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Financial Stability

European sovereign bond market sensitivities to surprises

ESMA Report on Trends, Risks and Vulnerabilities Risk Analysis

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Summary

Surprising information can move markets and trigger market risks. Increasing sensitivity to surprises can thus act as a measure of increasing market risk severity. To explore this in the European context, this note extends an analysis presented in a recent BIS Quarterly Review (2024) looking at the sensitivity of two-year US Treasury yields to surprises in inflation and employment indicators. They find substantial and statistically significant increases in the sensitivity of US treasury yields to surprises (deviations between the actual indicator and the forecasts) for both economic indicators in 2023 and 2024. In our analysis, we first replicate their analysis for the US, before applying a similar analysis of euro-zone, German, French and Italian yields to assess corresponding sensitivities. In the replication of the BIS analysis, we find similar results up to 2024 but also find that US sensitivities trended downwards after the period investigated by the BIS authors. In the European analysis, the paper finds brief periods of statistically significant sensitivity. Where statistically significant, sensitivities tend to rise sharply for brief periods for euro-zone yields. There is, however, a sharp increase in sensitivity to inflation surprises in spring 2026 with the beginning of the Iran war for euro-zone, German and Italian yields. Employment sensitivities are less often statistically significant, though with a notable peak for euro-zone yields in late 2024. This work has potential for the development of new risk indicators, which could be informative alongside existing indicators, such as those on EU sovereign bond market liquidity.

[1] This article was written by Damien Fennell. We are very grateful for important comments from Christian Winkler, Steffen Kern, members of the Risk Standing Committee and colleagues in the Economics, Financial Stability and Risk Department at ESMA.

Introduction

In recent years there has been evidence of securities markets **reacting strongly to unexpected news.** There have been numerous recent examples. On 10 April 2025, US two-year treasury yields rose by 20bps on higher-than-expected inflation figures in the context of the recently announced liberation day tariffs. On 2 August 2024, US yields fell by 28bps on unexpectedly weak employment figures. While on 5 March 2025, German two-year bund yields rose by 23bps on the news the incoming chancellor planned to relax fiscal measures for defence and infrastructure spending. And more recently, we have seen sizeable market movements on Iran war statements and developments in both equity and bond markets.

An important question for risk analysis is whether market volatility on surprises is growing. To explore this in the European context, this short note extends an analysis presented in a recent BIS Quarterly Review (2024).[2] In this work, Xia and Zhu assess an aspect of the increasing response of US securities markets to macroeconomic news. Specifically, they investigate the sensitivity of two-year US Treasury yields to surprises in two key economic monthly indicators, non-farm payrolls (an employment measure) and the core consumer price index (CPI) inflation. In their analysis, they find substantial and statistically significant **increases in the sensitivity of US treasury yields to surprises** – deviations between the actual indicator and the forecasts – for both economic indicators in 2023 and 2024.

The aim of this short analysis is to carry out a similar analysis in the **European Union context**, to investigate whether EU government two-year bond yields have exhibited a similar increase in sensitivity in recent years to employment and inflation surprises. This has relevance to our risk monitoring in that the evolution of sensitivity of bond markets could provide us with a new risk metrics, informative in themselves, but also complementing risk indicators we already monitor, not least on liquidity in EU sovereign bond markets.[3]

More fundamentally, the motivation for this analysis is its importance to **ESMA's remit to promote financial stability**. Here ESMA acts '[t]o strengthen the financial system to be capable of withstanding shocks and the unravelling of financial imbalances'. [4] Monitoring market sensitivities is informative on the evolution of the possible scale of shocks that could be triggered and propagate through the financial system. In key markets, such as for sovereign bonds investigated here, this can have systemic implications affecting a wide range of market participants.

As a preliminary step, this note first repeats the analysis carried out by Xia and Zhu for US treasury yields, with the aim of replicating their results. With later data available, it also extends their analysis to April 2026, so providing further information on the subsequent evolution of sensitivity of US 2-year treasury yields.

Methodology

The approach follows that of Xia and Zhu to the extent possible. In terms of data, for the US analysis we use monthly releases for inflation (core CPI year-on-year flash data) and for employment (non-farm payrolls) and use the monthly median of consensus forecasts from EIKON for each economic indicator to calculate the monthly surprise, that is, the difference between the actual indicator release and its median forecast.

For the European analyses, we measure sensitivities for a selection of **two-year government bond yields** namely: euro-area,[5] Germany, France and Italy. The choice of two-year yields is done to replicate the Xia and Zhu analysis. Where data is available to us, we measure sensitivities to surprises in the relevant (region or member state) monthly year-on-year inflation and the employment indicators [6] .

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[2] See the box 'Markets' increasing response to labour market conditions in the United States', Xia and Zhu in *Carry on Carry off,* BIS Quarterly Review, September 2024.

[3] We currently monitor EU sovereign bond liquidity in our semi-annual Trends, Risks and Vulnerabilities report. See for example, charts A.26-A.30 in the ESMA (2026), Trends, Vulnerabilities Report, 1-2026 Statistical Annex, March 2026.

[4] See https://www.esma.europa.eu/about-esma .

[5] For the euro-zone yield, we use the ECB series YC.B.U2.EUR.4F.G_N_A.SV_C_YM.SR_2Y which estimates a 2-year AAA euro-zone spot rate based on AAA-issued euro-area government bond issuance.

[6] In the employment sensitivity regressions, we measure sensitivity to employment not unemployment. Therefore in the EU context, where employment is typically measured by an unemployment rate, we measure sensitivity to surprises using the implied employment rate (= 1 - unemployment rate).

Inflation measures are year-on-year estimates for CPI in the US, France and Italy and HICP in the euro-zone and Germany. The choice is dictated in part by the consensus

However, in the French case, we lack median forecasts for unemployment, so in this case we limit the analysis to inflation. To calculate surprises, we use the difference between the published economic indicator and the corresponding EIKON median consensus forecast.

For both the US and EU cases, we regress the change in the yield on the day of the release of the indicator against the surprise of the indicator on that day. Like Xia and Zhu, we run **24-month rolling regressions** with exponential weighting to weigh recent observations more strongly. As in their analysis, we carry out the regression with a normalisation of the surprise variable so that we can compare the sensitivity of the yield changes to inflation and employment. As Xia and Zhu are not explicit in how they do this, we normalise the surprise by dividing by the mean absolute deviation.[7] We suspect Xia and Zhu do a similar rescaling, but it is likely to be over a different period given their dataset starts much earlier than ours. Unlike Xia and Zhu, whose analysis is focused on the US, we also normalise the yield change variables in some cases to enable comparisons of sensitivities between the US and the EU.

There are also a couple of **differences in our approach and theirs**, mainly due to data availability. We use EIKON rather than Bloomberg data and our data starts in 2015 rather than 2004. Given these differences, and from other likely minor discrepancies in the approaches, our results for US sensitivities are very similar to but not identical to theirs.

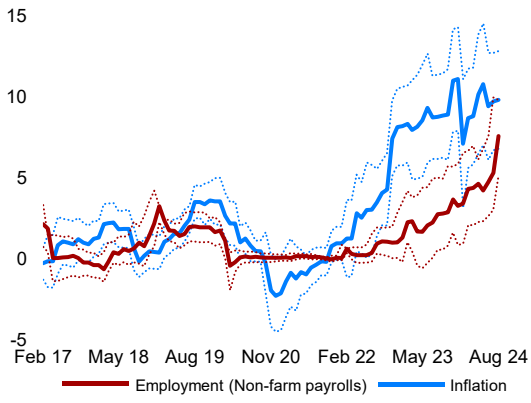
There are some other **limitations to our analysis**. First, while two-year yields were chosen to replicate the Xu and Zhia analysis, two-year sovereign bond markets are not the most liquid maturity (the ten-year is generally more so) and thus, two-year yield changes may be more subject to liquidity effects on the day of an indicator release. Second, we have not done an event study for each day of the release to check for unrelated events that could drive large yield changes. A third limitation is that the 24-month sample size in the rolling regressions, along with exponential weighting which limits the effective sample size and thus the power of the model to identify sensitivity changes. Fourth, the 90% confidence interval could imply some statistically significant sensitivity measures occur by chance.[8] Finally, European bond markets are structurally different to the US, being subject to both member state-specific influences and euro-zone-wide drivers, potentially weakening the relationship between surprises and yield changes, so limiting the applicability of the model developed for the US and used here.

Discussion

Replication of BIS analysis

The sensitivities of **US 2-year treasury yield changes** to inflation and employment surprises, presented by Xia and Zhu are reproduced below using chart data available on the BIS website. The chart also shows their 90% confidence intervals for the estimated sensitivities. However, to facilitate the comparisons with the charts that follow, the chart presented is over a shorter period than the original, covering only the period for which our data permits us to calculate sensitivities (2017 onwards).

Chart 1
2-yr UST yield sensitivities – original BIS chart data
Increases in sensitivities 2022 to 2024



Note: Sensitivities of US 2-yr treasury yield changes to indicator surprise (day change in yield slope coefficient from regression of yield changes on surprise in on day of release) in bps, with 90% confidence interval between dotted lines.
Sources: BIS data, ESMA.

The two charts below compare our sensitivity curves with those of Xia and Zhu (Chart 2 and 3). In both cases, we replicate their key result that the sensitivities of two-year treasury yields increased sharply from 2022 to summer 2024.

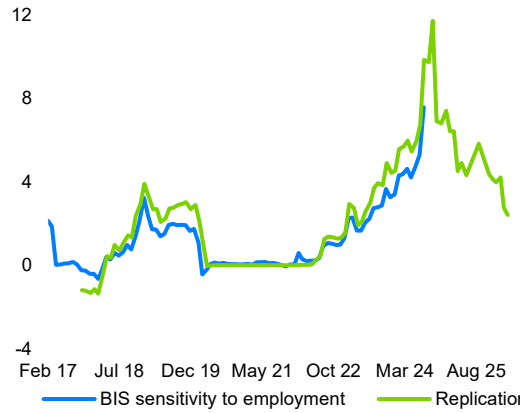
forecast data available to us. The indicator value is also that released on the day, even if later corrected, to capture its informational value on the day.

7 The close replication of our analyses to Xia and Zhu's, seen in Charts 2 and 3 below, suggest that Xia and Zhu may well be using the same methodology in normalising surprises.

8 With 90% confidence, one would expect that 1 in 10 statistically significant sensitivities (on average/in the long term) to be by chance (false positives).

Our **replication of their curve** for the sensitivity of UST yields to surprises in the non-farm payrolls is almost exact (Chart 2) suggesting our methodology closely matches theirs.

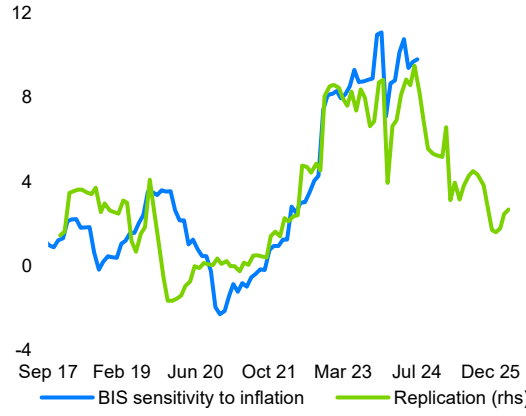
Chart 2
Employment sensitivity: BIS chart data vs replication
Increases in sensitivities 2022 to 2024



Note: Sensitivities of US 2-yr treasury yield changes to employment (non-farm payrolls) surprise (day change in yield slope coefficient from regression of yield changes on surprise in on day of release) in bps.
Sources: BIS data, Bureau of Labor Statistics, ESMA.

In contrast, for inflation, while there is a reasonably close match, for the earlier period our replication reacts earlier than the BIS results.

Chart 3
Inflation sensitivity: BIS chart data vs replication
Increases in sensitivities 2022 to 2024

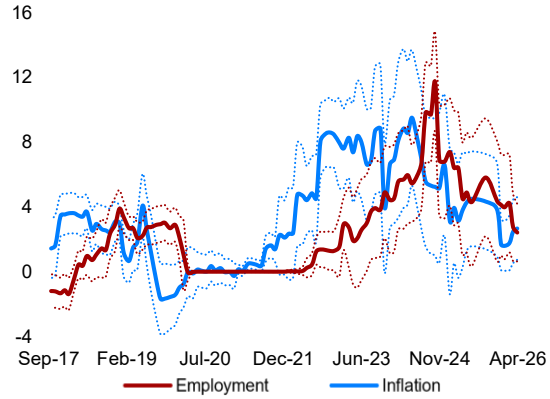


Note: Sensitivities of US 2-yr treasury yield changes to inflation (core cpi) surprise (day change in yield slope coefficient from regression of yield changes on surprise in on day of release) in bps.
Sources: BIS data, EIKON, ESMA.

The reasonable match for both charts in later periods (after 2022) suggests also that our charts likely capture the **evolution of US sensitivities** after the period analysed by Xia and Zhu, from the second half of 2024 onwards into early 2026.

Chart 4 presents the inflation and employment sensitivities extending into 2026.

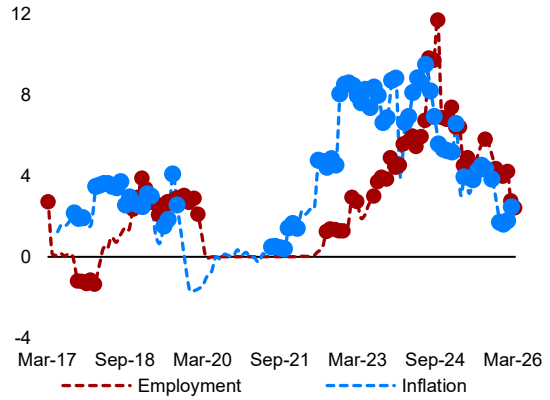
Chart 4
Extended US inflation and employment sensitivities
Sensitivities fell from late 2024 onwards



Note: Sensitivities of US 2-yr treasury yield changes to indicator surprise (day change in yield slope coefficient from regression of yield changes on surprise in on day of release) in bps, with 90% confidence interval between dotted lines.
Sources: EIKON, ESMA.

Chart 5 presents the same sensitivities, highlighting as a dot each sensitivity that is non-zero at a 90% confidence level. It shows that the US yield sensitivities to surprises are non-zero with statistical significance of 90% for most of the period of our sample.

Chart 5
Replicated US employment and inflation sensitivities
Non-zero over long periods (with 90% conf.)



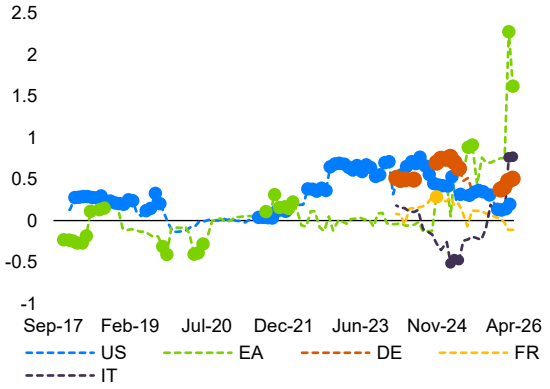
Note: Sensitivity of the US 2-year treasury yield changes to suprirses in employent and inflation indicators (CPI year-on-year monthly flash indicator) on day of release in bps. Dots shown where sensitivity is significant with 90% confidence.
Sources:Refinitiv EIKON, ESMA.

With the later endpoint for our data, as compared to the original Chart 1 above, we can see from our replications that the inflation and employment **sensitivities of US treasury yields fell back** from late 2024 into 2026 (Chart 4) perhaps linked to receding uncertainty on future US interest rate

changes at that point. Nonetheless, sensitivity levels remained high in 2025 compared with historical levels. possibly due to ongoing uncertainty from wide-ranging US policy changes then being introduced, notably the introduction of wide-ranging tariffs.

Interestingly, there is little sign (yet) of an increase in sensitivity to inflation at the end of the data series, in March 2026 with the **Iran war**, and the associated energy supply shock, increasing inflation expectations. This likely reflects the fact that the period during which the data sample overlaps with the start of the Iran war is short, with just two data points, in March and April 2026 (the February and March inflation figures). For these data points, there were no surprises because the median inflation forecasts correctly predicted the released inflation figures.

Chart 6
EU yield sensitivities to inflation surprises
Increase in sensitivity in spring 2026



Note: Two-year sovereign yield sensitivities to inflation surprises (yield change and surprises normalised using mean absolute deviations), points are shown where sensitivities are significant at 90% confidence. EA - euro area, and ISO 3166-1 alpha-2 country codes.
Sources: Refinitiv Elkon, ESMA

EU inflation sensitivities

Our sensitivity results for the EU are presented below alongside the corresponding US sensitivities. As mentioned above, yield changes here are normalised (using mean absolute deviation) to allow the comparisons within the EU and with the US. In addition, the sensitivity time series for the EU member states included (Germany, France and Italy) start later (2024 onwards) due to limitations in our commercial data access.

Looking first at inflation (Chart 6), **EU sensitivity patterns are generally less pronounced** than those of the US. Also, unlike the US, the periods of statistical significance at 90% for sensitivities – indicated by dots in the charts below – are less frequent and shorter than those of the US.

That said, there is an exception in spring 2026 when EU sensitivities exceed those of the US. Here, unlike the US where there were no surprises with releases of the February and March inflation figures, for the EU inflation forecasts were slightly inaccurate for both February and March. The forecast for February underestimated inflation by 20bps, while the forecast for March overestimated inflation by 10bps. These surprises were associated with an increase and decrease in yields respectively.

As a result, **eurozone inflation sensitivity jumped sharply with the Iran war**. We also see statistically significant increases in sensitivity for Germany and Italy, again exceeding the US sensitivity, though the increases are not as large as that for the euro-zone yield. In contrast, we do not observe an increase in sensitivity for France. While being careful not to over-interpret results from surprises linked to just two inflation releases, the increased inflation sensitivity observed here may reflect increased market expectations that monetary policy would become more inflation-focused and data-driven given the anticipated energy-supply shock.

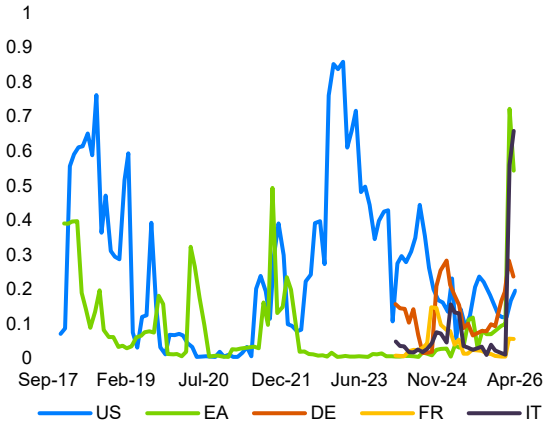
Otherwise, **German sensitivities** show the longest periods of statistical significance at elevated levels among the European yields, with higher levels in late 2024 into early 2025. Euro-area yield sensitivities are lower, but these also increase in late 2024 and are briefly statistically significantly positive, reaching levels higher the German and US levels in 2024. Italian sensitivities show statistical significance in late 2024 but are negative. French sensitivities are

generally lower and only very briefly statistically significantly non-zero.

Given the **short periods of statistical significance**, it is also informative to compare the explanatory power of the inflation surprise models across regions. Chart 7 below plots the R-squared levels, which as the regression models are generalised linear models, measures the proportion of yield change variance explained by surprises.

Chart 7 shows US inflation surprises explain much of the change in US yields, with long periods of elevated R-squared. In contrast, European R-squared values are generally much lower, except for the very recent 2026 period and an earlier peak in 2021 during the pandemic. Thus, this indicates **limited explanatory power in EU inflation models** as compared to those of the US. This also suggests that there are wider and more varied drivers of yield changes in the EU as compared to the US context, limiting what can be explained by inflation surprises.

Chart 7
Explanatory power of inflation regressions
EU regressions markedly less explanatory



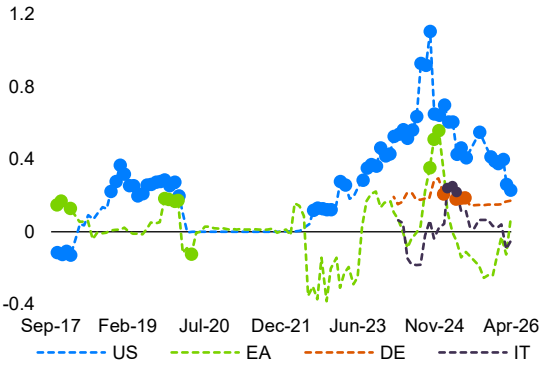
Note: R-squared of rolling regressions of yield changes to inflation surprises, euro area, Germany, Italy and US.
Sources: Refinitiv Elkon, ESMA.

Overall, the analysis here provides some indication of **elevated German yield sensitivities** in 2023 and 2024 and of a sharp increase in euro-zone sensitivities in late 2024 and more recently in spring 2026. However, for the euro-zone, our analysis shows brief statistically significant peaks of euro-zone sensitivities rather than the steady increase like that seen in US sensitivities in 2023 and 2024.

EU employment sensitivities

Turning to the sensitivity of the EU bond yields to surprises in the employment rate (Chart 8), we see again only relatively brief periods of statistical significance across the period of the dataset as compared with the US, with periods of significance at the end of 2019 and in the last quarter of 2024. In the latter there is a notable **peak in Euro-zone yield sensitivity in late 2024** around the same time as that in US sensitivities.

Chart 8
2-yr yield normalised sensitivity to employment
Late 2024 peaks in European sensitivities



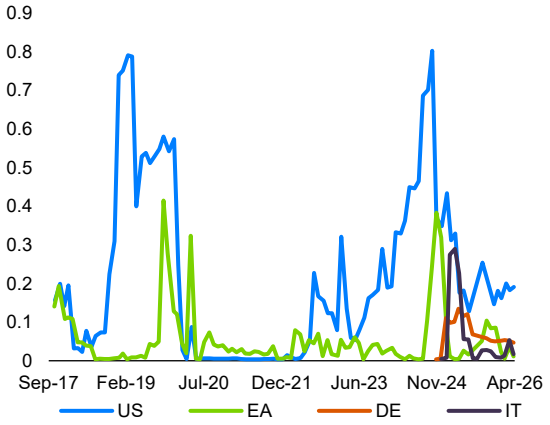
Note: Two-year sovereign yield sensitivities to employment surprises (yield changes and surprises normalised using mean absolute deviations), points are shown where sensitivities are non-zero with 90% confidence. EA - euro area, and ISO 3166-1 alpha-2 country codes, France omitted due to lack of data.
Sources: Refinitiv Elkon, ESMA.

The peak in euro-zone sensitivities starts in late 2024 close to the period in August 2024, when US employment sensitivities rose sharply, and which was a focus of the BIS paper. At this time, there was a rapid unwinding of the leveraged equity and currency positions (carry-trades), particularly in the Yen as it appreciated, exacerbated by news of disappointing US employment statistics. This led to significant, albeit short-lived, falls in equity markets and a surge in volatility.

While the peak in the European sensitivity prima facie looks similar to the US peak, there are **differences with the US**. First, the peak in employment sensitivity occurs in late January 2025, later than October 2024 for the US peak. Second, the surprises driving the sharp increase in the EU are qualitatively different. In the US the surprise was unexpectedly weak employment figures, while in the EU peak, the surprise was on the upside, with unexpectedly high employment figures.

Finally, if we compare the explanatory power of employment surprises for yield changes, as shown in Chart 9 below, we see similarly to the inflation case, relatively **weak explanatory power of European employment surprises** to yields for the euro-zone, Germany and Italy, as compared to the US.

Chart 9
Explanatory power of employment regressions
EU sensitivity regressions less explanatory



Note: R-squared of rolling regressions of yield changes to employment surprises, euro area, Germany, Italy and US.
Sources: Refinitiv Elkon, ESMA.

The **explanatory power** is weaker than for inflation surprises with peaks in R-squared in European regions at around 0.4, half the levels of the peaks in US R-squared. This shows that the US employment surprises are generally stronger predictors of changes in US yields, than EU employment surprises are for euro-zone yields. Also, in this case, unlike the inflation model, the explanatory powers of the models for individual member-states are all lower than for the euro-zone model.

Overall, our analysis for employment shows little that mirrors what is seen for US sensitivities. Our analysis for euro-zone, German and Italian yields does not provide many periods of statistical significance. Euro-zone yields do show some **sensitivity to employment for brief periods** when sensitivity increases sharply, but these periods are short and do not show sustained increases or falls, as seen for US sensitivities.

One possible partial explanation for the difference in the sensitivities of yields to employment surprises may be **differences in the central bank mandates** for the US and the euro-zone,[9] given that the two-year yields are relatively short-term and highly influenced by monetary policy. The Federal Reserve has a dual mandate, to ensure price stability (addressing inflation) and maximum employment. While, in contrast, the ECB's primary objective for its monetary policy is price stability. This difference would imply the ECB would be less directly focused on employment indicators than the Fed, feeding through to lower sensitivity of short-term yields to employment surprises in in the EU context.

Conclusions

In Xia and Zhu's analysis, and in our replication, there is **clear upward trend in US treasury yield sensitivities** to both employment and inflation surprises, growing in 2023 and 2024, indicating that US sensitivities to surprises and inflation and employment grew after the pandemic. In our replication, since our data continues to cover 2025 and into 2026, we also see that the sensitivities trend back downwards after peaking in late 2024.

Our results for **inflation sensitivities of European yields are less clear-cut**. For inflation, euro-zone sensitivities show brief periods of statistical significance, with two notable increases, first in late 2024 and second, and more dramatically, in spring 2026 with inflation surprises in the context of the Iran war. German yield inflation sensitivities are also elevated in late 2023 and 2024, and likewise increase in Spring 2026, as are sensitivities of Italian yields, though for both Germany and Italy not as strongly as euro-zone sensitivities.

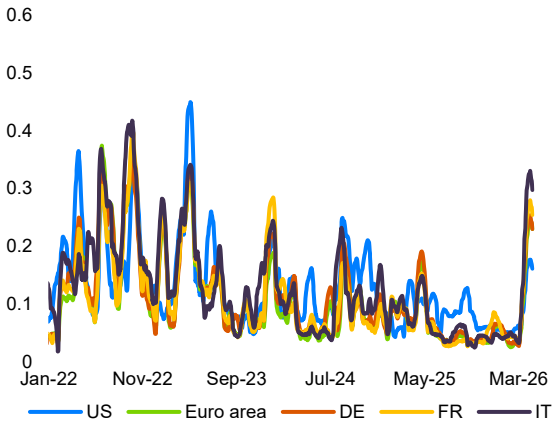
For **employment sensitivities of European yields,** there are only short periods of statistical significance where sensitivities are positive and statistically significant at 90% for euro-zone, German, French and Italian yields. Statistically significant sensitivities are also much lower than those for US treasury yields. The explanatory power of the European employment sensitivities models of yield changes is also lower than those for the European inflation models, and much lower than those of the US.

Underlying this **difference in explanatory power of EU and US sensitivity models** is the fact that the euro-zone and its member states are qualitatively different from the US. First, the euro-zone yield used in the analysis is constructed from the yields of government bonds of euro zone member states, there are thus many more drivers and more varied drivers to the aggregate European yield than is the case with the US treasury yield. Similarly, at member-state level, the shared currency and single market also implies wider drivers of yields outside of the member state, with the relationship between yields at member-state level more likely to be swayed by range of outside factors than the US.

[9] Please see here for the ECB's primary objective and the US Federal Reserve's dual mandate.

An interesting secondary finding of this paper is that the **US sensitivities fell from 2025 onwards**. This could appear counterintuitive given the geopolitical context has continued to present and to add material uncertainty to the economic outlook over recent years, with rapidly changing tariff policies, ongoing conflict in Ukraine, and the recent Iran war. Given this growing uncertainty one could expect increased sensitivity.

Chart 10
Volatilities of daily yield changes by region
Volatility surge 2026, especially in Europe



Note: 40-day running volatilities of 2-year bond yields. ISO 3166 two-letter country codes.

However, as Chart 10 shows, after 2024 daily bond volatilities trended downwards in the US and in the other regions and countries looked at here. The chart also shows, however, the sharp pick up in yield volatility with the Iran war, including for US yields, though the volatility for US yield is lower than those in Europe, reflective of potentially greater vulnerability to energy supply disruption in the Gulf. Nonetheless, it suggests that we may **still see an increase in yield sensitivity in the US** to surprises in inflation and employment indicators. The chart above in any case suggests greater sensitivity to developments in more general terms. Ultimately, with recent military conflicts creating uncertain energy supply disruption much of this is likely to be linked to inflation expectations, even if not captured in surprise reactions to the inflation release themselves.

In sum, this analysis has provided evidence and analysis on the recent history of sovereign bond market sensitivities in the current uncertain geopolitical context, with signs that sensitivities to inflation and unemployment surprises are more limited in Europe than the US, and that the latter have been moderating since 2025. **Looking ahead**, the work carried out here also has potential to be extended to other member states, and other markets, such as equities, to assess trends in sensitivities in these. A particular challenge, given signs of market swings in response to rapidly changing signals on the Iran war, could also be to broaden the analysis to a wider pool of surprise information, for example, geopolitical announcements. The work could also be used to develop new risk indicators for ESMA's risk analysis which would be informative to consider alongside other existing indicators, such as those on liquidity in EU sovereign bond markets, given sensitivities to surprise information are likely to be higher in markets with lower liquidity, where price effects of a surprise could be magnified.