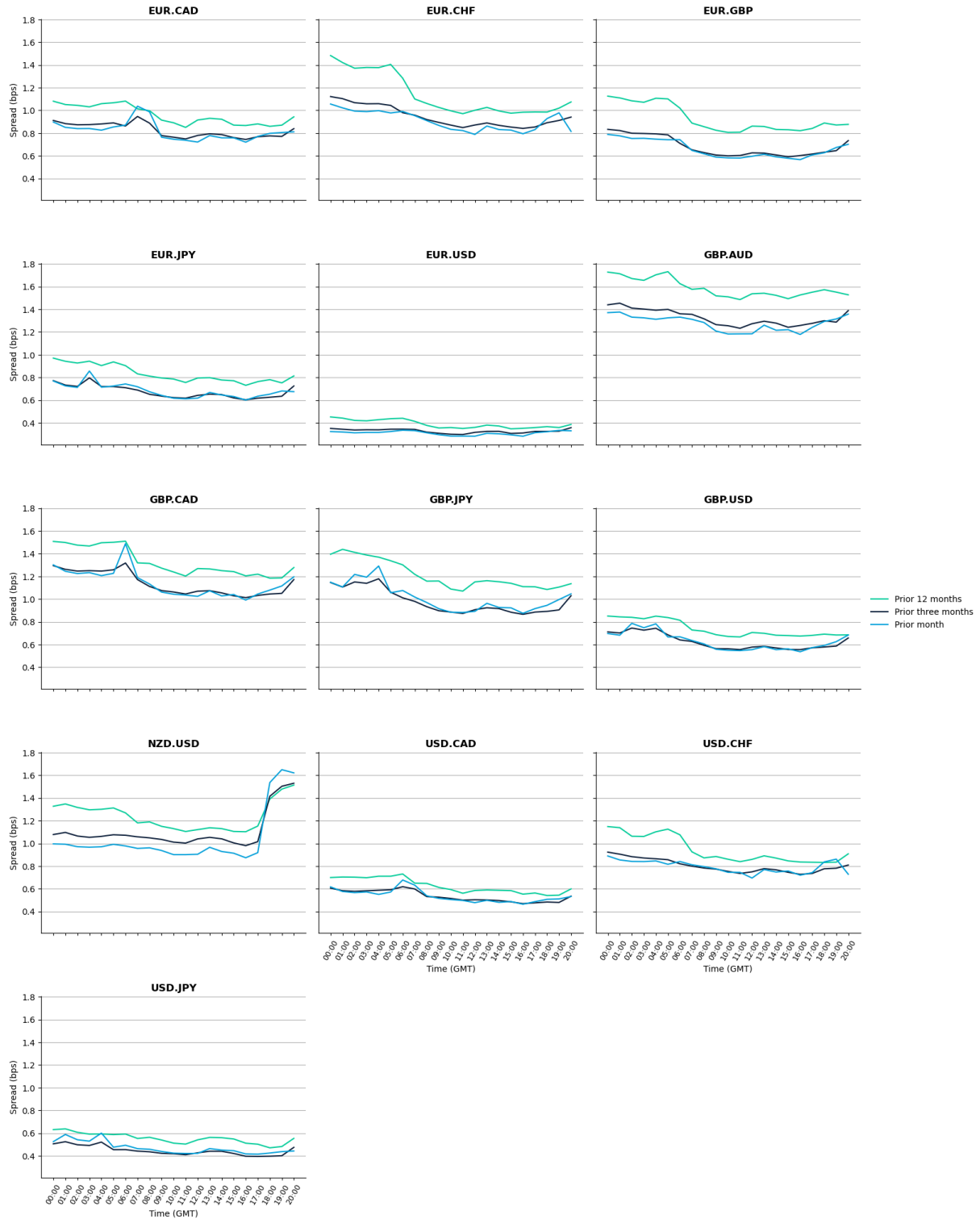
SPREADS

Reviewing December's changes in intra-day spreads, spreads widened in Tokyo, London and New York desk trading for most major pairs. In contrast to the previous month's observation of narrower spreads throughout the day for all 23 pairs, this month, spreads consistently were wider throughout the day for all pairs. Despite relatively small back-and-forth moves over the prior three months, the overall stability remained constant.

G-10 Currency Pairs: Average Hourly Spread, 00:00-20:00 GMT

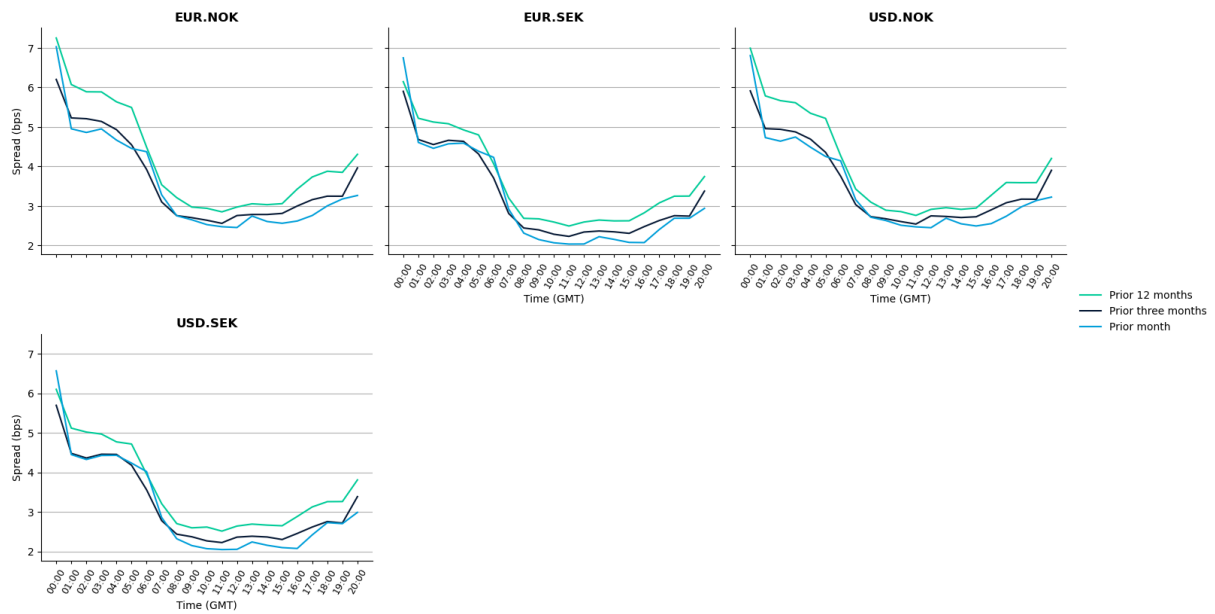
Comparison over the past month, three months and year







Scandinavian G-10 Currencies: Average Hourly Spread, 00:00-20:00 GMT Comparison over the past month, three months and year



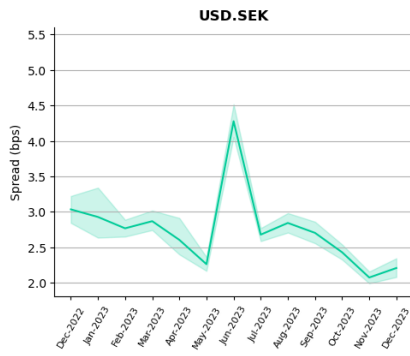
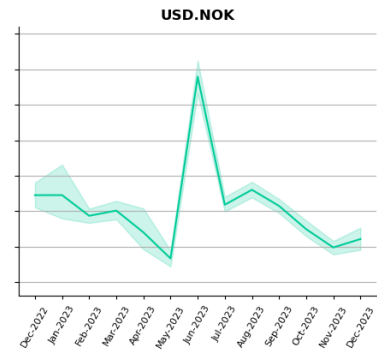
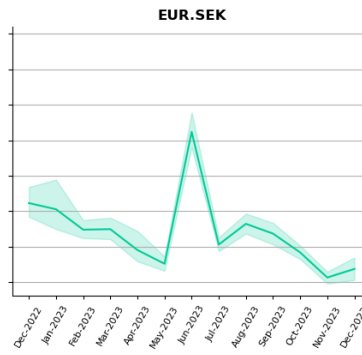
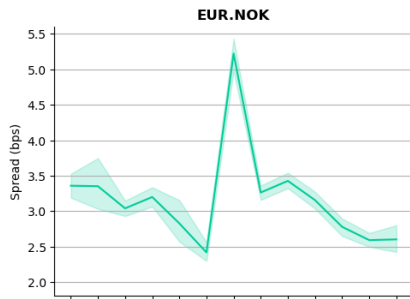
G-10 Currencies: Average Daily Spread, 12:00-16:00 GMT December 2022 - December 2023





Scandinavian G-10 Currencies: Average Daily Spread, 12:00-16:00 GMT December 2022 - December 2023







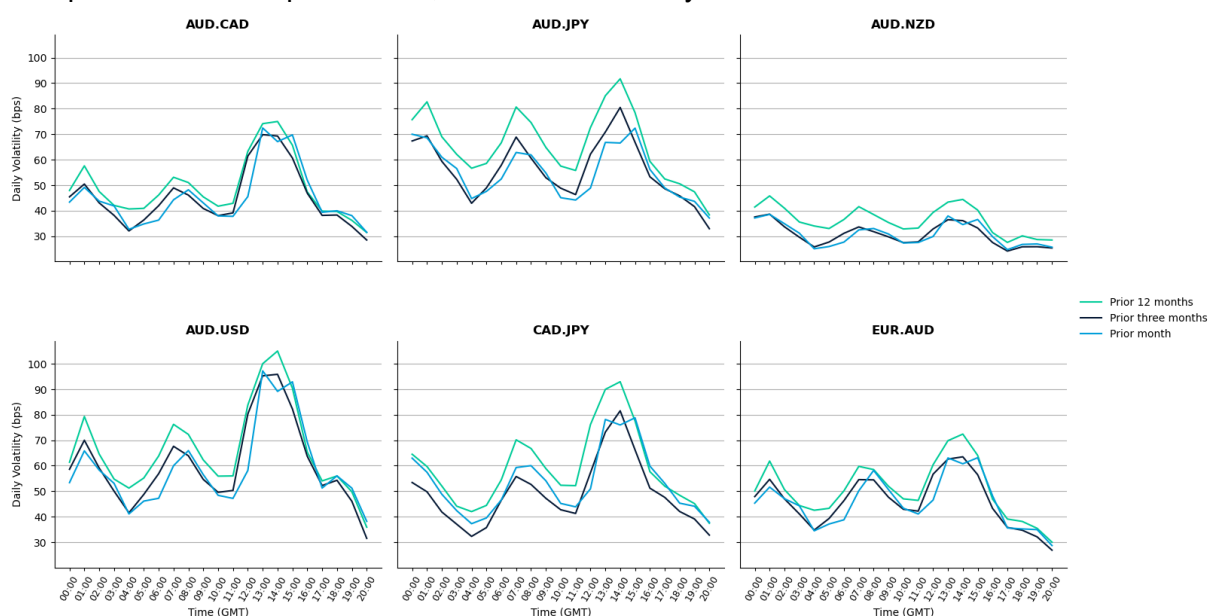
VOLATILITY

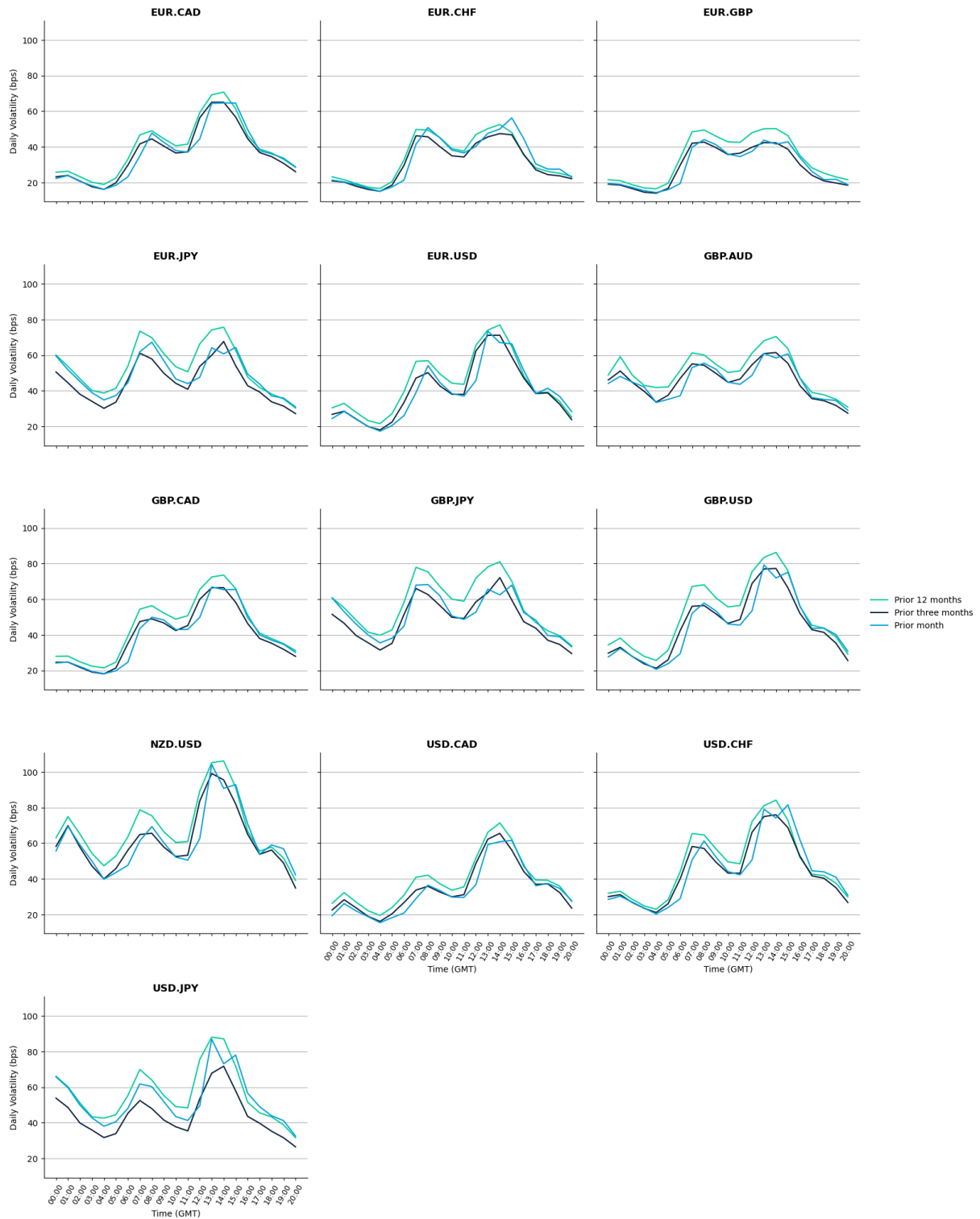
In December, FX spot volatility increased for 19 of 23 pairs during the pre-WMR trading window. Among the major pairs, compared to three months ago, volatility was higher for all pairs except AUD.USD and EUR.USD. When compared to six months ago, only USD.CHF and USD.JPY recorded lower volatility. Looking back 12 months, hourly volatility was lower for all 23 pairs except for EUR.SEK.

On an intraday basis, we observed a modest increase in FX volatility in Tokyo, London and New York desk trading for all but three pairs, EUR.NOK, USD.CAD and USD.NOK. Globally, rate volatility for the pairs was higher in December compared to November across all regions.

G-10 Currencies: Average Hourly Volatility, 00:00-20:00 GMT

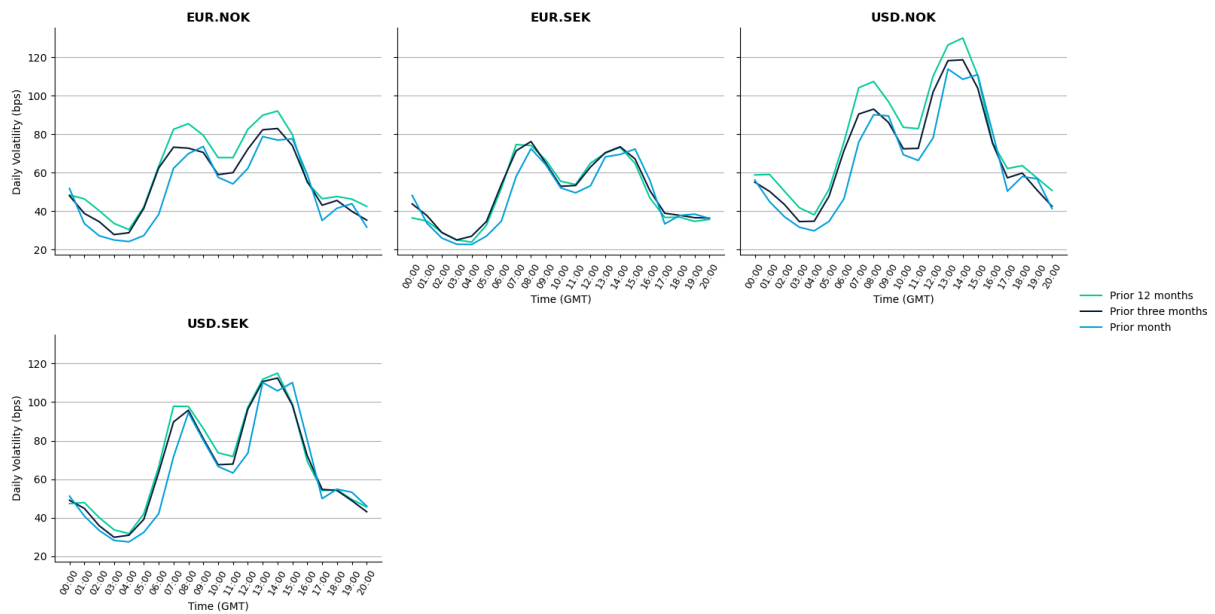
Comparison over the past month, three months and year



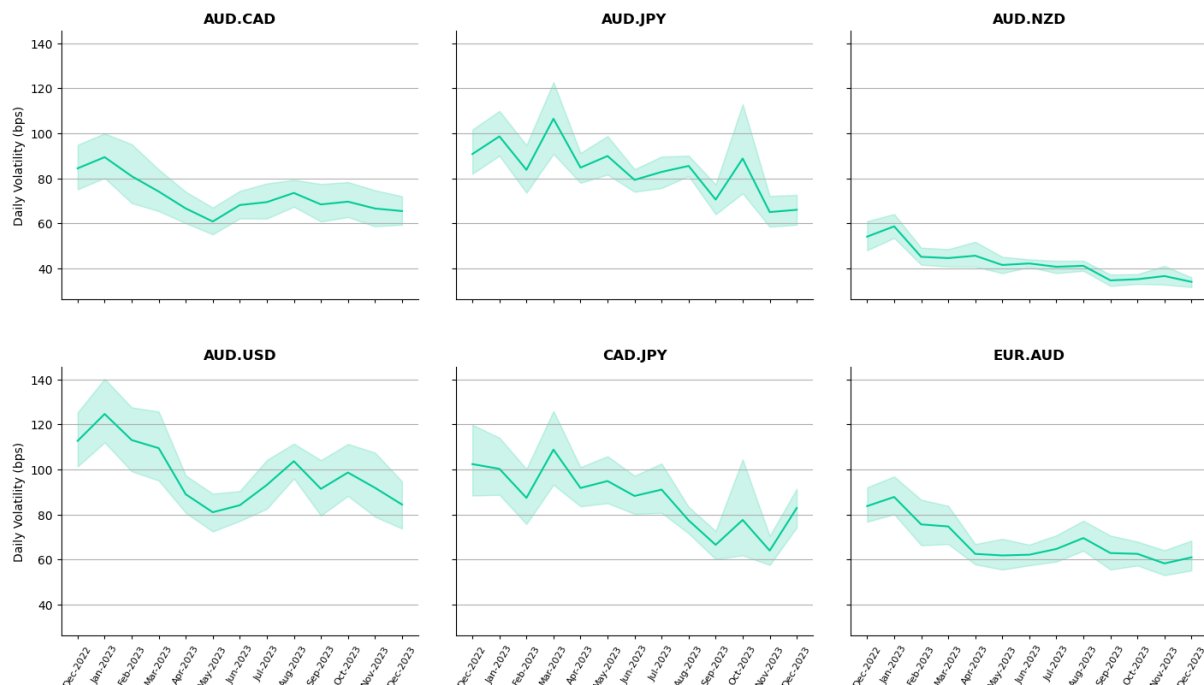




Scandinavian G-10 Currencies: Average Hourly Volatility, 00:00-20:00 GMT Comparison over the past month, three months and year

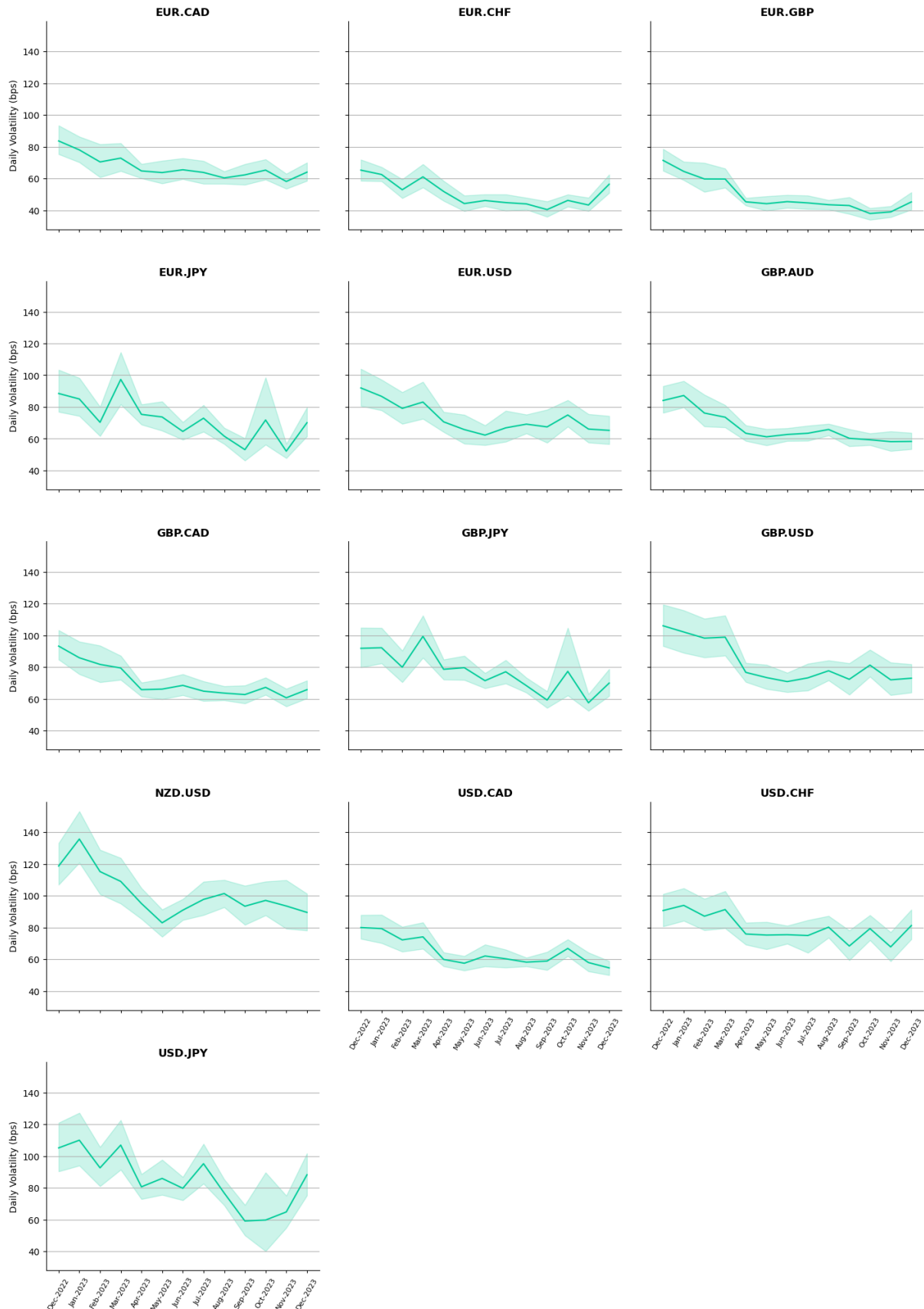


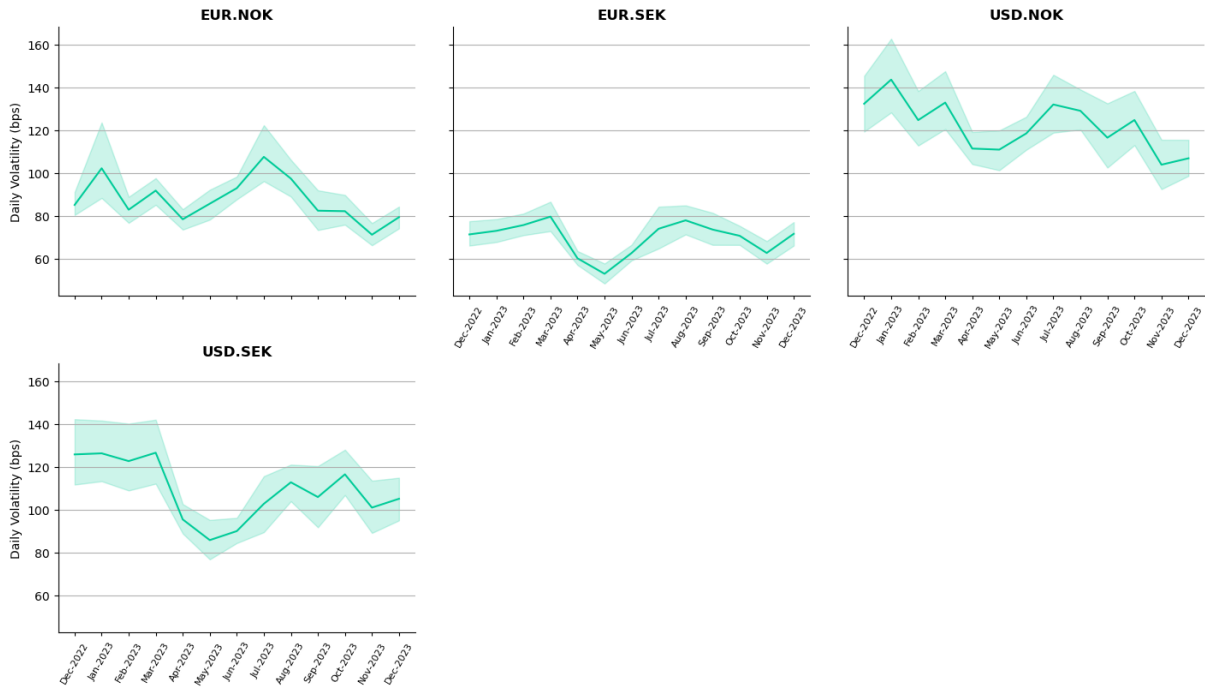
G-10 Currencies: Average Daily Volatility, 12:00-16:00 GMT December 2022 - December 2023





Scandinavian G-10 Currencies: Average Daily Volatility, 12:00-16:00 GMT December 2022 - December 2023





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All chart sources: Virtu Financial, 2023. Spread and volatility calculations are derived from sources that Virtu believes to be reliable, but Virtu does not make any claims to its accuracy. USD.NOK, USD.SEK, EUR.NOK and EUR.SEK are shown in separate exhibits.