BIS

BIS Bulletin

No 136

High public debt, NBFIs and the risk of market dysfunction

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29 September 2026

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The editors of the BIS Bulletin series are Gaston Gelos and Frank Smets.

This publication is available on the BIS website (www.bis.org).

ISSN: 2708-0420 (online)
ISBN: 978-92-9259-984-3 (online)

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High government debt, NBFIs and the risk of market dysfunction

Key takeaways

- *Near record-high government debt levels and the growing role of non-banks have reshaped government debt markets in recent years.*
- *High levels of government sector debt are expected to worsen future government debt market liquidity conditions in general, including by increasing the risk of market dysfunction.*
- *A large non-bank financial institution footprint heightens the risk of market dysfunction while also making very favourable liquidity conditions more likely.*

Across the globe, government debt markets have been reshaped by two major shifts in recent years that have affected market functioning (BIS (2026)).[1] First, government debt has grown rapidly in the wake of the Great Financial Crisis (GFC) and the Covid-19 pandemic. It is now close to post-World War II highs in many advanced economies (Graph 1.A). Second, non-bank financial institutions (NBFIs) have become even more significant holders of government debt (Graph 1.B). At the same time, episodes of market dysfunction have become more frequent, as evidenced by the "dash for cash" at the onset of the pandemic or the liability-driven investment (LDI) episode in the United Kingdom in 2022.

In this Bulletin, we assess the impact of government debt levels and NBFI activity on the functioning of government bond markets. Given a lack of available data, we focus on the United States and use a broad US Treasury market conditions indicator (MCI). We then show that the level of government debt and the NBFI footprint in government debt markets, measured by the share of government bond holdings by money market funds, investment funds, pension funds and insurance companies, have a significant impact on the three-month-ahead distribution of the MCI.[2] While high government debt worsens expected future liquidity conditions in general, a high NBFI footprint widens the range of possibilities. It heightens not only the risk of market dysfunction but also makes favourable liquidity conditions more likely. This finding supports the notion that NBFIs can benefit liquidity conditions in good times but become detrimental in bad times, when they become shock amplifiers.

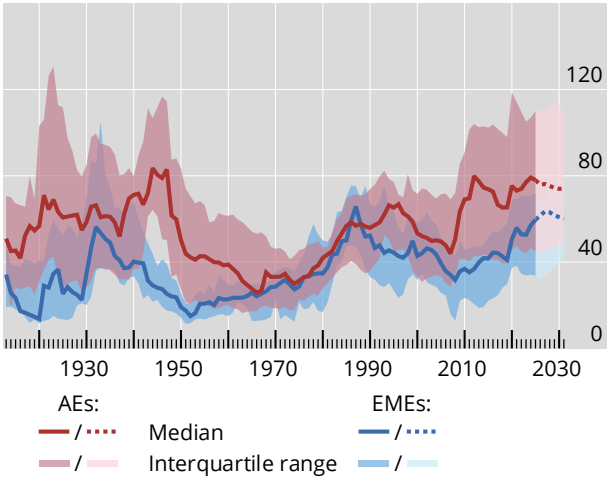
[1] For ease of exposition, we refer to public debt in general even though our analysis is based solely on debt issued by the sovereign government.

[2] A related finding is that the shift from banks to NBFIs has increased government bond markets' sensitivity to supply shocks (Eren et al (2026)).

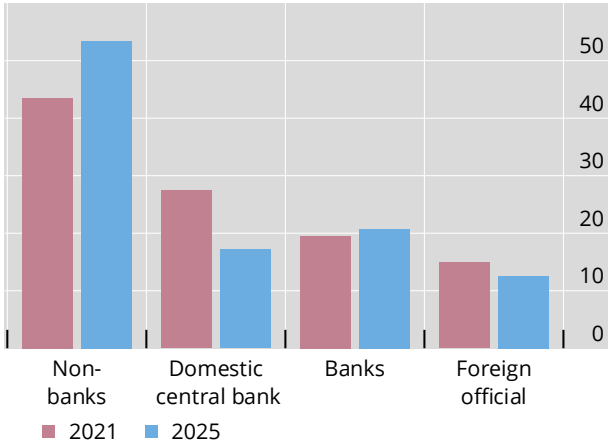
Rising government debt and the expanding footprints of NBFIs

As a percentage of GDP — Graph 1

A. Government debt as a percentage of GDP[1]



B. Holders of sovereign debt in advanced economies[2]



The dotted lines and lighter shaded areas in panel A indicate forecasts.

[1] The sample covers 27 advanced economies and 24 emerging market economies, subject to data availability. For government debt, general (if not available, central) government debt at nominal (if not available, market) value. [2] Aggregate debt divided by the aggregate GDP of 24 advanced economies.

Sources: Arslanalp and Tsuda (2014); IMF; Finaeon; national data; BIS.

Market functioning, NBFIs and government debt markets

The underlying vulnerabilities that can give rise to market dysfunction differ for different types of NBFIs. Liquidity mismatches in money market and open-ended funds are one source of vulnerability. Money market funds and many open-ended funds provide daily redemptions, which can give rise to a first-mover advantage by end investors. This, in turn, can trigger fire sale dynamics and depress prices, leading to further outflows and thus a negative feedback loop (see eg Goldstein et al (2017)). Such mechanisms were visible during the March 2020 "dash for cash", when selling pressures hit fixed income markets (see eg Lewrick and Claessens (2021)).

Vulnerabilities can also emerge from long-term buy-and-hold investors, such as insurance companies and pension funds. These investors deepen markets and diversify risks in normal times. Yet the strategies these NBFIs deploy to manage risks can amplify risks in certain situations. For example, the use of derivatives to manage solvency risks by life insurers has increased, which exposes insurers to greater risks of liquidity shortage related to collateral and margin calls (Aquilina et al (2025)). Another example is defined benefit pension funds that rely on derivatives to hedge long-term liabilities. The potential financial stability risks crystallised during the LDI crisis in 2022 in the United Kingdom when collateral calls forced LDIs to sell gilts, giving rise to asset fire sale dynamics.[3]

Lastly, leveraged hedge funds represent a growing source of vulnerability in these markets as their role has expanded. For instance, since 2022 hedge funds' exposure to US government debt has more than doubled, and they now account for over 50% of trading in electronic government debt markets in Europe (see BIS (2026)). Many of these hedge funds engage in long/short strategies that exploit small price differences between spot and related derivatives markets, such as futures or swaps. Since the arbitrage

[3] The impact of asset fire sales accounted for around half of the peak-to-trough drop in gilt prices (see Pinter et al (2024)).

gains are very small, they lever via short-term repo markets. This activity provides liquidity in good times, but in stress small price changes can quickly force large-scale deleveraging, potentially leading to market stress. This was one of the key drivers of Covid-19 market dysfunction (see eg Schrimpf et al (2020)). While the role of hedge funds in government bond markets has become very important, our empirical analysis does not capture their contributions because historical hedge funds data are not available.

These NBFI vulnerabilities interact with high government debt levels. Take, for instance, a negative shock about the fiscal position of a government. If government debt is very low, markets may not react strongly because the government has fiscal space. If, on the other hand, government debt is already high and fiscal space is strained, markets may require increased risk premia, translating into higher yields and possibly less benign liquidity conditions. Market functioning may be especially undermined if the initial jump in yields is amplified by any of the discussed NBFI vulnerabilities, which in turn can further undermine fiscal space, thus giving rise to a negative feedback spiral.[4]

Government sector debt, the NBFI footprint and market conditions

Assessing financial market functioning is not easy, and cross-country measures are hardly available. We therefore rely on US data and assess market functioning based on the MCI for the US Treasury market introduced by Aldasoro et al (2025). The MCI summarises various proxies for liquidity conditions.[5] Unlike traditional indices, the MCI emphasises market dislocations as reflected in episodes of illiquidity and deviations from no-arbitrage conditions driven by balance sheet constraints of intermediaries and the impairment of arbitrage. It is normalised to have a zero mean and unit variance, and higher values of the indicator are associated with worse liquidity conditions.

The MCI effectively captures periods of adverse liquidity conditions (Graph 2.A). For instance, at the onset of the pandemic in March 2020, the MCI recorded an unprecedented six-standard deviation shock. Other notable spikes occurred in November 2008, February 2016 and October 2022, each reflecting roughly two-standard deviation shocks associated with heightened market volatility.

High government sector debt and a high NBFI footprint seem to be associated with more adverse liquidity conditions on average (Graph 2.B). Looking across the sample between July 2004 and May 2024, the average MCI is 0.23 if the government debt-to-GDP ratio is in its bottom tercile versus 0.4 if the ratio is in its top tercile.[6] Equally, the average MCI is significantly lower if the share of government debt held by the NBFIs is in the bottom tercile than when it is in the top tercile.[7] While indicative, these full sample, contemporaneous relationships do not necessarily reveal how current government debt levels and the NBFI footprint help predict future market conditions.

To assess whether the NBFI footprint and the level of government debt can help to predict market functioning in the future, we use machine learning techniques to forecast the full distribution of the MCI out of sample.[8] Machine learning models are ideally suited to capture non-linearities, and interactions of

[4] See Zampolli (2026) for a formal analysis of the interactions of financial stability vulnerabilities and fiscal sustainability.

[5] The MCI for the US Treasury market is the first principal component from a broad list of variables, including the MOVE index, the US Government Securities Liquidity Index, the quoted spread and time-to-quote of government bonds, the on-the-run premium, the absolute overnight index swap (OIS) spread and the absolute Treasury futures basis trade.

[6] These average results are not solely driven by the spike in the MCI during the Covid-19 crisis. Comparisons based on the median rather than the mean convey a similar message.

[7] Throughout the analysis, we measure the NBFI footprint by share of government bond holdings of money market funds, investment funds, pension funds and insurance companies from the flow of funds data.

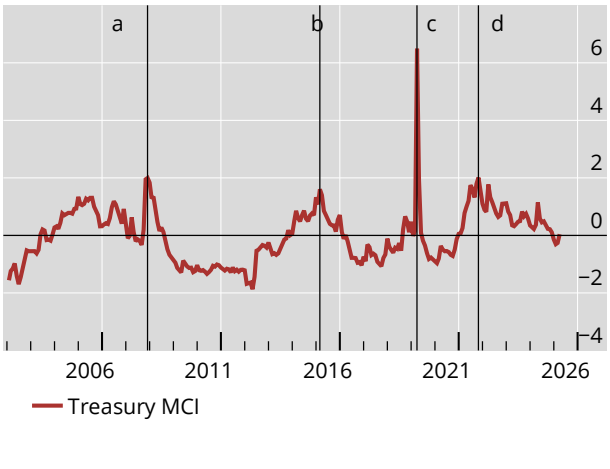
[8] To do out-of-sample forecasts, we use rolling window estimates. We use the first seven years of data from July 2004 to July 2011 to train the random forest to forecast the three-month-ahead distribution of the MCI. Subsequently, we iteratively update the data by removing the earliest month and adding a new month to the rolling window. After each estimation, the fitted model

a large set of potential predictor variables without prespecified functional forms. We follow Aldasoro et al (2025) and use a random forest model to forecast the full three-month-ahead conditional distribution of the MCI.[9] The authors consider 44 explanatory variables including funding liquidity, macroeconomic conditions, fund flows and option-implied market volatility. We add the government debt-to-GDP ratio and the NBFI footprint to this list.

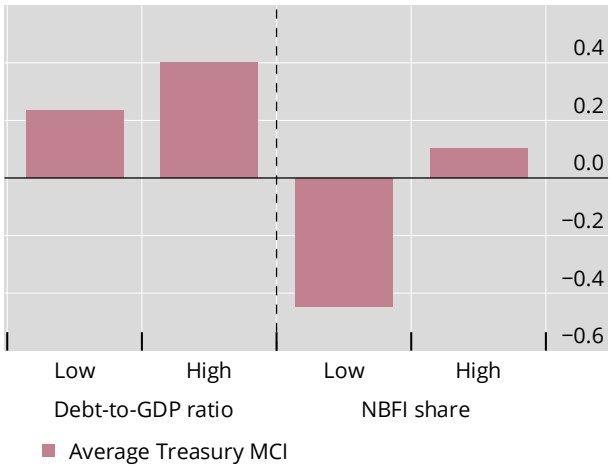
US Treasury market conditions

Standard deviations — Graph 2

A. The market conditions indicator over time



B. Liquidity conditions are worse when the debt-to-GDP ratio or the NBFI share is high[1]



[a] November 2008. [b] February 2016. [c] March 2020. [d] October 2022.

[1] High/low are defined by the respective variable being in the top/bottom tercile of its full sample distribution. Higher values of the market conditions indicator are associated with worse liquidity conditions in the US Treasury market.

Sources: Aldasoro et al (2025); authors' calculations.

Out-of-sample predictions by the random forest model yield two takeaways.[10]

First, high government debt worsens expected liquidity conditions in general (Graph 3.A). Higher debt-to-GDP ratios shift the forecast of the entire MCI distribution to the right. Put differently, the likelihood of exceeding any level of the MCI in three months is always greater when the government debt-to-GDP ratio is in its top tercile than when it is in its bottom tercile. This is in line with previous evidence, such as Duffie et al (2023) that shows that when Treasury supply is large relative to dealers' and investors' risk-bearing capacity, balance sheet and funding constraints bind more frequently, thinning market liquidity.

is used to predict the distribution of the MCI three months ahead. This process is repeated monthly up to May 2024, generating 84 out-of-sample predictions.

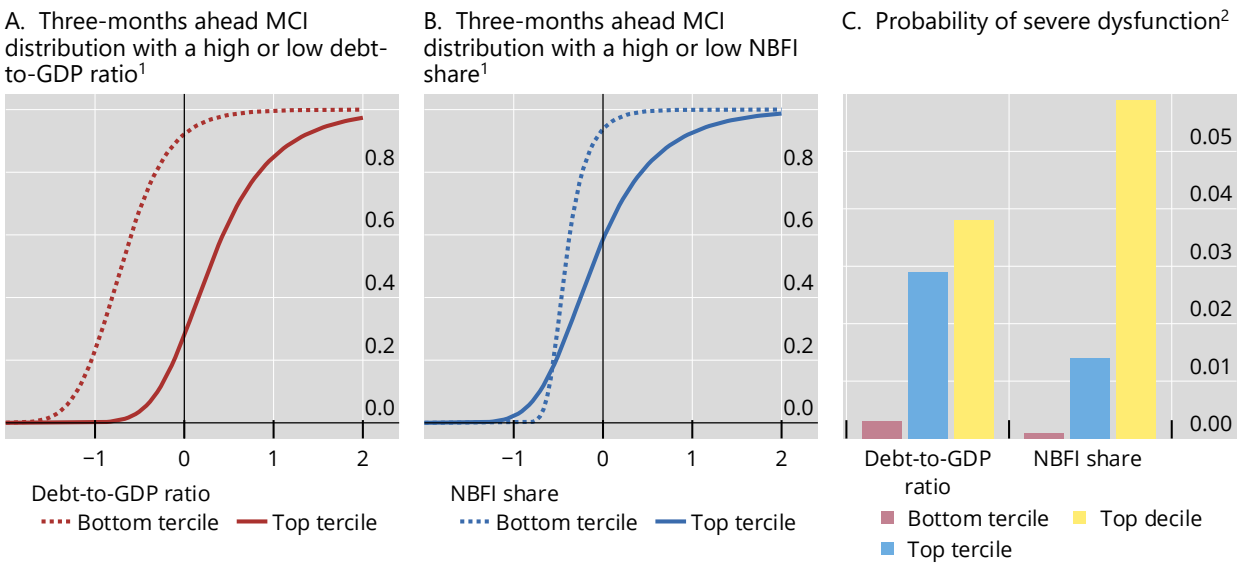
[9] A random forest averages many decision trees. A tree, in turn, is a sequence of simple if-then rules that partition the data into regions (leaves) where past observations share similar characteristics. For example, a tree might first split on whether the two-year government bond yield is high, then on the size of net purchases of the Federal Reserve. Days with both high yields and net purchases end up in the same leaf. This leaf also contains the realised Treasury MCI in these states as the outcome variable. The best prediction minimises the objective function – in our case, the quantile loss – across these leaves. The forest builds many such trees on different random samples of the data and subsets of predictors, creating multiple, slightly different partitions of the data space. By pooling the outcomes from the matched leaves across all trees, we obtain an empirical distribution conditional on the values of the explanatory variables.

[10] These insights are robust to delineating high/low public sector debt or the NBFI footprint differently, by for instance by looking at the top or bottom deciles.

Second, a high NBFI footprint increases the probability of experiencing both very high and very low market liquidity conditions (Graph 3.B). For example, the probability of the MCI in three months being below the 20th percentile of its distribution in the full sample is virtually zero when the NBFI share is low, whereas it is 7% when the share is high. At the same time, the probability of the MCI being above the 80th percentile is virtually zero when the NBFI share is low, whereas it is 12% when the share is high.[11] This evidence is in line with ideas that NBFIs enhance liquidity in good times but amplify shocks and adversely affect liquidity during periods of stress.

Government debt, the NBFI footprint and future market conditions

Graph 2



[1] MCI: US treasury market conditions indicator. [2] The probability of the MCI exceeding its average level during the GFC between October and December 2008.

Sources: authors' calculations.

The results also imply that with high government sector debt and a large NBFI footprint, the risk of market dysfunction increases. This is evident when for instance considering the likelihood of the MCI exceeding its levels during the GFC between October and December 2008. When the government debt relative to GDP is in its top tercile, the probability of experiencing a GFC-like stress event in three months is 3%, compared with just 0.02% when government debt is below its bottom tercile (Graph 3.C). Similarly, when the NBFI share in the government bond market is in its top tercile, the probability of a GFC-like event is 1.5%, much higher than the respective (close to zero) probability when the NBFI share is low.[12]

The relationship between government sector debt, the NBFI footprint and the risk of market dysfunction is non-linear. If we only look at very high levels of government sector debt or the NBFI footprint as measured by the variables being in their respective top deciles, the probability of a GFC-like stress event increases substantially (Graph 3.C). This is especially evident for the NBFI footprint. When the NBFI share in the government bond market is in its top decile, the probability of a GFC-like event is 6%, much higher than the 1.4% probability when the NBFI share is in its top tercile.

[11] The 20th and 80th percentiles of the distribution of the MCI in the full sample are –0.78 and 0.75.

[12] As a robustness check, we also compute Shapley values as in Aldasoro et al (2025). The Shapley value of a variable X reveals the contribution of X to a forecast across all possible subgroups of predictor variables. The three most important contributors to the 95th percentile of MCIs are the lagged values of the MCI itself, the interest swap spread and the debt-to-GDP ratio. The NBFI share is the eighth top predictor.

The current combination of high levels of government debt and large NBFI footprint in sovereign bond markets therefore poses substantial risks to market functioning. Their interplay forms part of a broader, new fiscal-financial stability nexus (BIS (2026)), which can amplify fiscal risk shocks and give rise to more frequent and sharper shifts in sovereign bond yields with significant macroeconomic implications. The policy implications of this fiscal-financial stability nexus are explored in BIS (2026). They include a call for jurisdictions with high government debt levels to implement, credible medium-term fiscal frameworks to ensure that fiscal consolidation takes place. On the regulatory side, the BIS (2026) argues that authorities should pursue "congruent regulation". This would imply regulatory frameworks that apply similar stringency to financial intermediaries posing similar risks to financial stability, regardless of their legal form or business model. Given NBFI vulnerabilities, it is especially important to consistently tighten safeguards against excessive leverage, liquidity mismatches and fragile funding structures that can amplify stress in government bond markets.

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