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When and for Whom Does the Sovereign–Bank Nexus Matter? Evidence from Post-Crisis Europe*

Charlotte Hoopes† Pinar Uysal‡ Ilknur Zer§

September 2026

Abstract

We study whether sovereign risk continues to affect banks a decade after Europe began reshaping its financial architecture. Combining daily bank and sovereign credit default swap spreads with supervisory data on banks' domestic sovereign portfolios, we show that the sovereign–bank relationship remains economically meaningful but is highly conditional. Banks with larger sovereign holdings respond more sharply to home-sovereign risk, and this amplification is substantially stronger for mark-to-market than amortized-cost exposures, consistent with more immediate recognition of valuation losses. Sovereign-to-bank transmission is stronger for less-capitalized, wholesale-funded, and peripheral banks, during periods of elevated market uncertainty, and when the home sovereign has less fiscal capacity. The policy reforms aimed at weakening the sovereignbank relationship only managed to reduce the extent of the link, but not eliminate it.

Keywords: Sovereign–bank nexus; sovereign exposures; bank risk; fiscal space.
JEL classification: G15, G21, G28.

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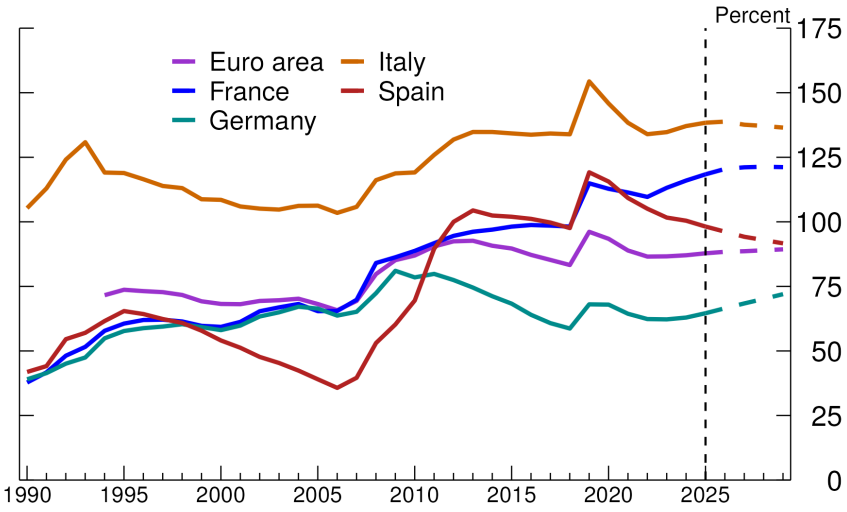
1 Introduction

A decade of institutional reforms has changed the environment in which European sovereigns and banks interact. Banking Union, common resolution arrangements, sovereign backstops, and new central-bank instruments were designed in part to reduce the feedback between a country's fiscal space and bank balance sheets (Darvas et al., 2025). Yet European banks continue to hold substantial domestic government debt portfolios, and public debt remains elevated. Euro-area government debt stood at over 87 percent of gross domestic product (GDP) in 2025—down from its 2020 peak but still well above pre-pandemic levels—and is projected to edge higher as governments face mounting pressures from aging populations, rising defense needs, and energy transition costs (Figure 1). Recent increases in sovereign yields also pass gradually into government budgets as outstanding debt is refinanced.

These developments raise a central question: does sovereign risk still transmit to bank risk in Europes post-crisis institutional environment, and, if so, which banks remain most vulnerable? We show that the sovereignbank nexus remains economically meaningful but is highly conditional. Our central contribution is to show that the sensitivity of bank risk to sovereign risk differs both with the size and the accounting treatment of banks sovereign holdings. Banks with larger domestic sovereign portfolios are more sensitive to home-sovereign risk, but this amplification is substantially stronger for holdings marked to market (MTM) than for those measured at amortized cost (AC). Stronger capitalization moderates the MTM amplification. Although amplification through MTM holdings declines over the sample, the broader sovereignbank nexus persists, and banks that typically hold larger MTM portfolios remain more sensitive to sovereign risk.

The sovereign–bank nexus describes the two-way interdependence between sovereign and bank credit risk. When banks hold sizable portfolios of domestic sovereign debt, they become vulnerable to changes in sovereign credit conditions. Increases in sovereign risk can weaken banks through several channels. Most directly, banks may incur valuation losses as sovereign credit conditions deteriorate, reducing capital and weakening balance sheets. Increases in sovereign risk can also raise banks' funding costs, reduce the perceived value of government support, and weaken macroeconomic conditions, further increasing bank risk (Correa and Sapriza, 2015; Committee on the Global Financial System, 2011). Transmission can also run in the opposite direction. Banking-sector weakness can reduce credit provision and economic activity, weakening public finances, while actual or expected government support for distressed banks can increase sovereign fiscal burdens. Together, these interactions may generate a mutually reinforcing feedback loop between sovereign and bank risk, often referred to as the sovereign–bank "doom loop" (Acharya et al., 2014; Becker and Ivashina, 2018;

Figure 1. Euro-area debt-to-GDP ratios and projections



Note: Data extend through 2025. Dashed lines show forecasts.
Data downloaded on April 16th, 2026.
Source: International Monetary Fund.

Brunnermeier et al., 2016).

The euro-area sovereign debt crisis of 2010–2012 provided a stark illustration of the sovereign–bank doom loop, which emerged as a key driver of financial instability (Rojas and Thaler, 2024; Farhi and Tirole, 2018). Concerns about the fiscal sustainability of Greece and other vulnerable member states led to a sharp increase in sovereign borrowing costs. As sovereign bond prices fell, domestic banks with large holdings of government debt suffered significant losses, weakening their balance sheets. At the same time, expectations that governments might need to support distressed banks further undermined sovereign creditworthiness, reinforcing the sovereign–bank feedback loop. As sovereign spreads widened across peripheral euro-area countries, funding conditions deteriorated, credit supply contracted, and economic activity weakened.

This paper focuses on the sovereign-to-bank direction of this feedback loop, and in particular on the balance-sheet exposure channel—the transmission of sovereign risk to banks through their sovereign debt holdings. To this end, we use bank and sovereign credit default swap (CDS) spreads—a timely, market-based measure of perceived credit risk— matched with semiannual supervisory data on banks' sovereign holdings. Our sample includes 34 European banks in 12 countries from 2014 to 2025.

Our empirical design exploits cross-bank differences in domestic sovereign exposures. We estimate panel regressions relating daily log changes in sovereign CDS spreads to daily

log changes in bank CDS spreads, allowing the sensitivity to depend on both the size and accounting treatment of banks' domestic sovereign portfolios. In particular, we distinguish securities held at AC, which are generally insulated from short-run market-price changes, from MTM holdings, whose valuation changes are recognized more promptly. This cross-bank variation helps distinguish an exposure-sensitive balance sheet component from aggregate channels that affect banks in the same country.

We then ask whether this exposure channel has faded over time as Europes post-crisis institutional architecture has strengthened. Finally, we examine when and where the nexus is most pronounced, focusing on market uncertainty, bank location, funding structure, and the fiscal position of the home sovereign.

Our results point to several main conclusions. First, sovereign and bank risk remain closely linked in the post-crisis period. Increases in sovereign CDS spreads are associated with increases in bank CDS spreads. This transmission is amplified for banks with larger sovereign debt holdings, indicating that investors differentiate across institutions based on their exposures. Importantly, accounting treatment is central to this heterogeneity. The amplification associated with MTM holdings is substantially larger than that of AC holdings. Because valuation changes in MTM securities are recognized promptly through earnings or other comprehensive income, whereas AC securities generally affect reported capital only following impairment or sale, this pattern is consistent with an immediate balance-sheet exposure channel.

Second, we find that the average sovereign–bank nexus remains economically meaningful in the post-crisis period, but amplification through MTM holdings declines gradually over time. The decline begins well before the European Central Bank's (ECB) June 2022 anti-fragmentation announcement and continues afterward. By the end of the sample, this interaction is statistically indistinguishable from zero. However, the decline is substantially smaller when each banks exposure is held at its sample average, indicating that changes in portfolio composition account for part of the estimated time pattern. We therefore interpret the results as evidence that MTM amplification has weakened, not as the disappearance of persistent differences across banks.

Third, the nexus is not equally strong across banks or market conditions. Better-capitalized banks are less sensitive to sovereign risk through their MTM portfolios, while transmission is stronger for peripheral banks and for banks that rely more heavily on wholesale funding. Periods of elevated market uncertainty further strengthen the overall comovement between sovereign and bank risk, suggesting that both bank characteristics and the broader market environment shape how sovereign risk is transmitted.

Fourth, the sovereigns own fiscal position also matters for how strongly sovereign risk

reaches the banking sector. Transmission is stronger when public debt and government interest burdens are higher, but weaker when fiscal balances are stronger. This suggests that the nexus depends not only on banks exposures, but also on the fiscal capacity of the sovereign behind those exposures: fluctuations in sovereign risk may be transmitted more forcefully in highly indebted countries because markets perceive less room for the government to absorb further fiscal deterioration.

Finally, the effects of sovereign risk extend beyond bank risk to bank equity valuations. Higher sovereign risk is associated with lower bank stock returns, with larger declines among banks with greater sovereign exposures. Thus the sovereign–bank nexus is reflected not only in creditors assessments of bank default risk, but also in investors valuation of bank equity.

Our analysis relates to the literature examining how the euro area's institutional architecture shapes the sovereign–bank nexus. Lane (2012) emphasizes that the absence of a federal fiscal backstop makes the nexus particularly acute in a monetary union. More recently, Darvas et al. (2025) review the post-crisis reforms, including the Banking Union, the European Stability Mechanism (ESM), and ECB policy initiatives, and discuss how they were designed to reduce vulnerabilities arising from the sovereign–bank nexus. Our paper complements this literature by providing bank-level evidence on how the nexus operates in the post-reform environment. Rather than examining the reforms themselves, we ask whether sovereign risk continues to transmit to bank risk after these reforms and how this transmission varies across banks and countries.

Our paper also relates to the broader literature on sovereign–bank linkages. A large body of work documents the two-way feedback between sovereign and bank risk and formalizes the doom loop (Acharya et al., 2014; Farhi and Tirole, 2018; Brunnermeier et al., 2016). Gennaioli et al. (2014) show that sovereign defaults depress private credit, with larger effects in countries where banks hold more government bonds. Rojas and Thaler (2024) revisit the doom loop from the perspective of default incentives, arguing that domestic sovereign debt holdings can serve as a government commitment device and thereby avert the loop.

In this paper, we move beyond average effects of the nexus and identify its cross-sectional structure. We show that the accounting treatment of sovereign holdings is important for understanding the balance-sheet component of the sovereign–bank nexus. Furthermore, while prior work has documented the nexus during the 2010–2012 crisis, evidence on how it operates in the reformed institutional environment is limited. We show that sovereign risk continues to transmit to bank risk despite the reforms, and that the strength of this transmission varies substantially across institutions and countries.

The remainder of the paper proceeds as follows. Section 2 describes the data and presents descriptive evidence. Section 3 sets out the empirical framework. Section 4 reports empirical

findings, and Section 5 concludes.

2 Data and descriptive evidence

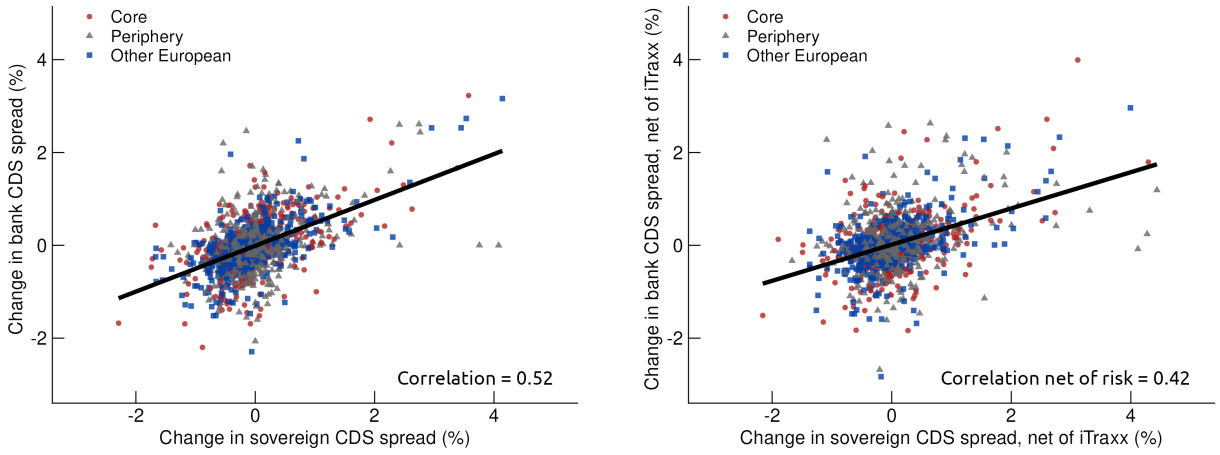
2.1 Descriptive evidence

Figure 2 illustrates the sovereign–bank nexus in Europe in recent years. Panel (a) shows a strong positive relationship between changes in sovereign CDS spreads and changes in bank CDS spreads, averaged within each country-month, suggesting that sovereign and bank risk remain closely linked. However, this comovement partly reflects common risk factors, such as market-wide credit conditions, liquidity premia, or risk aversion, that move both series together regardless of any direct sovereign–bank transmission.

Figure 2. Sovereign and bank risk remain closely linked in Europe

(a) Changes in bank and sovereign CDS spreads

(b) Risk-adjusted changes in bank and sovereign CDS spreads

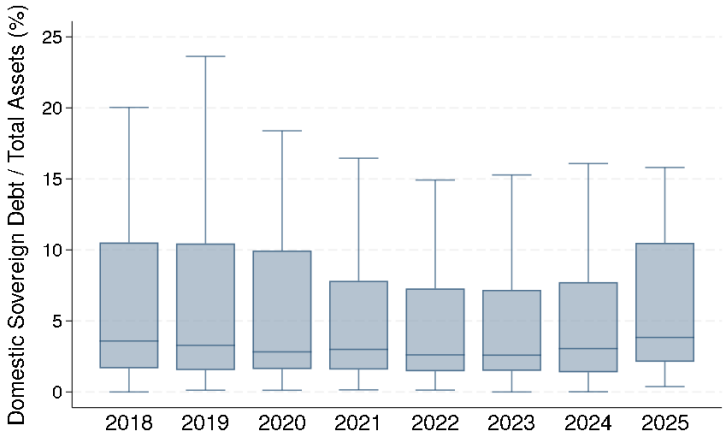


Note: Panel (a) plots average daily log changes in European banks' CDS spreads against average daily log changes in European sovereign CDS spreads. For each country, we first compute the daily log change in bank and sovereign CDS spreads and then average them within each country-month. CDS spread levels are quoted in basis points. The sample runs from October 2014 to December 2025. Panel (b) plots the credit-risk-adjusted comovement. Daily log changes in bank and sovereign CDS spreads are orthogonalized with respect to daily log changes in the iTraxx Europe Crossover index. The reported correlation is computed using the residualized series, averaged within each country-month.
Source: Bank of England via Haver Analytics, European Central Bank, International Monetary Fund via Haver Analytics, Bloomberg, Markit; authors' calculations.

To verify that the bank-sovereign comovement reflects transmission rather than common risk exposure, Panel (b) considers the correlation net of common credit risk. We use the

iTraxx Europe Crossover index, a sub-investment-grade corporate CDS index, as a measure of market-wide credit risk. We regress changes in bank and sovereign CDS spreads separately onchanges in the iTraxx index and plot the resulting residuals. The positive association remains. Although this residualized correlation is not by itself causal evidence of transmission, it shows that the raw relationship is not explained entirely by their common exposure to broad credit-market movements. The dispersion in both panels also motivates our focus on heterogeneity across banks and countries.

Figure 3. Distribution of banks domestic sovereign debt holdings



Note: The figure shows the distribution of banks domestic sovereign debt holdings as a share of total assets from 2018 to 2025. Each boxplot summarizes the cross-sectional distribution across banks in a given year, with the box representing the interquartile range, the horizontal line indicating the median, and the whiskers denoting the range of the distribution.
Source: European Banking Authority and authors' calculations.

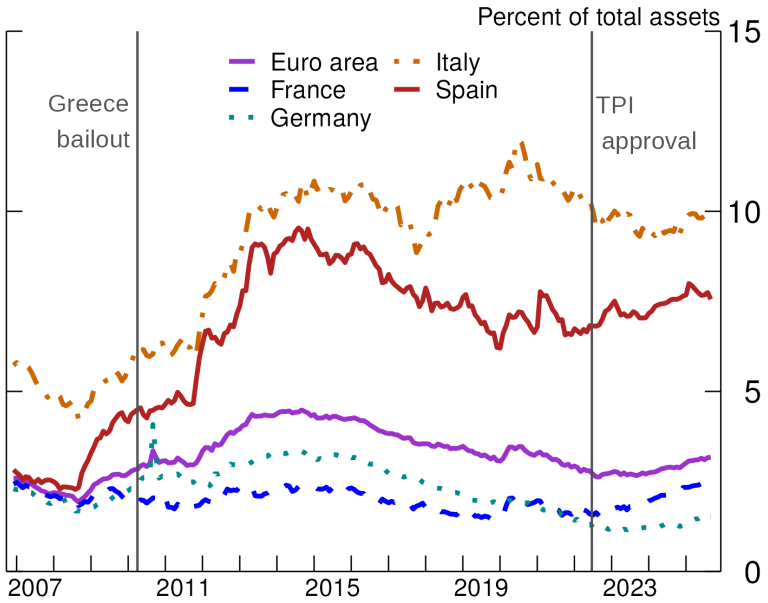
One of the key sources of this heterogeneity is cross-bank variation in sovereign exposures. Although European banks continue to hold sizable amounts of sovereign debt, these exposures vary widely across institutions. Figure 3 shows the distribution of banks domestic sovereign debt holdings over time, highlighting substantial dispersion. Some banks hold more than 20 percent of total assets in domestic sovereign debt, while others have minimal exposures. Although dispersion was highest around 2019 and has declined somewhat since, it remains meaningful through 2025.

On average, banks' holdings of sovereign debt issued by domestic governments accounted for roughly 3 percent of total bank assets as of February 2026, down from a peak of about 4.5 percent after the euro-area sovereign debt crisis (Figure 4, purple line).[1] Even so, these

[1]While banks are also exposed through loans to sovereigns, this analysis focuses on sovereign bonds, which represent the bulk of bank exposures. We use the terms sovereign bonds and sovereign debt interchangeably throughout the paper.

holdings remain sizable enough to keep sovereign risk relevant for bank balance sheets. Cross-country differences are particularly pronounced. Banks in peripheral euro-area countries, such as Italy and Spain, remain far more exposed to domestic sovereign debt than banks in core countries. As of early 2026, banks in peripheral countries held more than 7 percent of assets in domestic sovereign bonds, compared with less than 2 percent in core countries. Italian banks are particularly exposed, with domestic sovereign debt accounting for around 10 percent of total assets. By contrast, domestic sovereign exposure is much lower in most core countries, although French banks have increased such exposures in recent years.

Figure 4. Banks holdings of domestic sovereign debt as a share of total assets



Note: Chart plots banks holdings of domestic sovereign debt securities, averaged across different jurisdictions. The sample includes all banks participating in the Single Supervisory Mechanism (changing composition). First vertical line represents the first bail-out package for Greece in May 2010. Second vertical line represents the ECB's approval of TPI in July 2022. Data through February 2026. Source: European Central Bank.

2.2 Data sources and sample

We construct our sample by merging various data sources and aligning them at daily frequency. Because sovereign exposure data are available at lower frequencies, we repeat those observations at the daily level to match the market data.

We use daily 5-year senior unsecured CDS spreads from IHS Markit to measure bank and sovereign credit risk. The sample covers October 1, 2014, to December 31, 2025, and

includes 34 European banks across 12 countries.[2] Our sample begins in late 2014, after the acute phase of the crisis, but still during a period in which this post-crisis framework was being implemented and refined. The paper therefore speaks to the sovereign–bank nexus in a post-crisis setting. Both bank and sovereign CDS contracts are denominated in U.S. dollars. For sovereign CDS, we use contracts with the CR14 restructuring clause; for bank CDS, we use contracts with the MM14 restructuring clause. We also collect daily bank stock prices and euro-area broad market index from Bloomberg.

We obtain daily sovereign yield data from Haver Analytics and Bloomberg, which we use to construct daily changes in the 2-year yield, the term spread, and the spread between the national 10-year yield and the German 10-year benchmark.[3]

Bank-level sovereign exposures and balance sheet variables come from the European Banking Authority (EBA) transparency exercise, which provides semiannual data on banks sovereign debt holdings and balance sheet characteristics from 2018:Q2 to 2025:Q2. We backfill sovereign exposure data to 2014:Q4 using the earliest available bank-level exposure observations. This approach allows us to exploit the longer history of daily CDS data while preserving the cross-sectional variation in sovereign exposures that is central to our analysis.[4] The EBA data allow us to measure banks sovereign holdings by issuer country and by accounting treatment. We also use bank-level balance sheet variables, including Common Equity Tier 1 (CET1) ratio and total assets.

Country-level fiscal indicators come from the ECB Data Portal and span 2014 to 2025. For Norway and Hungary, we supplement these data with annual fiscal indicators from the International Monetary Fund Fiscal Monitor. We include the debt-to-GDP ratio, government interest expenditures as a share of GDP, the fiscal balance as a share of GDP, and the primary balance as a share of GDP. The debt-to-GDP ratio is defined as general government gross debt divided by GDP; government interest expenditures are total interest payments on public debt; the fiscal balance is the overall government budget balance (surplus or deficit); and finally, the primary balance is the fiscal balance excluding interest payments.

[2]The countries in the estimation sample are: Austria, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Portugal, Spain, Sweden. We excluded Greece from our analysis due to data limitations. Although the European Banking Authority transparency exercise covers a broader set of banks, many institutions are not included in our estimation sample because matching bank or sovereign CDS data are unavailable.

[3]Sovereign yield data are obtained from: London Stock Exchange Group via Haver Analytics (Austria, Denmark, Finland, Greece); Tullett Prebon Information via Haver Analytics (Hungary, Norway); and Bloomberg (Germany, Belgium, Ireland, Spain, Italy, Portugal, France, Netherlands, Sweden).

[4]We re-estimate the analysis using only the period for which actual EBA exposure data are available (2018:Q2 onward). The results presented in Section 4.5 are virtually unchanged. Given that the balance sheet data are relatively persistent at the bank level, the robustness of the results is consistent with the backfilled values providing a reasonable approximation of banks' relative sovereign exposure positions over the earlier period.

3 Empirical framework

To examine how sovereign risk is transmitted to banks, we estimate the following panel regressions:

$$\begin{aligned}\Delta\text{BankCDS}_{bc,t} &= \beta_1 \Delta\text{SovCDS}_{c,t} + \beta_2 \text{SovExp}_{bc,s} + \beta_3 \left(\Delta\text{SovCDS}_{c,t} \times \text{SovExp}_{bc,s}\right) \\ &\quad + \Phi Z_{c,t} + \Gamma X_{bc,s} + \alpha_b + \mu_q + \varepsilon_{bc,t}. \end{aligned} \tag{1}$$

where $\Delta\text{BankCDS}_{bc,t}$ is the change in log CDS spread of bank b, headquartered in country c, on day t, and $\Delta\text{SovCDS}_{c,t}$ is the change in log sovereign CDS spread for country c. $\text{SovExp}_{bc,s}$ denotes the log of bank bs holdings of sovereign debt issued by its home country, where s denotes the most recent semiannual reporting period available prior to day t.[5] In the baseline specification, we focus on domestic exposures because they capture the most direct balance-sheet channel through which sovereign risk is transmitted from the home sovereign to domestic banks. To facilitate interpretation of the estimated coefficients, we de-mean sovereign exposures before estimation. Consequently, the estimated coefficients capture the effect of a one-unit change relative to the cross-sectional average in a given period.

$Z_{c,t}$ denotes the market-level controls to account for broader macro-financial conditions. We include the change in the 2-year sovereign yield, term spread, and the interest-rate spread relative to the German 10-year yield. Higher short-term yields and a steeper yield curve are generally associated with lower bank CDS spreads, reflecting improved bank profitability, while a wider spread relative to Germany captures elevated country-specific sovereign risk and is expected to increase bank CDS spreads. $X_{bc,s}$ includes bank-level controls: the CET1 ratio and log assets. We include bank (α_b) and year-quarter (μ_q) fixed effects, and report Driscoll and Kraay (1998) standard errors which allow for cross-sectional dependence and serial correlation.[6]

The coefficient on the daily log change in the sovereign CDS spread, β_1, captures the average sovereign–bank nexus. The coefficient β_2 captures the association between sovereign holdings and bank risk, while the interaction coefficient β_3 tests whether banks with larger sovereign debt holdings are more sensitive to sovereign risk than their peers. Because portfolios are not randomly assigned, we interpret the estimates as exposure-conditioned sensitivity, not as the causal effect of holding more sovereign debt.

[5] We measure sovereign exposures using absolute euro values (cross-sectionally demeaned). We re-estimate the baseline specification using ratios of exposures to assets or CET1 capital in Section 4.5.

[6] Our results are robust to standard errors double-clustered at the bank and day levels.

4 Empirical findings

4.1 Sovereign exposures, accounting treatment, and bank risk

Table 1 presents the baseline results. Column (1) shows that changes in sovereign CDS spreads are positively and significantly associated with changes in bank CDS spreads, indicating that increases in sovereign risk are reflected in bank risk. Column (2) shows that this relationship is stronger for banks with larger domestic sovereign portfolios. Investors therefore do not view all banks as equally exposed to sovereign risk; rather, they price banks according to the size of their domestic sovereign holdings. These estimates capture the average sensitivity of bank risk to sovereign risk over the sample period. Because the sample largely covers the relatively calm post-crisis period, they likely understate the strength of sovereign–bank linkages during periods of acute market stress.

Column (3) distinguishes sovereign holdings by accounting treatment. MTM securities are marked to market through earnings or other comprehensive income, whereas AC securities are generally insulated from transitory market-price changes unless impaired or sold. We find that amplification is consistently larger for MTM than AC portfolios, with the difference statistically significant at the 1 percent level. Thus, investors respond not only to the amount of sovereign debt a bank holds but also to how quickly changes in its value are reflected on the balance sheet. The stronger response to MTM exposures is therefore consistent with more immediate recognition of sovereign losses as an important mechanism linking sovereign and bank risk.[7] Other channels, including changes in funding conditions and the perceived value of government support, may also contribute to sovereign-risk transmission (Committee on the Global Financial System, 2011; Correa et al., 2014), but the MTM results are consistent with a direct balance-sheet exposure channel.

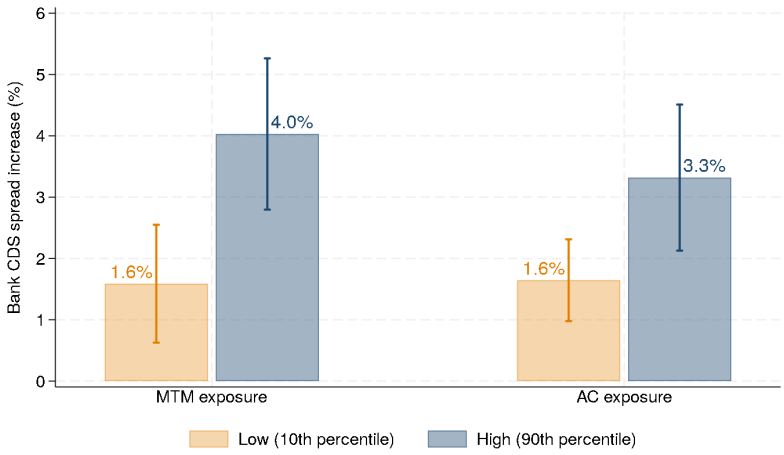
Column (4) further examines whether bank capitalization moderates this exposure-sensitive component of the nexus. The additional sensitivity associated with sovereign holdings is substantially weaker among better-capitalized banks, especially for MTM exposures. This pattern is consistent with stronger bank capitalization limiting the effect of potential valuation losses on bank risk.

Figure 5 illustrates the economic magnitude of the exposure channel. It reports the estimated increase in bank CDS spreads following a 10 percent increase in sovereign CDS spreads, evaluated at low (10th percentile) and high (90th percentile) values of MTM and AC exposures. The estimated increases in bank CDS spreads are statistically different between

[7] MTM and AC portfolios may also differ in maturity, duration, liquidity, security composition, hedging, and portfolio purpose. We therefore interpret the stronger MTM interaction as consistent with more immediate recognition of valuation losses, rather than as isolating the causal effect of accounting classification.

low and high exposure levels for MTM but not for AC portfolios. Moving from low to high MTM exposure increases the pass-through from sovereign risk to bank risk by 2.4 percentage points, while the same shift in AC exposure increases pass-through by 1.7 percentage points. Thus, the exposure-driven gap in pass-through is about 40 percent larger for MTM holdings than for AC holdings. Because this gap captures the additional sensitivity associated with a bank's own sovereign exposure, the larger gap for MTM holdings indicates that a given increase in MTM sovereign exposure amplifies the transmission of sovereign risk to bank risk more strongly than the same increase in AC exposure. This pattern is consistent with the more immediate recognition of valuation losses under MTM accounting strengthening the transmission of sovereign risk to bank risk.

Figure 5. Effect of a 10 percent Sovereign CDS increase



Note: Bars report the estimated effect of a 10 percent increase in sovereign CDS spreads on bank CDS spreads, evaluated at the 10th percentile (low) and 90th percentile (high) of MTM or AC sovereign exposure, holding the other exposure measure and all remaining regressors at their median values. Whiskers indicate 95 percent confidence intervals.

4.2 How has the sovereign–bank nexus evolved?

4.2.1 Sovereign–bank nexus over time

So far, we show that sovereign risk continues to transmit to banks in the post-crisis period. We now ask whether the strength and composition of this transmission have changed as the European institutional framework has evolved.

The post-crisis framework was implemented and refined throughout our sample. Following the crisis, the European Union introduced a broad set of reforms that strengthened the

euro area's institutional architecture and mitigated vulnerabilities arising from the sovereign–bank nexus (Darvas et al., 2025). The ESM established a permanent mechanism for providing financial assistance to distressed member states, while the Banking Union centralized bank supervision and introduced a common resolution framework. The ECB also developed instruments to preserve monetary-policy transmission and limit destabilizing fragmentation in sovereign bond markets. Most notably, the announcement of Outright Monetary Transactions in 2012 provided a credible backstop against self-fulfilling sovereign-market dynamics, thereby mitigating the sovereign–bank nexus indirectly. More recently, in 2022, the ECB introduced the Transmission Protection Instrument (TPI), which can be activated to counter unwarranted and disorderly market dynamics that pose a serious threat to monetary policy transmission.

Against this background, we re-estimate the baseline specification allowing the coefficients on sovereign CDS spreads, the levels of MTM and AC exposures, and their interactions with sovereign CDS spreads to vary across annual bins centered around June 15, 2022. On that date, the ECB announced the development of a new anti-fragmentation instrument, which was subsequently introduced as the TPI one month later.

$$
\begin{aligned}
\Delta\text{BankCDS}_{bc,t} \;=\; & \sum_{k\in\mathcal{K}} \beta_{1,k}\left(\Delta\text{SovCDS}_{c,t}\times D_{k,t}\right) \\
& + \sum_{k\in\mathcal{K}} \beta_{2,k}^{MTM}\left(\text{SovExp}_{bc,s}^{MTM}\times D_{k,t}\right) + \sum_{k\in\mathcal{K}} \beta_{2,k}^{AC}\left(\text{SovExp}_{bc,s}^{AC}\times D_{k,t}\right) \\
& + \sum_{k\in\mathcal{K}} \beta_{3,k}^{MTM}\left(\Delta\text{SovCDS}_{c,t}\times \text{SovExp}_{bc,s}^{MTM}\times D_{k,t}\right) \\
& + \sum_{k\in\mathcal{K}} \beta_{3,k}^{AC}\left(\Delta\text{SovCDS}_{c,t}\times \text{SovExp}_{bc,s}^{AC}\times D_{k,t}\right) \\
& + \Phi Z_{c,t} + \Gamma X_{bc,s} + \alpha_b + \mu_q + \varepsilon_{bc,t}. \qquad (2)
\end{aligned}
$$

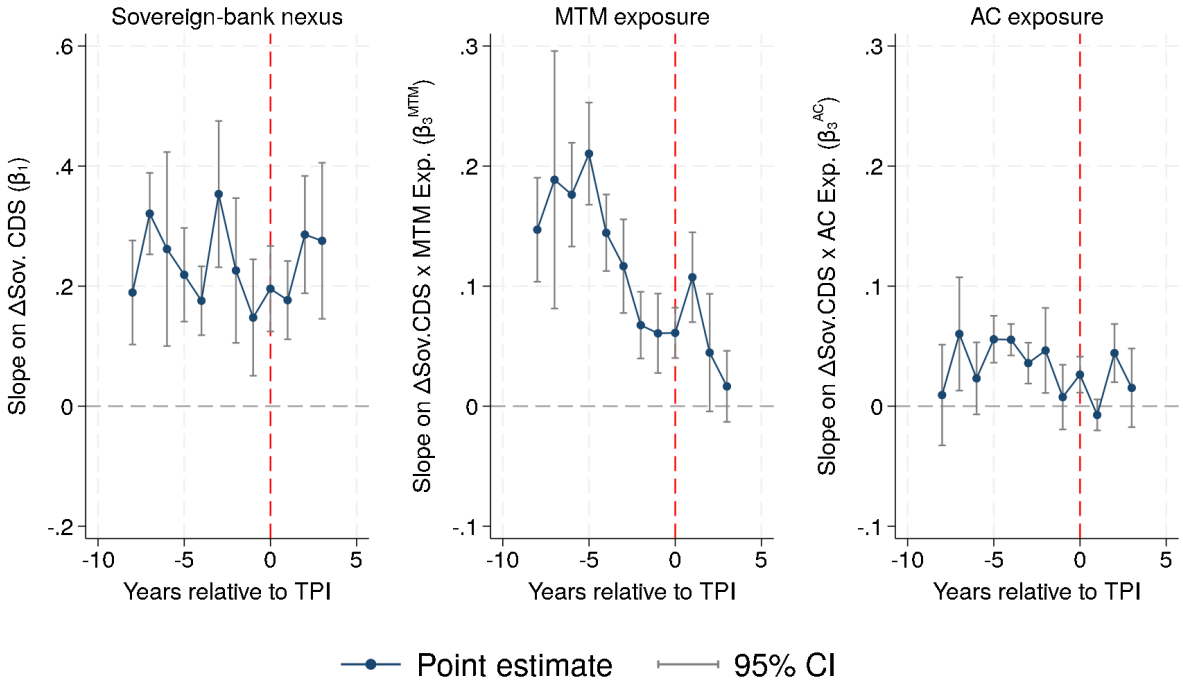
where $D_{k,t}$ is an indicator for annual bin k relative to June 15, 2022. The coefficients $\beta_{1,k}$ trace the evolution of the average sovereign–bank nexus, while $\beta_{3,k}^{MTM}$ and $\beta_{3,k}^{AC}$ trace the amplification associated with MTM and AC sovereign exposures, respectively.

Figure 6 plots the resulting coefficients with 95% confidence intervals. The average sovereign–bank nexus, β_1, remains positive and relatively stable. By contrast, the amplification associated with MTM sovereign exposures, β_3^{MTM}, starts declining well before June 2022 and eventually becomes statistically indistinguishable from zero.[8] AC amplification,

[8]We formally test whether this decline is statistically significant by re-estimating equation (1) with every term interacted with a continuous linear time trend (in years, centered on the June 2022 announcement). The estimated trend in β_3^{MTM} is -0.015 per year ($p<0.01$), compared with -0.003 per year for the average

β_3^{AC}, is substantially weaker throughout. Overall, estimated amplification based on MTM exposures weakened during a period in which Europe's post-crisis framework and banks' measured portfolios were evolving, even while the average relationship between sovereign and bank risk remained intact.

Figure 6. The evolution of sovereign–bank risk transmission



Note: The figure reports annual-bin estimates around the ECB's June 15, 2022 TPI announcement. The left panel plots the coefficient on changes in sovereign CDS spreads, $\beta_{1,k}$, while the middle and right panels plot the interaction coefficients for MTM and AC sovereign exposures, $\beta_{3,k}^{MTM}$ and $\beta_{3,k}^{AC}$, respectively. Vertical bars denote 95 percent confidence intervals using Driscoll and Kraay (1998) standard errors. The dashed red line marks the TPI announcement as an institutional reference point.

4.2.2 Changes in measured sovereign exposures

The estimated decline in $\beta_{3,k}^{MTM}$ has two possible interpretations. It may reflect a weakening in how markets price the transmission of sovereign risk to bank risk for a given unit of MTM exposure. Alternatively, it may reflect changes in banks' measured MTM exposure, with the pricing of a given unit of exposure remaining unchanged. This distinction is particularly

nexus β_1 (p=0.55, not statistically significant) and −0.003 per year for β_3^{AC} (p=0.08, marginal). The decline in exposure-based amplification is therefore concentrated in, and statistically significant only for, the MTM interaction, rather than reflecting a general decline in sovereign–bank comovement. Full estimates are reported in Appendix Table A.1.

relevant after the introduction of International Financial Reporting Standard 9 (IFRS 9) in January 2018, which changed the accounting rules governing the classification of securities as amortized cost or fair value. As banks reassessed their portfolios under the new standard, securities could be reclassified from MTM to AC without a corresponding change in the underlying holdings.

We distinguish these possibilities by re-estimating equation (2) using fixed rather than time-varying exposure measures. Specifically, we replace each bank's time-varying MTM and AC exposure ($\text{SovExp}_{bc,s}^{MTM}$ and $\text{SovExp}_{bc,s}^{AC}$) with that bank's own full-sample average of the respective exposures. We refer to these as the *time-varying exposure* and *fixed exposure* specifications, respectively.

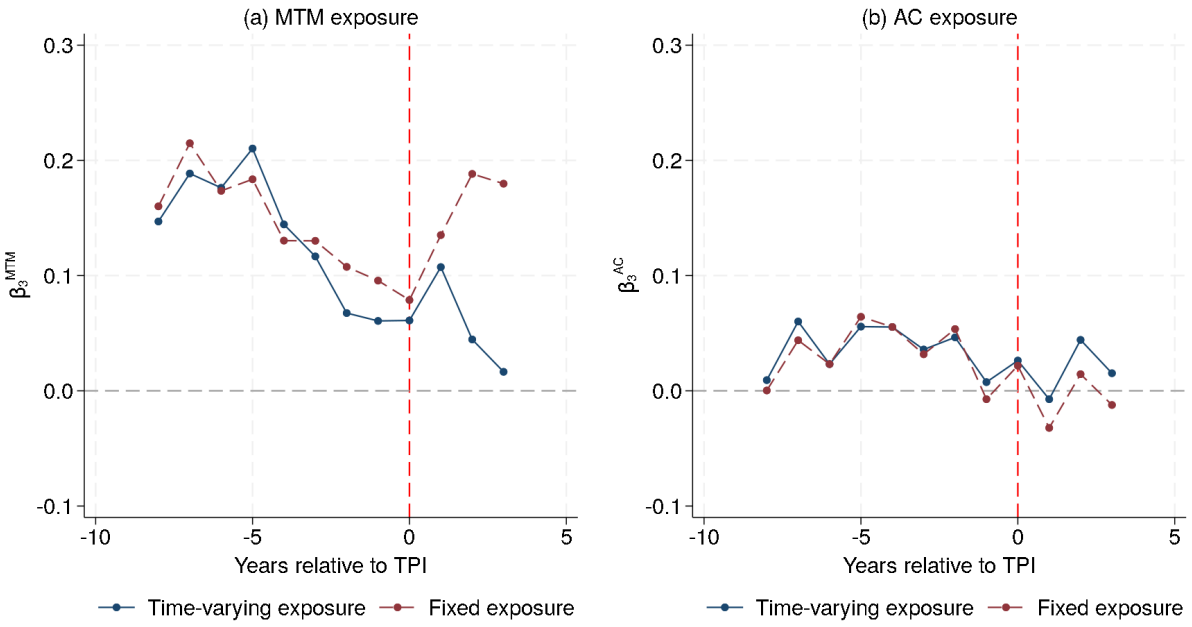
Figure 7 compares $\beta_{3,k}^{MTM}$ and $\beta_{3,k}^{AC}$—the coefficients for MTM (panel a) and AC (panel b) exposure—with the navy line reproducing the *time-varying exposure* estimates from Figure 6. The MTM estimates are similar across the two specifications through much of the sample but diverge sharply in the later years. For AC exposure, by contrast, the two estimates remain relatively small and close throughout the sample, with no comparable divergence.

The contrast between the two specifications suggests that the late-sample decline in $\beta_{3,k}^{MTM}$ is driven primarily by changes in measured MTM exposure rather than by a weakening in the pricing of a given unit of exposure. If the latter were the main explanation, the coefficient should also decline when exposure is fixed at each bank's typical level. Instead, the fixed-exposure coefficient remains high while the coefficient based on time-varying exposure declines. The pattern is therefore consistent with a shift of sovereign holdings out of the MTM category rather than a change in how markets price a given unit of MTM exposure. Figure 8 documents this shift directly and plots the average share of domestic sovereign holdings classified as MTM, which falls from about 55 percent in 2018 to about 36 percent by the end of the sample.

4.3 When and where the sovereign–bank nexus is strongest

So far, we have shown that sovereign risk transmits to bank risk either through a common repricing of sovereign risk that affects all banks similarly or a balance-sheet-specific component that operates through banks' own sovereign holdings. In this section, we ask whether the strength of these channels differs across groups of banks, market conditions, and sovereign fiscal environments.

Figure 7. MTM and AC amplification with time-varying and fixed bank exposures



Note: Each point shows, for a given year, how much more sensitive banks with larger MTM (panel a) or AC (panel b) sovereign holdings are to changes in sovereign CDS spreads. The time-varying series uses each bank's actual MTM or AC exposure at that date. The fixed series instead uses each bank's own average exposure over the full sample, so it does not change from year to year. Both series use the same banks, sample, controls, and estimation method; only the exposure measure differs. Confidence intervals are left off this figure to keep it readable, but both series are estimated with Driscoll and Kraay (1998) standard errors. The dashed red line marks the June 2022 TPI announcement as a reference point in time.

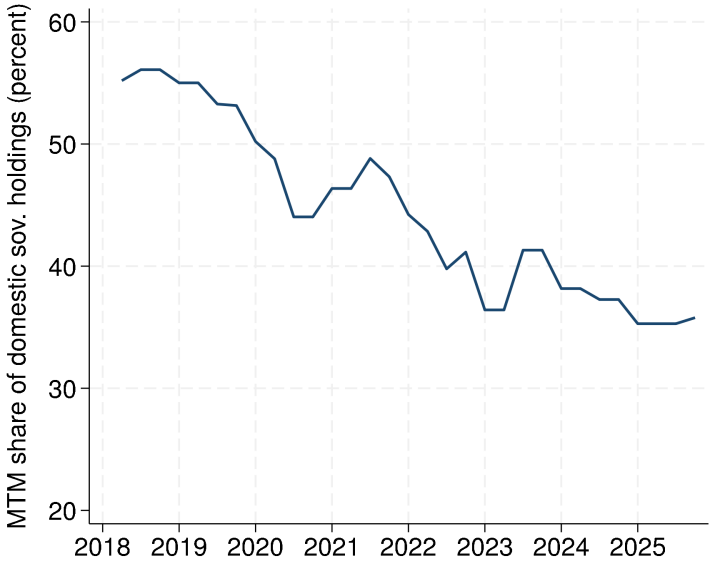
4.3.1 Bank and market conditions

Table 2 asks whether the strength of the nexus differs systematically with wholesale funding reliance, bank location, and market uncertainty. To examine these differences, we augment the baseline specification by interacting the full set of baseline variables with indicators capturing bank and market characteristics. Table 2 reports the estimated coefficients for each group, together with the difference between them and a test of whether that difference is statistically different from zero.[9]

We begin by splitting banks according to their wholesale-funding reliance, using the median ratio of deposits from financial institutions to total liabilities. Panel A shows that

[9]The differences are estimated directly as interaction coefficients in the pooled regressions. Their Driscoll–Kraay standard errors are therefore computed from the joint covariance matrix, allowing the group-specific estimates to covary through common dates and sovereign shocks.

Figure 8. MTM share of domestic sovereign holdings



Note: The figure plots the cross-sectional mean of banks' domestic sovereign securities classified as MTM divided by its total domestic sovereign securities.

wholesale funding reliance primarily affects the exposure-sensitive component of the nexus. Banks that depend more heavily on market funding do not exhibit a systematically stronger average nexus, but their credit risk becomes markedly more sensitive to sovereign risk when they hold larger MTM sovereign portfolios. This pattern is consistent with funding pressures reinforcing the market-valuation channel for banks that rely more heavily on wholesale funding (Committee on the Global Financial System, 2011).

In Panel B, we ask whether the nexus differs between banks headquartered in peripheral and core countries. Peripheral banks stand out because both components of the nexus are stronger: their credit risk responds more strongly to sovereign risk on average, and this sensitivity rises further with the size of their MTM sovereign holdings. The AC channel, by contrast, does not differ significantly across the two groups. Taken together, the results suggest that peripheral banks are more closely tied to their home sovereign both through the broader repricing of bank risk and through the additional vulnerability associated with sovereign holdings that are marked to market.

Finally, Panel C contrasts high-uncertainty periods, defined as observations in which the lagged 20-trading-day rolling volatility of the iTraxx index is above its 90th percentile, with the remainder of the sample. The average response of bank risk to sovereign risk is significantly stronger in periods of high market uncertainty. The MTM and AC interactions are positive in both regimes, but neither differs significantly between high- and normal-

volatility periods. Market uncertainty therefore appears to strengthen the common repricing of sovereign and bank risk without materially changing the additional sensitivity associated with banks' own sovereign exposures.

4.3.2 Sovereign fiscal conditions

The transmission of sovereign risk may also depend on the fiscal position of the home country. Limited fiscal space can weaken the government's capacity to support the financial sector, while high public debt and interest burdens can reinforce concerns about the link between sovereign and bank balance sheets. Stronger fiscal and primary balances, by contrast, may signal greater capacity to absorb deterioration in sovereign conditions. We examine these dimensions separately because they capture related but distinct aspects of fiscal capacity.

Table 3 augments the baseline specification with four alternative fiscal measures: the fiscal balance, primary balance, government interest expenditure relative to GDP, and debt-to-GDP. Together, these measures capture both the government's flow position and the stock and servicing burden of public debt.

The estimates suggest that sovereign risk is transmitted more strongly when debt-to-GDP and interest expenditure are higher. A stronger fiscal balance is associated with weaker transmission, while the primary-balance interaction is smaller and estimated less precisely. This pattern suggests that markets place particular weight on the outstanding debt stock and the burden of servicing it. The results should nevertheless be interpreted as conditional associations, since fiscal conditions are persistent and may also reflect broader country characteristics that shape sovereign–bank linkages.[10]

4.4 Sovereign risk and bank equity valuations

Previous sections examine how sovereign risk is reflected in bank risk. Table 4 asks whether the balance-sheet exposure channel also shapes equity-market valuations. We replace the daily log change in bank CDS spreads with the daily return on bank stocks and include the daily log change in the bank CDS spread and the return on the broad euro-area equity index. The remaining controls and fixed effects follow the baseline specification.

[10]Because fiscal conditions are persistent within a country, one concern is that the fiscal interactions simply relabel the cross-sectional difference between peripheral and core banks documented in Table 2. As an additional check, results not shown, we re-estimate all four fiscal specifications with country-by-quarter fixed effects, which absorb country characteristics common to all observations within a quarter, including the core-periphery classification. The level effects of the fiscal variables are absorbed, but their interactions with daily changes in sovereign CDS remain identified. The interaction estimates retain their signs and similar magnitudes, leaving the conclusions unchanged.

Column (1) establishes a negative relationship between sovereign risk and bank stock returns, conditional on broad market movements and bank risk. Columns (2) and (3) show that this response is more negative for banks with larger domestic sovereign portfolios, irrespective of the accounting classification. Both MTM and AC exposures amplify the negative equity response to sovereign risk, and the estimated amplification is similar across the two portfolios. This contrasts with the sharper MTM–AC distinction in the bank-CDS results.

Equity investors therefore differentiate across banks according to their exposure to the home sovereign. This response extends beyond the immediate accounting recognition of valuation losses through MTM securities. The balance-sheet channel is distinct from, but may operate alongside, changes in the perceived value of government support, which prior work has also linked to the equity-market transmission of sovereign risk (Correa et al., 2014).

4.5 Robustness

Table 5 reports several robustness checks for the baseline MTM–AC specification. In columns (1) and (2) sovereign exposures are scaled by total assets and CET1 capital, respectively. The positive MTM amplification result is preserved under both normalizations, while the AC interaction changes sign. This pattern is consistent with two different explanations. First, after controlling for bank size and other balance-sheet characteristics, CDS markets may place greater weight on the absolute size of banks' sovereign exposures than on exposures measured relative to total assets. Second, scaling exposures by total assets or CET1 capital may introduce additional volatility unrelated to the sovereign–bank nexus. Because the alternative variables use different units, their coefficient magnitudes are not directly comparable with those in the baseline specification.

Columns (3) and (4) examine whether the results depend on sample construction. Restricting the sample to the period beginning in 2018:Q2, for which EBA exposures are observed rather than backfilled, leaves both exposure interactions positive and significant, with substantially stronger amplification through MTM holdings. The same pattern holds when the COVID-19 period is excluded.

Finally, columns (5) and (6) replace Driscoll–Kraay standard errors with two-way clustering by bank and day or by bank and half-year. The statistical significance of the MTM and AC interactions is preserved under both alternatives. Overall, the robustness exercises support the central conclusion that sovereign exposures amplify risk transmission and that this amplification is more pronounced for MTM portfolios, while also showing that the AC result is less stable under alternative exposure scaling.

5 Conclusion

This paper asks whether sovereign risk continues to reach banks in a European financial system that has changed substantially since the sovereign debt crisis. We show that sovereign and bank risk remain closely linked and that this relationship is stronger for banks with larger domestic sovereign holdings, particularly holdings marked to market, for which valuation losses are recognized more promptly. MTM amplification is stronger among less-capitalized and wholesale-funded banks, while the broader relationship is stronger for peripheral banks and when the home sovereign has less fiscal space.

The nexus has also evolved during a period of substantial institutional reform. The average relationship between sovereign and bank risk remains stable over the sample, whereas amplification through MTM holdings declines gradually. Yet banks that typically hold larger MTM portfolios remain more sensitive to sovereign stress. The remaining risks are therefore concentrated among banks and sovereigns with less capacity to absorb adverse shocks.

The financial-stability implication is that total sovereign holdings provide only a partial measure of banks vulnerability. Accounting treatment affects how quickly sovereign losses are reflected in bank balance sheets, while the resilience of banks and their home sovereigns shapes the consequences of those losses. Assessing sovereign-related vulnerability therefore requires looking beyond the size of banks sovereign portfolios.

References

Acharya, V. V., Drechsler, I., and Schnabl, P. (2014). A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk. *The Journal of Finance*, 69(6):2689–2739.

Becker, B. and Ivashina, V. (2018). Financial repression in the european sovereign debt crisis. *Review of Finance*, 22(1):83–115.

Brunnermeier, M. K., Garicano, L., Lane, P. R., Pagano, M., Reis, R., Santos, T., Thesmar, D., Van Nieuwerburgh, S., and Vayanos, D. (2016). The Sovereign-Bank Diabolic Loop and ESBies. *American Economic Review*, 106(5):508–512.

Committee on the Global Financial System (2011). The impact of sovereign credit risk on bank funding conditions. Technical Report 43, Bank for International Settlements, Basel, Switzerland.

Correa, R., Lee, K.-H., Sapriza, H., and Suarez, G. A. (2014). Sovereign credit risk, banks' government support, and bank stock returns around the world. *Journal of Money, Credit and Banking*, 46(S1):93–121.

Correa, R. and Sapriza, H. (2015). Sovereign debt crises. In Berger, A. N., Molyneux, P., and Wilson, J. O. S., editors, *The Handbook of Banking*, chapter 30, pages 737–755. Oxford University Press, 2 edition.

Darvas, Z., Welslau, L., and Zettelmeyer, J. (2025). Sovereign Debt and Fiscal Integration in the European Union. *Journal of Economic Perspectives*, 39(4):49–74.

Driscoll, J. C. and Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics*, 80(4):549–560.

European Central Bank (2022). The Transmission Protection Instrument.

Farhi, E. and Tirole, J. (2018). Deadly Embrace: Sovereign and Financial Balance Sheets Doom Loops. *The Review of Economic Studies*, 85(3):1781–1823.

Gennaioli, N., Martin, A., and Rossi, S. (2014). Sovereign default, domestic banks, and financial institutions. *The Journal of Finance*, 69(2):819–866.

Lane, P. R. (2012). The European Sovereign Debt Crisis. *Journal of Economic Perspectives*, 26(3):49–68.

Rojas, L. E. and Thaler, D. (2024). The Bright Side of the Doom Loop: Banks' Sovereign Exposure and Default Incentives. *European Economic Review*, 170:104878.

Schnabel, I. (2021). The Sovereign-Bank-Corporate Nexus – Virtuous or Vicious? Speech at the LSE Conference on Financial Cycles, Risk, Macroeconomic Causes and Consequences.

Table 1. Sovereign debt holdings and bank risk

	(1)	(2)	(3)	(4)
ΔSovCDS	0.233***	0.253***	0.254***	0.218***
	(0.024)	(0.022)	(0.022)	(0.023)
SovExp		0.016		
		(0.019)		
ΔSovCDS × SovExp		0.133***		
		(0.008)		
SovExp^{MTM}			0.016	0.027*
			(0.013)	(0.016)
ΔSovCDS × SovExp^{MTM}			0.094***	0.089***
			(0.008)	(0.006)
SovExp^{AC}			-0.007	-0.001
			(0.020)	(0.022)
ΔSovCDS × SovExp^{AC}			0.038***	0.041***
			(0.005)	(0.006)
ΔSovCDS × CET1 ratio				-1.672***
				(0.324)
SovExp^{MTM} × CET1 ratio				-0.434
				(0.443)
SovExp^{AC} × CET1 ratio				-0.057
				(0.300)
ΔSovCDS × SovExp^{MTM} × CET1 ratio				-1.843***
				(0.275)
ΔSovCDS × SovExp^{AC} × CET1 ratio				-0.627***
				(0.181)
CET1 ratio	-0.269	-0.198	-0.111	-0.020
	(0.594)	(0.594)	(0.589)	(0.678)
Total Assets	0.154	0.108	0.149	0.142
	(0.134)	(0.140)	(0.140)	(0.145)
Observations	80,002	77,821	77,447	77,447
Within R^2	0.104	0.122	0.123	0.130
$\beta^{\Delta\text{SovCDS}\times\text{SovExp}^{MTM}} = \beta^{\Delta\text{SovCDS}\times\text{SovExp}^{AC}}$			29.09***	34.30***
$\beta^{\Delta\text{SovCDS}\times\text{SovExp}^{MTM}\times\text{CET1ratio}} = \beta^{\Delta\text{SovCDS}\times\text{SovExp}^{AC}\times\text{CET1ratio}}$				9.72***

This table reports estimates from panel regressions specified in Equation (1). The dependent variable is ΔBankCDS. ΔSovCDS denotes the daily change in the log of the home sovereign's CDS spread. SovExp is the demeaned log value of domestic sovereign debt holdings, while SovExp^{MTM} and SovExp^{AC} denote the corresponding holdings classified as marked-to-market and amortized-cost, respectively. The CET1 ratio is mean-centered before the interaction terms in column (4) are constructed. All specifications include market-level controls, bank fixed effects, and year-quarter fixed effects; the market-control coefficients are not reported. Standard errors are computed using the Driscoll–Kraay estimator. The coefficient-equality rows report F-statistics. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 2. The Sovereign–Bank Nexus, Conditional on Bank and Market Characteristics

Panel A: Wholesale Funding Reliance			
	High wholesale funding	Low wholesale funding	Difference
ΔSovCDS	0.246***	0.228***	0.017
	(0.024)	(0.024)	(0.015)
ΔSovCDS $\times$ SovExp^{MTM}	0.141***	0.042***	0.099***
	(0.011)	(0.009)	(0.013)
ΔSovCDS $\times$ SovExp^{AC}	0.021***	0.040***	−0.019***
	(0.005)	(0.007)	(0.007)
Panel B: Bank Location			
	Periphery banks	Core banks	Difference
ΔSovCDS	0.294***	0.166***	0.128***
	(0.017)	(0.026)	(0.023)
ΔSovCDS $\times$ SovExp^{MTM}	0.241***	0.071***	0.170***
	(0.013)	(0.019)	(0.025)
ΔSovCDS $\times$ SovExp^{AC}	0.013	0.030***	−0.017
	(0.012)	(0.006)	(0.013)
Panel C: Market Uncertainty			
	High volatility	Normal volatility	Difference
ΔSovCDS	0.343***	0.225***	0.118***
	(0.040)	(0.019)	(0.043)
ΔSovCDS $\times$ SovExp^{MTM}	0.099***	0.094***	0.005
	(0.010)	(0.010)	(0.014)
ΔSovCDS $\times$ SovExp^{AC}	0.043***	0.037***	0.006
	(0.011)	(0.005)	(0.012)

This table reports estimates from the baseline specification augmented by interacting all variables in the baseline specification, as well as the bank and year-quarter fixed effects, with the relevant conditioning indicator. We consider wholesale funding reliance, bank location, and overall market uncertainty in panels A, B, and C, respectively. Panel A classifies banks as having high or low wholesale-funding reliance using the cross-bank median of each bank's time-average wholesale-funding ratio, defined as deposits from financial institutions divided by total liabilities. Panel B compares banks headquartered in peripheral countries (Italy, Portugal, and Spain) with those headquartered in core countries (France, Germany, and the Netherlands); banks in other countries are excluded from this comparison. Panel C compares high-uncertainty periods, defined as observations in which the lagged 20-trading-day rolling volatility of the iTraxx index is above its 90th percentile, with lower-uncertainty periods comprising the remaining observations. All specifications include bank and market controls, bank fixed effects, and year-quarter fixed effects; these coefficients are not reported for brevity. Driscoll–Kraay standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

Table 3. Fiscal space

Fiscal Space:	(1) Fiscal balance (% of GDP)	(2) Primary balance (% of GDP)	(3) Interest exp. (% of GDP)	(4) Debt (% of GDP)
ΔSovCDS	0.261***	0.253***	0.282***	0.280***
	(0.021)	(0.021)	(0.018)	(0.019)
SovExp^{MTM}	0.015	0.015	0.014	0.015
	(0.014)	(0.014)	(0.012)	(0.013)
$\Delta\text{SovCDS} \times \text{SovExp}^{MTM}$	0.093***	0.095***	0.074***	0.079***
	(0.008)	(0.009)	(0.008)	(0.008)
SovExp^{AC}	-0.006	-0.006	-0.005	-0.005
	(0.022)	(0.021)	(0.022)	(0.023)
$\Delta\text{SovCDS} \times \text{SovExp}^{AC}$	0.030***	0.035***	0.027***	0.016**
	(0.006)	(0.006)	(0.006)	(0.006)
FiscalSpace	-0.002	-0.001	0.015	-0.001
	(0.007)	(0.008)	(0.055)	(0.002)
$\Delta\text{SovCDS} \times \text{FiscalSpace}$	-0.014***	-0.005	0.072***	0.003***
	(0.005)	(0.005)	(0.012)	(0.000)
Observations	74,538	74,538	74,538	74,538
Within R^2	0.127	0.126	0.130	0.131

This table reports estimates of Equation (1) augmented with alternative measures of a country's fiscal space. Column (1) uses the general government overall fiscal balance as a share of GDP; column (2) uses the primary balance, which excludes government interest payments; column (3) uses general government interest expenditure as a share of GDP; and column (4) uses general government gross debt as a share of GDP. Higher fiscal and primary balances denote stronger fiscal positions, whereas higher interest expenditure and debt denote greater fiscal burdens. All specifications include bank and market controls, bank and year-quarter fixed effects; these coefficients are not reported for brevity. Driscoll–Kraay standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

Table 4. Sovereign exposures and bank valuations

	(1)	(2)	(3)
Broad Index (% change)	1.075***	1.071***	1.072***
	(0.024)	(0.024)	(0.024)
ΔBankCDS	-0.044***	-0.039***	-0.039***
	(0.006)	(0.005)	(0.005)
ΔSovCDS	-0.028***	-0.036***	-0.036***
	(0.006)	(0.006)	(0.007)
SovExp		0.024**	
		(0.012)	
ΔSovCDS × SovExp		-0.028***	
		(0.005)	
SovExp^{MTM}			-0.012
			(0.008)
$\Delta\text{SovCDS} \times \text{SovExp}^{MTM}$			-0.013***
			(0.004)
SovExp^{AC}			0.043***
			(0.016)
$\Delta\text{SovCDS} \times \text{SovExp}^{AC}$			-0.013***
			(0.003)
Observations	60,474	59,426	59,426
Within R^2	0.407	0.407	0.407

This table reports panel regressions based on Equation (1), replacing the dependent variable with the daily bank stock return. Broad Index is the daily return on the broad euro-area equity index. The remaining variables are defined in Table 1. Column (1) estimates the average relationship between sovereign risk and bank equity returns, column (2) allows this relationship to vary with total domestic sovereign exposure, and column (3) separates the exposure interaction by accounting classification: MTM and AC. All specifications include bank and market controls, bank and year-quarter fixed effects; these coefficients are not reported for brevity. Driscoll–Kraay standard errors are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

Table 5. Robustness

	Total Assets	CET1	No Backfill	Drop COVID	Bank-Day Cluster	Bank × Half yr Cluster
	(1)	(2)	(3)	(4)	(5)	(6)
ΔSovCDS	0.233***	0.232***	0.233***	0.234***	0.254***	0.254***
	(0.022)	(0.024)	(0.029)	(0.019)	(0.038)	(0.015)
SovExp^{MTM}/TA	0.008					
	(0.007)					
ΔSovCDS × SovExp^{MTM}/TA	0.008**					
	(0.004)					
SovExp^{AC}/TA	-0.004					
	(0.011)					
ΔSovCDS × SovExp^{AC}/TA	-0.013***					
	(0.002)					
SovExp^{MTM}/CET1		0.031*				
		(0.016)				
ΔSovCDS × SovExp^{MTM}/CET1		0.011***				
		(0.002)				
SovExp^{AC}/CET1		-0.035				
		(0.052)				
ΔSovCDS × SovExp^{AC}/CET1		-0.057***				
		(0.011)				
SovExp^{MTM}			0.019	0.013	0.016***	0.016
			(0.012)	(0.014)	(0.003)	(0.011)
ΔSovCDS × SovExp^{MTM}			0.073***	0.099***	0.094***	0.094***
			(0.008)	(0.011)	(0.028)	(0.017)
SovExp^{AC}			-0.011	-0.011	-0.007	-0.007
			(0.022)	(0.021)	(0.004)	(0.011)
ΔSovCDS × SovExp^{AC}			0.035***	0.035***	0.038**	0.038***
			(0.006)	(0.006)	(0.016)	(0.008)
Observations	78,930	78,546	54,580	63,550	77,447	77,447
Within R^2	0.107	0.108	0.0932	0.121	0.115	0.115

This table reports robustness checks for the baseline MTM–AC specification. TA denotes total assets. Columns (1) and (2) scale exposures by TA and CET1 capital. Column (3) uses observed EBA exposures from 2018:Q2 onward, and column (4) excludes March 2020 through December 2021. Columns (5) and (6) use two-way clustering by bank and day and by bank and half-year; columns (1)–(4) use Driscoll–Kraay standard errors. All regressions include baseline controls and bank and year-quarter fixed effects. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

A Formal test of temporal attenuation in MTM amplification

Section 4.2 shows, using annual bins, that the amplification associated with MTM sovereign exposures declines gradually over the sample, while the average sovereign–bank nexus and AC amplification do not display a comparable decline. This appendix reports a single formal test of that pattern. We re-estimate equation (1) after interacting every term with a continuous linear time trend, measured in years and centered on the June 2022 anti-fragmentation announcement purely as a reference date, not an assumed break:

$$\begin{aligned}\Delta\text{BankCDS}_{bc,t} \;=\;& \beta_1 \Delta\text{SovCDS}_{c,t} + \beta_1^{Trend}\left(\Delta\text{SovCDS}_{c,t} \times Trend_t\right) \\ &+\beta_2^{MTM}\text{SovExp}_{bc,s}^{MTM} + \beta_2^{MTM,Trend}\left(\text{SovExp}_{bc,s}^{MTM} \times Trend_t\right) \\ &+\beta_2^{AC}\text{SovExp}_{bc,s}^{AC} + \beta_2^{AC,Trend}\left(\text{SovExp}_{bc,s}^{AC} \times Trend_t\right) \\ &+\beta_3^{MTM}\left(\Delta\text{SovCDS}_{c,t} \times \text{SovExp}_{bc,s}^{MTM}\right) \\ &+\beta_3^{MTM,Trend}\left(\Delta\text{SovCDS}_{c,t} \times \text{SovExp}_{bc,s}^{MTM} \times Trend_t\right) \\ &+\beta_3^{AC}\left(\Delta\text{SovCDS}_{c,t} \times \text{SovExp}_{bc,s}^{AC}\right) \\ &+\beta_3^{AC,Trend}\left(\Delta\text{SovCDS}_{c,t} \times \text{SovExp}_{bc,s}^{AC} \times Trend_t\right) \\ &+\Phi Z_{c,t} + \Gamma X_{bc,s} + \alpha_b + \mu_q + \varepsilon_{bc,t}.\end{aligned}$$

The coefficients of interest are the triple-interaction trends: β_1^{Trend} traces the linear trend in the average sovereign–bank nexus, while $\beta_3^{MTM,Trend}$ and $\beta_3^{AC,Trend}$ trace the linear trends in MTM and AC amplification, respectively. A negative and statistically significant $\beta_3^{MTM,Trend}$ indicates that MTM amplification declines over the sample; comparing its magnitude and significance with β_1^{Trend} and $\beta_3^{AC,Trend}$ indicates whether that decline is specific to the MTM channel or instead reflects a broader decline in sovereign–bank comovement.

Table A.1 reports the results. The trend in MTM amplification, $\beta_3^{MTM,Trend}$, is -0.015 per year and statistically significant at the 1 percent level. By contrast, the trend in the average nexus, β_1^{Trend}, is -0.003 per year and not statistically distinguishable from zero (p=0.55), and the trend in AC amplification, $\beta_3^{AC,Trend}$, is also -0.003 per year and only marginally significant (p=0.08). The decline documented in Figure 6 is therefore concentrated in, and only clearly statistically significant for, the MTM-exposure interaction, rather than reflecting a general attenuation of sovereign–bank comovement across all channels.

Table A.1. Formal test of temporal attenuation

	(1)
ΔSovCDS	0.235***
	(0.025)
ΔSovCDS × Trend	-0.003
	(0.005)
SovExp^{MTM}	0.018
	(0.014)
SovExp^{MTM} × Trend	-0.003
	(0.004)
ΔSovCDS × SovExp^{MTM}	0.075***
	(0.006)
ΔSovCDS × SovExp^{MTM} × Trend	-0.015***
	(0.003)
SovExp^{AC}	-0.006
	(0.020)
SovExp^{AC} × Trend	0.001
	(0.002)
ΔSovCDS × SovExp^{AC}	0.029***
	(0.005)
ΔSovCDS × SovExp^{AC} × Trend	-0.003*
	(0.002)
CET1 ratio	-0.127
	(0.586)
Total Assets	0.127
	(0.149)
Observations	77,447
Within R^2	0.127

This table reports estimates of equation (1) with every term interacted with a continuous linear time trend (Trend), measured in years and centered on the June 2022 anti-fragmentation announcement as a reference date rather than an assumed break. ΔSovCDS denotes the daily change in the log of the home sovereign's CDS spread. SovExp^{MTM} and SovExp^{AC} denote demeaned log domestic sovereign holdings classified as marked-to-market and amortized-cost, respectively. All specifications include the market-level controls from equation (1), bank fixed effects, and year-quarter fixed effects; these coefficients are not reported for brevity. Standard errors are computed using the Driscoll–Kraay estimator. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.