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Research Report

From climate change to cyber-attacks: Incipient financial-stability risks for the euro area

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From climate change to cyber-attacks: incipient financial-stability risks for the euro area

Zsolt Darvas, Marta Domínguez-Jiménez and Guntram Wolff

Executive summary

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- The European Central Bank's November 2019 *Financial Stability Review* highlighted the risks to growth in an environment of global uncertainty. It also discusses sovereign-debt concerns in case interest rates increase, and risks arising from household and corporate debt. It assesses the risks from a possible overvaluation of asset prices, and evaluates risks within the banking and non-banking system, and climate risks. On the whole, the ECB report is comprehensive and covers the main risks to euro-area financial stability. However, some issues deserve more attention.
- First, the assessment of risks in the housing market should be more nuanced. Current housing markets relative to those pre-crisis seem to be far less driven by mortgage credit, and the size of the construction sector has not increased. This is possibly good news for financial stability because a house price correction would transmit less into mortgage defaults and corrections to economic activity.
- Second, there should be greater emphasis on changes in market expectations of interest rates, which can have substantial effects on asset prices. This could be particularly relevant if interest rate changes are not driven by real-economy developments.
- Third, the financial system relies on a safe asset as a reference. We show that the supply of safe sovereign assets in the euro area has fallen dramatically, driven by deteriorating sovereign credit ratings and reduced supplies of bonds from the safest countries. More safe assets would support financial stability.
- Fourth, though climate risks to financial stability must be taken seriously, risk weights on green assets should not be reduced since they still contain normal financial stability risks. Instead, risk weights for brown assets should be increased.
- Fifth, the ECB does not consider cybersecurity and hybrid threats in its assessment. These threats are significant risks for financial institutions and at the more systemic level.
- Policies to address financial-stability concerns include macroprudential measures. In this respect, we discover discrepancies between EU countries: countries with the same levels of house-price overvaluation have adopted very different macroprudential measures. Some countries might thus have done too much, while others have done too little.
- When it comes to preventing the next recession or reducing its impact, we argue that EU policymakers need to be better prepared to use discretionary fiscal policy earlier and more forcefully, in particular because the ability of monetary authorities to react to the next cyclical downturn is very limited.

1 Introduction

In this paper, written at the request of the European Parliament, we critically analyse the European Central Bank's (ECB's) November 2019 *Financial Stability Review*. On the whole, we think that the report is very comprehensive and covers the key risks to financial stability in the euro area.

As always in such assessments, it is relatively easy to argue where risks could emerge but it is much more difficult to quantify the size of the risks and rank them in terms of importance. In addition, given the radical uncertainty resulting from the unpredictability of politics and socio-economic and natural developments at the current juncture, totally unexpected risks could emerge. Unfortunately, we cannot solve this problem in our short paper. Nevertheless, through a combination of literature review and data analysis, we complement the ECB's analysis in a number of ways.

Housing markets have historically often been one of the key factors in financial crises, as was the case, for example, in the great crisis of 2008-11. We therefore decided to take a deeper look into housing in section 3. In section 3, we also discuss in some detail changes to market expectations and their consequences. We zoom in on the importance of a safe asset for financial markets. Finally, we emphasise two risks that the ECB and the European Parliament should prioritise: climate risks and cyber risks to financial stability. We then provide an overview of one of the key policy instruments for achieving financial stability, so-called macroprudential policies. The last section concludes.

We highlight that we have not discussed the risks related to the incomplete set-up of monetary union and in particular banking union. Certainly, the current system will be better equipped to deal with shocks from failing or likely-to-fail banks than before banking union, but the set-up remains fragile. Questions of liquidity provisioning in resolution and differences of insolvency regimes are key concerns. We also have left aside the question of whether the currently high degree of monetary accommodation in itself is contributing to or reducing financial stability – a hotly debated topic.

2 A summary of the ECB's assessment of key risks

The November 2019 ECB *Financial Stability Review* (hereafter ECB, 2019c) is a comprehensive and useful report assessing various aspects of financial stability risks in the euro area. We summarise the key messages of the report, and augment the assessment of some issues with our own findings in the next sections.

2.1 Prominent downside risks to economic growth, global environment

The euro area is experiencing an economic slowdown and the ECB expects near-term growth to remain modest. Growth and inflation projections have been revised downward. Manufacturing has been particularly affected and this vulnerability appears to be spreading. Current ECB projections expect growth in real GDP to be 1.1 percent in 2019, 1.2 percent in 2020 and 1.4 percent in 2021. This slight and gradual recovery is expected to be aided by accommodative monetary policy, which could strengthen lending to corporates, and a mildly supportive fiscal stance. Global demand is also expected to improve, not least because of the January 2020 trade agreement between China and the United States, which could help exports.

That said, global geopolitical risks remain the most prominent downside risks. The January 2020 China-US trade deal might just be a temporary pause in escalation of the trade conflict,

with the deal leaving most of the recently introduced tariff measures in place. According to the October 2019 International Monetary Fund (IMF) *World Economic Outlook*, US-China trade tension will cumulatively reduce the level of global GDP by 0.8 percent by 2020, which was a major reason for the downgrade of the global economic outlook. The IMF argued that subdued growth is a consequence of rising trade barriers, elevated uncertainty surrounding trade and geopolitics, idiosyncratic factors causing macroeconomic strain in several emerging market economies, and structural factors, including low productivity growth and aging demographics in advanced economies.

In Europe, a no-deal Brexit has been avoided. Under the EU-UK Withdrawal Agreement, the transition period during which the United Kingdom will remain a member of the EU's customs union and single market will last until the end of 2020. However, there are major uncertainties about whether and what kind of trade and financial services agreement will be concluded between the EU and the UK for the period following the transition period. While European and British institutions have made comprehensive preparations for an eventual abrupt end to the passporting rights enjoyed by UK-based financial firms, an eventual failure of the EU and UK to agree on arrangements beyond the transition period would likely affect growth negatively on both sides of the channel. The growth effects would be concentrated in specific EU countries with close ties to Britain. However, the direct financial risks may be more limited.

The evolution of the US economy will be a key determinant of European economic and financial developments. US growth has remained robust, spurred on by record-low unemployment, ample consumption and an appealing fiscal and monetary environment. However, the current economic expansion is by far the longest in the US's post-war economic history and political developments (such as the election of a Democrat in the 2020 US presidential election) might change economic sentiment and bring the current US economic cycle to an end.

Similarly, while the Chinese slowdown has so far been gradual, risks to growth are negatively skewed and could result in a sharper decline, especially given the weakness caused by the trade conflict, the lack of clarity over available stimulus policies and the very high level of private debt.

A global economic slowdown could threaten financial stability in the euro area. Slower euro-area economic growth resulting from a global slowdown would reduce household incomes and corporate profits, and could threaten the ability to meet debt obligations, especially given high non-financial sector debt in some Member States. More vulnerable sovereigns could also come under strain. Global stock prices might also contract, spilling-over to the euro area, leading to a negative wealth effect.

2.2 Sovereign debt concerns

Sovereign debt positions appear largely sustainable. The euro area's fiscal position is expected as expansionary in 2019 and subsequent years. While debt-to-GDP remains above 85 percent, well above the Maastricht 60 percent benchmark, it is expected to fall given the generally large positive differential between the economic growth rate and the interest rate (see Darvas *et al*, 2019, for a quantification and discussion of the growth-interest rate differential for all EU countries). Countries with sufficient fiscal space are counselled to make use of it, while for those with less-sustainable debt positions, prudence is the order of the day, according to the ECB report.

Sovereign debt sustainability is aided by benign financing conditions. Many euro-area countries have used recent low interest rates (across the yield curve) to extend the average maturities of their debts, reducing refinancing needs. Most hold ample liquidity buffers.

That said, a more pronounced downturn could pose risks for countries with medium to high levels of debt. Debt sustainability could suffer especially if risk premiums rise as a result. Political and policy uncertainty could also expose sovereign debt to greater vulnerability, especially for Member States in need of a significant share of debt refinancing. Overall global pessimism could undermine the current favourable financing conditions.

2.3 Household resilience and a growing housing market

Household real disposable incomes are growing, given the favourable labour market outlook. Bank lending to households, especially mortgage lending, remains solid in some parts of the euro area, while in other parts (typically in countries with higher public debts, weaker banks, weaker growth outlooks) credit is hardly growing. Throughout the euro area, a slowdown appears to be on the horizon with indicators beginning to paint a more pessimistic picture.

Household debt remains broadly stable throughout the euro area, standing at 95 percent of disposable income and 58 percent of GDP (though this hides substantial variation, from 40 percent of disposable income in Latvia and Lithuania, to 200 percent in the Netherlands). That said, the Netherlands has seen recent deleveraging, as have Spain, Portugal and Ireland. France, by contrast, appears to be re-leveraging. Household repayment capacity remains robust, especially given the interest rate environment. But a significant downturn could put this into question.

There are signs of over-valuation in the residential housing markets according to the ECB report (on average above 7 percent, although divergence is widespread). In contrast, commercial real estate appears to be in a downturn, although the market continues to grow in countries that were most heavily affected by the crisis, including Greece and Spain.

Overall, according to the ECB's assessment, property markets pose a growing risk to financial stability. The low-rate environment and strong labour market outlook could increase pressure on prices in the medium-term. At the same time, the negative growth outlook and risk of deteriorating financing conditions could place a strain on the sustainability of household and corporate debt. Foreign investors are more significantly affected by the evolution of global financial markets.

2.4 Corporate debt

Corporate profits have been negatively affected by the growth outlook, with declining business sentiment and increasingly competitive markets. These profits and the subsequent fall in retained earnings could affect future investment and medium-term profits. Retained earnings remain the main overall source of finance expansion.

The level of corporate debt is high but stable (and has been for several quarters), although divergences between countries remain significant (and some surpass the 75 percent of GDP threshold implied in the Macroeconomic Imbalance Procedure). That said, the performance of credit default swaps (CDS) for corporate bonds would indicate the market believes credit risk is small.

Low interest rates and liquidity buffers recently accumulated by companies further increase the sustainability of corporate debt. Furthermore, the increase in market financing reduces dependence on the banking sector and the risks to corporations of banking sector vulnerabilities.

While overall risks remain under control, specific companies should be carefully monitored according to the ECB. Companies with high-yield corporate bonds seem to have increased both their gross and net leverage, while investment grade companies have slightly deleveraged. Furthermore, the increase of risk premiums in case of downturn is troubling. There has been increased issuance of BBB-rated corporate bonds in the past five years, as well as of corporate bonds with an already high leverage ratio. The possible downgrade of these in case of aggregate economic weakness would cause a large increase in risk premiums and threaten debt sustainability. The average maturity of corporate bonds is also increasing, as shown in Chart 2.10 of ECB (2019c).

We add that the IMF's October 2019 *Global Financial Stability Report* (IMF 2019b) concluded that worldwide, including in Europe, the profits of non-financial companies would be insufficient to service their increased debts if a downturn takes place that is only half as severe as the 2008-2009 financial crisis.

We also highlight the study by Couaillier *et al* (2020), which highlighted the deteriorated interest coverage ratio in France, which together with the high degree of leverage in the

corporate sector, result in vulnerabilities. By the end of 2018, vulnerable French companies had an aggregate gross debt of €187 billion, which could rise by 60 percent if their costs of financing increase by 100 basis points.

2.5 Risky assets and low rates

The prices of riskier assets remain dependant on low rates. The prices of equities and corporate bonds have risen steadily, bar fluctuations arising from political uncertainty (the trade war, the possibility of a no-deal Brexit). This performance is well above growth in expected earnings or business sentiment. Using a dividend discount model, ECB (2019c) concludes that half of the increase in aggregate equity prices since the end of the euro-area sovereign debt crisis can be attributed to lower benchmark yields (Chart A on page 44).

The search for higher yield has resulted in increased demand for longer-maturity and lower credit-quality assets. While some risk-taking is an objective of loose monetary policy, continued low yields can result in misaligned valuations and increase the possibility of a stark price correction. US equity prices seem overvalued using both the unadjusted and the cyclically adjusted price/earnings (P/E) ratio, while the euro-area P/E ratio is close to the upper end of the historical distribution when using raw data, but well in the middle of the distribution when using cyclically adjusted data, suggesting fair valuation (Chart 2.9 on page 43 of ECB, 2019c).

Low funding costs due to a very low and very flat term structure further incentivise companies to leverage themselves. This may amplify the degree of re-pricing in a downturn.

2.6 The banking sector

ECB (2019c) highlights cyclical and structural factors that contribute to weak profitability, and evaluates the resilience of the banking system in adverse scenarios.

Bank profitability remains low in a historical comparison, driven by slowly growing net interest income, while net fee and commission income fell. Euro-area banks have high cost-to-assets and cost-to-income ratios. Some banks have sought to reduce branches and personnel and invest in digitalisation, yet a sub-sample of significant institutions (SIs) showed IT expenses were the main drivers of operating costs increases in 2014-18. Poor profitability performance remains widespread, yet banks in EU countries where the effects of the financial crisis were more significant remain weaker.

The evaluation of resilience uses a baseline and an adverse scenario. The adverse scenario assumes a significant downturn in 2021 (GDP fall by 1.7 percent, unemployment rate rises to 10 percent), a 16 percent residential real estate price fall, and an increase in 130 basis points of the weighted average euro-area 10-year bond yield.

The baseline scenario sees a small fall in bank profitability, small changes in lending to non-financial corporates, while bank solvency improves with the aggregate Common Equity Tier 1 (CET1) capital ratio rising by almost 1 percentage point to 15.3 percent in 2021.

The adverse scenario implies significant losses surpassing 15 percent of bank equity, big falls in lending to non-financial corporates, and a fall in CET1 by 3.1 percentage points to 11.3 percent.

The ECB's overall assessment is that the banking system remains largely resilient to major risks. The question is of course the likelihood of a scenario which is more adverse than the adverse scenario considered by the ECB.

2.7 Non-bank financial sector

The non-bank financial sector includes insurance corporations, pension funds, investment funds, money market funds and other financial institutions. The combined balance sheet of these non-bank financial institutions grew in the first half of 2019, because of inflows and valuation gains, and now represents 56 percent of total financial sector assets.

While valuation gains and inflows imply good news for the sector, their profitability is challenged by low yields. Nearly three-quarters (72 percent) of insurers' and pension funds'

bond holdings yield less than 1 percent (Chart 4.2 in ECB, 2019c). The low yield environment stimulates demand for riskier, longer-duration and less-liquid assets from non-bank financial entities, which can pro-cyclically affect prices and increase vulnerability, while maturity mismatch increases between liabilities and assets, leading to increased vulnerability to any re-pricing. Emerging market exposure is also increasing, though this remains small and also entails foreign-exchange risk.

Despite these increasing vulnerabilities and risks, the ECB foresees a stable outlook for the sector.

2.8 Climate change

The May 2019 ECB *Financial Stability Review* included a comprehensive assessment of the channels through which climate change can affect financial stability. It illustrates with various data the exposure of euro-area financial institutions to risks from climate change (see pages 120-133 of ECB 2019b). Notwithstanding the limited data availability, the analysis shows that climate change-related risks have the potential to become systemic for the euro area, in particular if markets do not price these risks correctly. The ECB report further highlighted the need for a forward-looking framework to improve the estimation of risks, and for better databases.

The November 2019 ECB *Financial Stability Review* included a box on climate-related disclosures by banks and insurers and a brief analysis of their market impact (see pages 64-66 of ECB 2019c). This box tackled the difficulty in gauging climate risks inherent in financial assets, which in turn complicates the assessment of how these risks could affect financial institutions. The Greenhouse Gas Protocol includes three 'scopes' of emissions for voluntary disclosure (direct, indirect from energy use and other indirect). However, financial firms disclose less than 30 percent of climate risks embedded in their financial assets (Chart A on page 65 of ECB 2019c), even though emissions related to financial assets of financial firms are very significant. The ECB argues that inconsistent reporting might explain why disclosures appear to have no effect on market valuations for banks, in contrast to pension funds, for which the ECB finds a statistically significant correlation (Chart B on page 66 of ECB 2019c).

3 Financial stability issues requiring special attention

We broadly agree with the key messages of the ECB's comprehensive analysis. In this section, we augment the ECB report by focusing on certain issues we believe require special attention.

3.1 The housing market

We complement the ECB's analysis by comparing pre-crisis developments, which were unsustainable in some countries, with the recent episode of house price increases. Housing loan developments are available from the ECB only starting in January 2003, while the housing boom started earlier in some euro-area countries. Nevertheless, two important conclusions can be drawn from Figure 1.

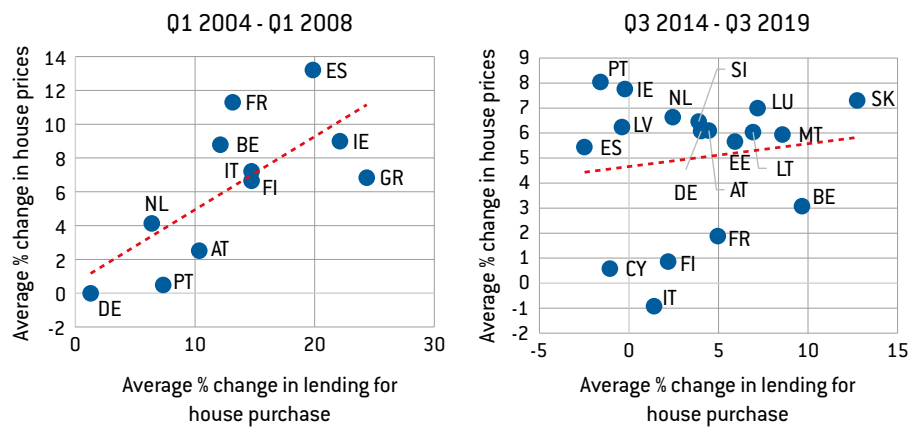
First, before 2008 there was a positive correlation between the speed of credit growth and house-price increases, suggesting that credit growth might have fuelled house-price growth. But this has not been the case in the past five years, since the correlation is rather weak. Certainly, there are some exceptions, such as in France in the pre-crisis period, where house prices increased very rapidly but credit growth was limited. Slovakia is an exception in the past five years since fast house-price increases there have coincided with rapid credit growth. But the big picture remains: in most euro-area countries credit growth does not appear to be

the most important driver of house-price increases in the past five years. This finding suggests reduced financial stability concerns compared to the pre-crisis period, because an eventual house-price correction will affect fewer borrowers and therefore impact less on bank profitability.

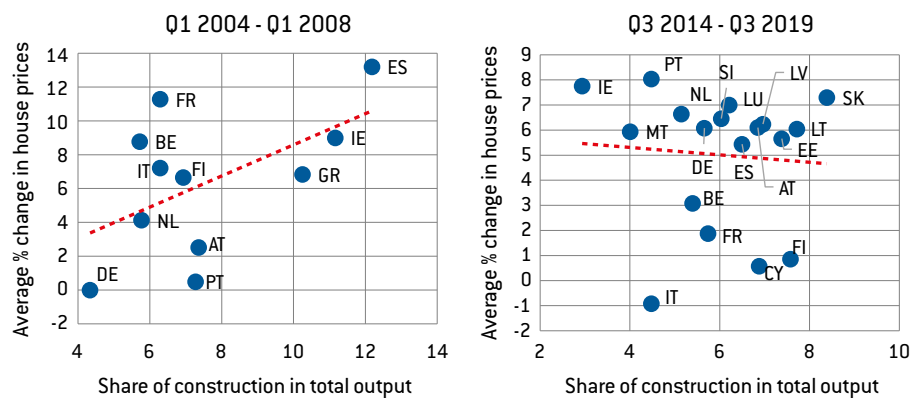
Second, in the pre-crisis period the share of construction in output increased to over 10 percent in Ireland, Spain and Greece. Employment in the construction sector, and public-sector revenues related to construction, were therefore significant. The global and euro-area financial crisis led to massive contraction in construction, with increased unemployment and loss of fiscal revenues. By contrast, in France, the share of construction in output remained almost unchanged in the pre-crisis period, despite the very fast pace of credit growth, and thereby the global and euro-area crises did not cause major disruption. In the past five years, construction has not expanded much, suggesting again that an eventual housing bust would be less disruptive than it was in Greece, Ireland and Spain after 2008.

Figure 1: House price increases, housing loans and construction share of output, 2004Q1-2008Q1 and 2014Q3-2019Q3

(A) House price increase and housing loans



(B) House price increase and construction share in output

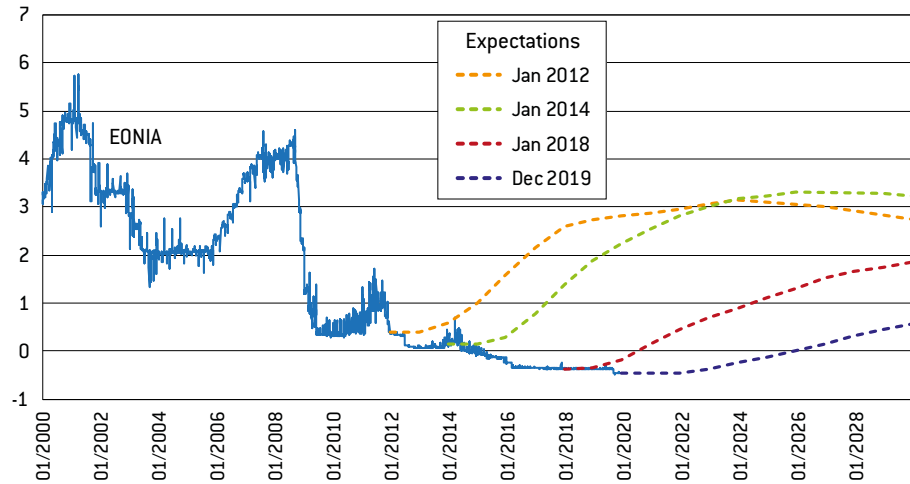


Source: Bruegel using data from OECD for 2003-2008 house prices; Eurostat for 2014-2019 house prices and gross valued added for the total economy and for construction; ECB for house loans. Note: the share of construction in output refers to the maximum value reached during the sample period. Average % change in house prices and lending refers to average annual change.

3.2 The unreliability of market expectations

While there has been a secular decline in safe real interest rates since the early 1980s (Del Negro *et al*, 2019), markets have been surprised by the continued fall in euro-area interest rates, as indicated by Figure 2.

Figure 2: Euro interest rates and expectations, %



Source: Bruegel using data from Bloomberg.

Given that market expectations have been wrong many times in recent years, current expectations might turn out to be inaccurate too. The euro-area AAA-rated yield curve is below zero up to 14 years of maturity¹. We regard an unexpected increase in the yield curve as more likely than an unexpected decline.

Since the current low rates have raised valuations of equities, a key question is how much equity valuations will change if and when interest rates rise. The direct effect of an interest rate rise would be a fall in equity prices. However, the crucial factor would be the reason for the interest rate increase.

Developments in the United States serve as a useful example. The Federal Reserve stopped net asset purchases in October 2014 and raised interest rates from December 2015. The effective federal funds rate increased from 0.1 percent in November 2015 to 2.4 percent in December 2018, while since October 2017, the Fed has even started to shrink its balance sheet, withdrawing liquidity. Despite these significant monetary tightening measures, US stock markets have not crashed and volatility has hardly changed. Most likely, robust US economic growth (boosted by a fiscal stimulus and weakened by the trade disputes and weaker global growth) increased expected corporate profits, which counter-weighted the impact of interest rate increases and Fed balance sheet contraction.

In Europe, too, the expected impact on equity prices of interest rate rises will likely depend on economic developments: if the economic outlook improves, higher interest might not lead to large equity price falls. But if interest rate increases are not accompanied by an improved economic outlook, equity prices could fall significantly. Equity prices could also fall significantly if the currently expected mild slowdown turns out to be a more protracted slowdown, or even a recession, even if interest rates do not change. An eventual major US stock price fall would likely cause European equities to fall too.

A crucial issue is the possibly heterogeneous recovery from the current economic slowdown in the euro area. There is the risk of differentiated growth – for example, western and

¹ See https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/euro_area_yield_curves/html/index.en.html.

northern euro-area members could grow faster than southern European countries. Since western and northern euro-area members account for a large share of the euro area while the ECB considers the euro-area average, such an asymmetric development would lead to area-wide interest rate increases, leading to interest rates that are too high for southern European countries. Such a situation would depress equity prices in the south and make economic recovery in southern countries even more difficult.

An asymmetric recovery could also have implications for public debt sustainability. If countries with higher public debt levels do not grow as much as countries lower debt levels, the currently favourable growth/interest rate differential might turn less favourable for countries with higher public debt levels. Coupled with domestic political risk, that might lead to an increase in risk premiums in some countries with weaker fiscal positions, which could further undermine fiscal sustainability, economic growth and financial stability, given the large government bond holdings of the banking system and the weaker economic performance.

3.3 The shortage of safe assets

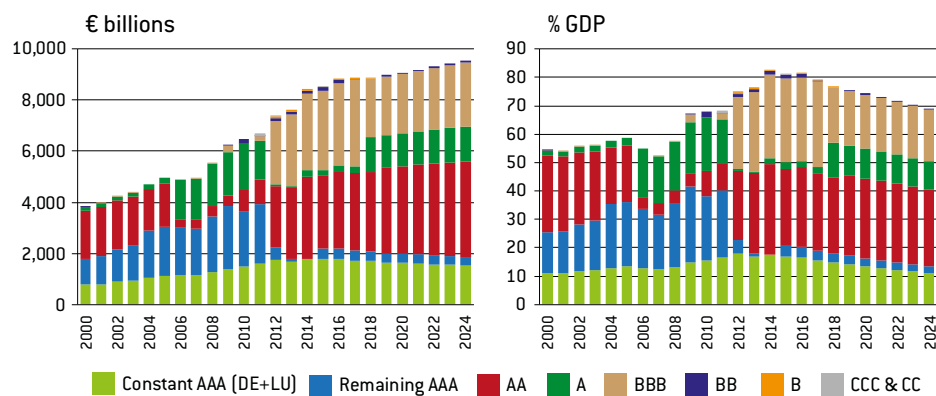
A sufficient supply of safe assets is essential for the smooth functioning of the financial system. The pricing of financial instruments and their valuations depend on returns on safe assets, while safe assets are also used as collateral in various transactions, including repurchase agreements. A low supply of safe assets is an important contributing factor to low interest rates. We miss a discussion in the ECB *Financial Stability Review* of the possible shortage of safe assets in the euro area.

Safe assets can be issued by governments and EU institutions.

As regards general government debt securities, currently only three countries (Germany, Luxembourg and the Netherlands) have AAA credit ratings for their long-term debt. Figure 3 shows that their outstanding stock is expected to decline in euro terms (because of budget surpluses) and even more as a share of GDP (because of the increase in nominal GDP).

The AA-rated countries are Austria, Belgium, Estonia, Finland and France, while the A-rated countries are Ireland, Latvia, Lithuania, Malta, Slovakia, Slovenia and Spain. Italy's current rating is BBB, along with Cyprus and Portugal. Greece is at B.

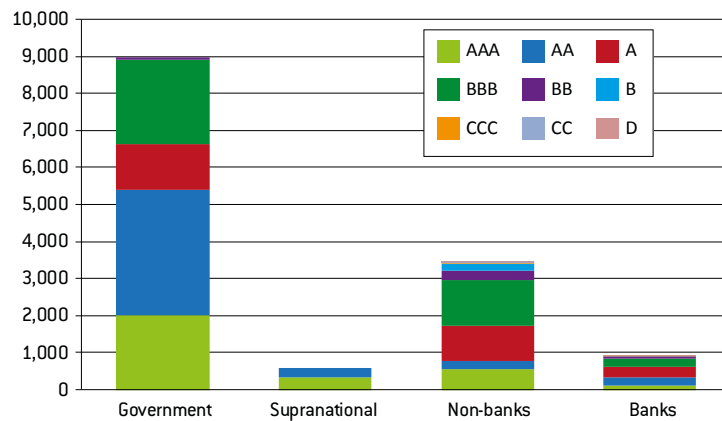
Figure 3: Debt security liabilities of euro-area general governments by credit rating



Source: Bruegel using data from Eurostat for government debt securities and IMF WEO for gross public debt and GDP, S&P ratings. Note: Eurostat data on government debt securities is available up to 2018. For our projections for 2019-2024, we assumed that the 2018 ratio of government debt securities to gross public debt remains the same and we use the IMF WEO projection for public debt in 2019-2024.

Meanwhile, the supply of safe assets from EU institutions such as the European Investment Bank (EIB) is relatively modest and has also been shrinking (Figure 4).

Figure 4: Outstanding stock of euro-denominated debt securities by credit rating, € billions



Source: Bruegel based on Bloomberg data for the outstanding stocks, and their S&P rating, of euro-denominated bank and non-bank debt securities (irrespective whether the issuer is domiciled in the euro area or not); Bloomberg data for the stock of supranational entity's bonds (which include the EU, EIB, European Stability Mechanism, and European Financial Stability Facility). For government debt securities we use our projection for 2019 as explained in the note to Figure 3.

To address concern about the low supply of safe assets, we would encourage European policymakers to pursue three avenues. First, the top-rated euro-area countries, in particular Germany, should not further reduce their absolute levels of debt. In a negative interest-rate environment, there surely must be projects with positive returns which could be funded by borrowing. Second, Figure 3 also shows that the supply of safe assets would be significantly increased if the ratings of less-well-rated countries improved. To a significant extent, this is a question of boosting long-term productivity growth. We consider therefore reforms boosting such growth to be fundamental also for the smooth functioning of the financial system. Third, it would be desirable for the euro area in particular to issue a common bond. If the EIB and other institutions could increase their supplies of bonds to fund economically and publicly sensible investments, for example green projects, financial stability would improve. The key argument is that credible fiscal actors should increase the supply of bonds to contribute to rising rates. Moreover, if less-well-rated bonds became safe assets, this would also increase the supply of safe bonds, helping to increase the interest rates on safe assets on which much financial market pricing is based.

3.4 Climate change

Financial risks can also result from climate change and its expected and unexpected consequences. The ECB's report calls for mandatory and harmonised firm-level reporting. This would allow better pricing and monitoring of financial institutions' exposures to climate-related risks, even if assessing firm-level risks to climate change is a complicated exercise.

Bolton *et al* (2020) regard price and financial stability as the primary mandate of a central bank, but fulfilling the mandate is challenged by climate-related risks. Therefore, they call for a more pro-active approach to coordinating central banks' responses to climate-related risks. Coordination with other public authorities and with the private sector also seems necessary for sufficient preparation in the face of climate risks.

We recommend that Members of the European Parliament push the ECB and other financial supervisory authorities to pay significantly more attention than currently to the impact of climate risks on financial stability. In the near term, we see a concrete task for Members of the European Parliament: fostering legislation on mandatory and harmonised firm-level reporting of emissions (and of climate-change related risks more broadly). Only comprehensive reporting by firms will enable the proper monitoring of financial institutions' exposures to climate-related risks. Proper reporting would allow better pricing of non-financial firms and

banks. We would also like to stress that in terms of regulation, increasing capital requirements for ‘brown’ assets is in our view the appropriate way to capture the additional risk resulting from climate change. Decreasing the capital requirements on ‘green’ assets could undermine the credibility of green finance, since other risks remain unchanged.

3.5 Cybercrime

ECB (2019a) presents a banking risk assessment, which includes cybercrime and IT disruption as one of three main drivers of risk in the banking system. Such risks could potentially disrupt the functioning of financial markets. However, the November 2019 ECB *Financial Stability Review* (ECB 2019c) referred to the issue only once – and briefly. Demertzis and Wolff (2019) documented the rise in cyber-attacks throughout the EU, highlighting the fact that while some institutions have implemented significant safeguards (the efficiency of which is as of yet unclear), very little has been done at Eurosystem level to ensure all financial institutions are adequately protected. Demertzis and Wolff (2019) further called for the integration of the EU’s broader security architecture, for example with centralised screening of FDI flows.

In our assessment, the ECB and European policymakers more broadly need to pay significantly more attention to the risks arising from cyberattacks for the stability of the EU’s financial system. We recommend that MEPs emphasise this point in their hearing.

3.6 Digital currencies

The ECB report does not mention digital currencies. Digital cryptocurrencies have seen significant volatility in recent years. In our assessment, the market for digital currencies is still relatively small, so financial stability concerns are limited. Nevertheless, there have been warnings of the risks to financial stability that could arise from the proliferation of digital currencies in the future, including from Mark Carney (as reported by Reuters, 2019), Randal K. Quarles (2019) and the BIS (2019). Central bank digital currencies could result in cyclical runs on banks (given popular access to central bank reserves) and reduced financial intermediation (Claeys and Demertzis, 2019). We would therefore recommend that increased attention should be paid to various forms of digital currency from the point of view of financial stability.

4 Macroprudential measures to address risks

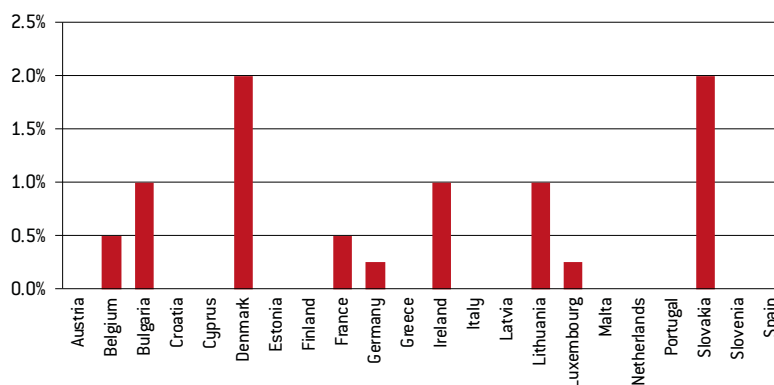
Macroprudential measures adopted in euro-area countries can be roughly divided into two primary groups: capital-based and borrower-based measures. Capital-based measures introduce minimum regulatory capital requirements, while borrower-based measures focus on lending conditions and impose a maximum threshold on credit. These measures have recently been employed to target potentially over-heated residential real-estate markets.

The primary capital requirement macroprudential measure employed in the euro area is the capital conservation buffer (CCoB), a capital buffer on banks’ total exposure that works as an additional safeguard to the 4.5 percent requirement of Common Equity Tier 1 capital².

Additionally, counter-cyclical capital buffers (CCyB) have been introduced to counter the pro-cyclicality inherent to the financial system. This buffer is activated when cyclical systemic risk is increasing in the banking sector. The subsequent build-up of capital during booms should support the credit supply in the cycle downswing. Figure 5 shows which euro-area countries have introduced counter-cyclical capital buffers.

2 https://www.esrb.europa.eu/national_policy/capital/html/index.en.html.

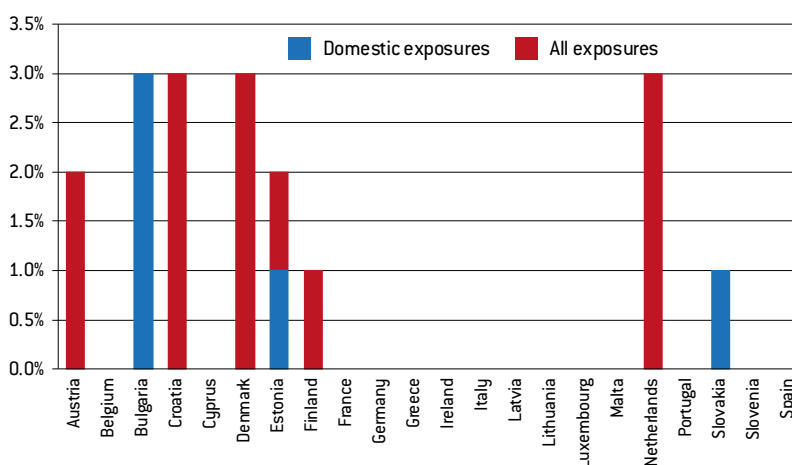
Figure 5: Countercyclical capital buffer requirements, % of bank total exposure



Source: Bruegel using data from ESRB. Note: Decision rates up to end of 2020 (as of December 2019).

A third capital requirement in place in some euro-area countries is the systemic risk buffer (SyRB), which protects the financial system against longer term and non-cyclical risks. It may be applied at different levels to all institutions or a group of institutions, on all exposures or a collection of exposures. Current rates are shown in Figure 6.

Figure 6: Systemic risk buffer requirements, % of total bank exposure

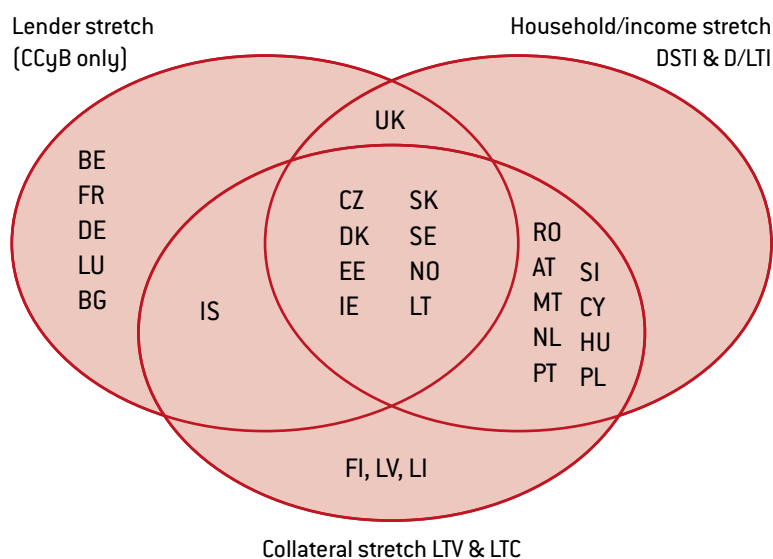


Source: Bruegel using data from ESRB.

Finally, global systemically important institutions (G-SII) have a compulsory additional surcharge or buffer that raises the amount of Common Equity Tier 1 capital they have to hold. Similarly, other systemically important institutions (O-SIIs), designated by member states, must also meet supplementary requirements to their Tier 1 Capital.

Additionally, risk assessments of residential real estate markets sometimes lead to the introduction of measures that focus on three aspects, as argued by ESRB (2019): the collateral stretch (concentrated on price misalignments and house-price evolution), the lending stretch (assesses the evolution of lending) and the household stretch (concentrates on household balance sheets and their potential vulnerabilities). Two types of borrower-based measures have been employed to prevent residential real estate from over-heating. First, loan-to-value (LTV) and loan-to-collateral (LTC) measures limit credit, based on collateral to address the collateral stretch. Second, debt-service-to-income (DSTI) and debt/loan-to-income (D/LTI) measures limit credit based on household income to address the household/income stretch. Additionally, counter-cyclical capital buffers address the lender stretch.

Figure 7: Use of residential real estate instruments



Source: Bruegel using data from ESRB, updating and extending from slide 11 of Dierick (2018). Note: CCyB: counter-cyclical capital buffers, DSTI: debt-service-to-income, D/LTI: debt/loan-to-income, LTV: loan-to-value, LTC: loan-to-collateral.

Given this state of play, it is worth comparing the deployment of these macroprudential measures with indicators of residential real estate vulnerability. Measuring the latter is difficult. We use two indicators: house-price increases between 2014 and 2019, and the over/under-valuation as estimated by the ECB (see Chart 1.14 of ECB, 2019c). The left panel of Figure 8 shows that Slovakia adopted the highest counter-cyclical capital buffer (CCyB). Some other countries had similar, or even faster, house-price increases, but adopted lower CCyB, or have not adopted buffers at all.

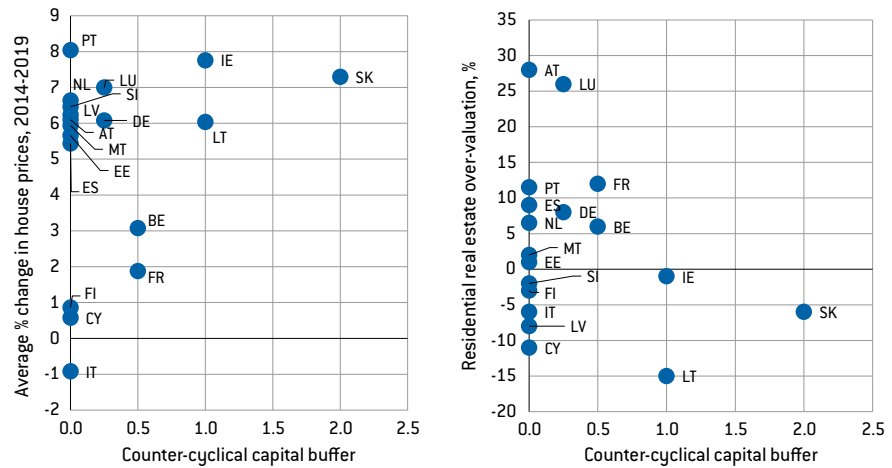
A possible explanation for these differing responses in different countries could be that the house-price increase does not reflect well whether the housing market is overheated. For example, fast growth from a low level might not reflect a problem. We therefore also use the ECB's estimate of house-price overvaluation in the right panel of Figure 8 on the next page. The message from this panel is even more controversial: while the ECB estimates that Austrian and Luxembourgish house prices are overvalued by about 25-30 percent, Austria has not introduced any CCyB, while the Luxembourgish value is very low at 0.25 percent. In contrast, Slovakian housing prices are seen undervalued by the ECB, yet Slovakia implemented the largest CCyB.

A similar picture is evident when one considers borrower-based measures (Figure 9). We calculated a new index, which has a value of zero if no measures have been introduced, one if either measures addressing the collateral stretch (LTC and LTV) or the household stretch (DSTI and D/LTI) have been introduced, and two if measures addressing both of these have been introduced. Certainly, the strictness of measures could vary from country to country, even if they have the same score, which is a limitation of our index.

Luxembourg, Germany and Spain have not introduced any borrower-based measures, even though these countries experienced relatively fast house-price increases (left panel of Figure 9), and overvaluation is particularly high in Luxembourg, but also sizable in Germany and Spain (right panel of Figure 9). Furthermore, Spain has adopted no CCyB, while Luxembourg implemented one of only 0.25 percent in January 2020 and Germany is due to implement only 0.25 percent as of July 2020. France and Belgium have not adopted borrower-based measures even though their residential real estate markets are also overvalued.

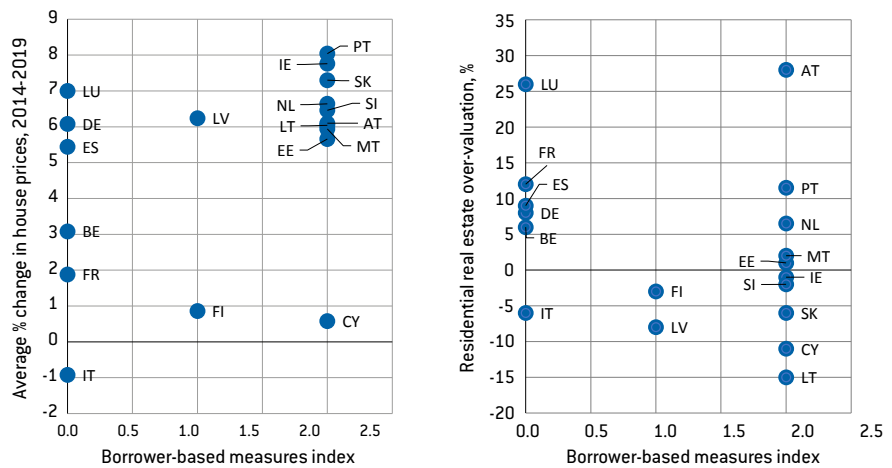
The inconsistencies between residential real estate vulnerability indicators and adopted macroprudential measures call for a comparative assessment of cross-country vulnerabilities and adopted macroprudential measures.

Figure 8: Counter-cyclical capital buffers against house price increase (left panel) and residential real estate overvaluation (right panel)



Source: Bruegel using data from Eurostat for house prices (data is for 2014Q3 to 2019Q3), ESRB for the counter-cyclical capital buffer, and the ECB Financial Stability Review November 2019 (Chart 1.14) for residential real estate (RRE) overvaluation. Notes: Counter-cyclical capital buffer (CCyB) values correspond to decided rates (as of December 2019), while implementation can start later.

Figure 9: Borrower-based macro-prudential measures against house price increase (left panel) and residential real estate overvaluation (right panel)



Source: Bruegel using data from Eurostat for house prices (data is for 2014Q3 to 2019Q3), ESRB data to calculate the borrower-based measures index, and residential real estate (RRE) overvaluation is from Chart 1.14 of ECB (2019c). Note: House price data is for 2014Q3 to 2019Q3. The Borrower-Based Measure index exhibits a value of zero if no measures have been introduced, one if either measures addressing the collateral stretch (LTC & LTV) or the household stretch (DSTI & D/LTI) have been introduced, and two if measures addressing both of these have been introduced.

5 Concluding remarks

EU policymakers need to be informed about risks to financial stability and the ECB report (ECB, 2019c) provides a great overview of key concerns.

We have highlighted a few areas that deserve special attention from policymakers based on our analysis: housing markets, the low interest-rate environment, climate-related risks and cyber risks. Concrete measures can be put in place to address these concerns.

We would also like to emphasise two major macroeconomic topics that interact with financial stability. The first is possible risks related to sovereign debt. We concur with the view

that risks to sovereign debt are rather limited because rates are very low and therefore the budgetary burden of debt is very limited. We would also argue that rate increases in normal circumstances are unproblematic. In fact, governments have lengthened the maturity of debt, insuring them against the effects of rate raises. More importantly, rate raises are usually connected with higher real growth, which should also boost tax revenues to service the debt. In the euro area, however, the main concern is that rates could increase because of an average increase in real growth, but some countries will not share in the growth increase. We therefore caution against fiscal expansion in countries with high debt burdens and low growth potential.

Second, we would like to stress the importance of more proactive fiscal policies to guard against the next downturn. Any major macroeconomic downturn will increase financial stability risks. Macroeconomic management is therefore not only beneficial for growth and jobs but also for financial stability. Policymakers need to understand clearly that there will be little scope to use monetary policy tools in the next recession, and should prepare accordingly. In fact, interest rates cannot be cut much further and other monetary-policy instruments are more limited in their effectiveness. It is therefore the responsibility of fiscal policymakers to prepare for the next recession with significantly more proactive fiscal policies than they have traditionally pursued.

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