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COMMISSION STAFF WORKING DOCUMENT

European Financial Stability and Integration Review (EFSIR)

This document has been prepared by the European Commission's Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA).

This document is a European Commission staff working document for information purposes. It does not represent an official position of the Commission on this issue, nor does it anticipate such a position. It is informed by the international discussion on financial integration and stability, both among relevant bodies and in the academic literature. It presents these topics in a non-technical format that remains accessible to a non-specialist audience.

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The production of the document was coordinated by the editors Geert Van Campenhout and Staffan Linden. Individual contributors were (in alphabetical order) Chris Bosma, Gundars Ostrovskis, Michael Thiel and Geert Van Campenhout.

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Comments are welcome and can be sent to:

Directorate-General for Financial Stability, Financial Services and Capital Markets Union
(DG FISMA)

Unit E1: EU/euro-area financial system

Unit E4: Economic analysis and evaluation

European Commission

1049 Brussels

Belgium

Or by email to peter.grasmann@ec.europa.eu or nathalie.stefanowicz@ec.europa.eu.

LIST OF ABBREVIATIONS

Countries (in alphabetical order)

AT	Austria	IT	Italy
BE	Belgium	JP	Japan
BG	Bulgaria	LT	Lithuania
CN	China	LU	Luxembourg
CY	Cyprus	LV	Latvia
CZ	Czechia	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	PL	Poland
EE	Estonia	PT	Portugal
EL	Greece	RO	Romania
ES	Spain	SE	Sweden
FI	Finland	SG	Singapore
FR	France	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	UK	United Kingdom
IE	Ireland	US	United States

Others

AML	Anti-money laundering	GDP	Gross domestic product
BIS	Bank for International Settlements	HICP	Harmonised index of consumer prices
CBCC	Central-bank cryptocurrency	ICT	Information and communication technology
CEE	Central and eastern Europe	IT	Information technology
CFT	Counter-terrorism financing	KYC	Know-your-customer
CLOs	Collateralised loan obligations	MFIs	Monetary financial institutions
CMU	Capital markets union	MiFID II	Markets in Financial Instruments Directive
DLT	Distributed ledger technology	MREL	Minimum requirement for own funds and eligible liabilities
EBA	European Banking Authority	NBER	The National Bureau of Economic Research
ECB	European Central Bank	NFC	Non-financial corporation
EIOPA	European Insurance and Occupational Pensions Authority	NPLs	Non-performing loans
EMIs	Electronic money institutions	PSD	Payment Service Directive
ESMA	European Securities and Markets Authority	TLTROs	Targeted longer-term refinancing operations

EXECUTIVE SUMMARY

The annual European Financial Stability and Integration Review examines recent economic and financial developments, and their impact on financial stability and integration in the EU.

In addition to a description of general macroeconomic and financial-sector developments, this year's issue combines different perspectives on the structural change that is taking place in the financial system, focusing on the banking sector in particular. Although the banking sector has continued to repair its balance sheet over the last decade, profitability has remained low, and many banks are seeking to change their business model. The cyclical factors that determined developments in 2019 made this change more challenging. Pressure on banks has intensified due to weakening economic prospects and the expectation that low interest rates will continue for longer.

Technological progress is increasingly driving structural change in the banking sector. More technology firms are becoming active in the traditional banking business. The market entry of FinTech firms into payment services – already a well established trend – has received further impetus from the emergence of cryptocurrencies. Cryptocurrencies challenge the future role of money and the functions that both central and commercial banks will play in an increasingly digitalised economy. The digital transformation of the economy is also changing the nature of investments, with a larger share of investment in intangible assets at the expense of traditional machinery and therewith the financing needs of firms. The financial system at large, and banks in particular, need to adapt to new requirements for financial services and products. The adjustment pressure on banks will continue unabated, and adjustment strategies will have to take into account the technological change.

Many technologies give rise to both scale effects and further specialisation. Since both scale and specialisation are easier to accomplish in larger markets, banks will in any case face new incentives to expand activity beyond their national markets. Remaining barriers to cross-border integration currently hinder such internationalisation strategies. Many banks in the EU retreated to their home markets in the aftermath of the 2008 financial crisis. Progress with the Banking Union would promote the development of a truly pan-European banking market, but the debate on whether policy must do more to support the emergence of a pan-European banking market is ongoing.

This report looks at most of these issues. It begins by describing general macroeconomic and financial-sector developments (see Chapter 1). It then presents a more in-depth review of the impact and policy implications of the challenges discussed above on the financial industry and on banks in particular. Chapter 2 explores the changes in financing needs that have occurred as a result of the digital transformation of the economy, and the implications of these changes on the demand for bank finance and other sources of finance. Chapter 3 focuses on the emergence of digital money, including cryptocurrencies and their impact on banks and the financial system. Chapter 4 analyses cross-border-banking developments in the EU.

Chapter 1 reports on how the European and world economy weakened in 2019. Unabated trade tensions and political and geopolitical uncertainty weighed on the economy. Real GDP growth fell to 1.5% in the EU, marking a protracted period of subdued growth and low inflation. The European Central Bank and other major central banks adopted a more accommodative policy stance in 2019 in response to increased macroeconomic uncertainty

and muted inflationary pressures. EU banks are resilient, but increasingly face profitability challenges amid less supportive cyclical conditions. The insurance sector remains adequately capitalised, but the prolonged low-interest-rate environment could put a strain on its overall development.

Financial stability risks have slightly increased over the past year, because subdued growth is making it harder to smoothly unwind structural and financial imbalances in the system. In 2019, the main concerns for the EU's financial stability remained: (i) the risks of a sustained and disruptive repricing of major financial asset classes; (ii) the resurgence of stress in the EU banking sector amid less supportive cyclical conditions and persisting challenges in some banks; and (iii) high levels of public and private debt. The post-crisis financial-reintegration trend resumed in 2019, driven by increased price convergence. Integration in money markets, bond markets, equity markets, and bank markets developed in different ways. Price integration increased in money markets and bond markets. However, price integration decreased in equity markets and stalled in bank markets, illustrating the importance of continuing efforts to advance the Capital Markets Union and Banking Union.

Chapter 2 examines the shift in investment towards intangible assets that has resulted from developments in technology, including the digital transformation of the economy. The chapter also reviews how this affects the financial system and demand for finance. Intangible investments tend to require smaller upfront financing than tangible investments. They also tend to have more uncertain economic outcomes, limiting the collateral value of intangible assets, and thus also limiting the possibility of raising secured debt financing. As a result, firms with a high level of intangible investment seem to use less external financing and hold more cash than traditional firms. This might help explain some of the reduction in the overall corporate demand for external financing. In the medium to long term, corporate demand for external finance is likely to continue the shift from bank lending towards market-based funding (notably equity capital). The EU Capital Markets Union provides a dedicated policy framework to promote market-based finance and support the digital transformation of the economy.

EU banks must also find a way to respond appropriately to this transformation, which weighs on their profitability and increasingly challenges their business models. Supervisory authorities should be vigilant to safeguard EU financial stability and ensure banks' resilience. With its Banking Union architecture, the EU has put in place a policy framework to accompany the structural changes in the banking sector, but further efforts are needed to complete this architecture.

Chapter 3 reviews cryptocurrencies and their possible future role in the financial system. Cryptocurrencies could make economic and financial processes more efficient and stimulate innovation, for example by enabling the use of smart contracts and automated machine-to-machine transactions. Cryptocurrencies could also become a substitute for physical cash and bank deposits. Banks could respond by tapping other funding sources or by making deposits more attractive. In addition, the new developments could present banks with opportunities to diversify revenues. Banks could, for instance, act as cryptocurrency distributors or provide

cryptocurrency custody services. In addition, the EU Payment Services Directive¹ provides for sharing of payment account data among banks and third party payment providers. This may actually help disintermediated banks to remain active in the payments market, tempering concerns about their possible declining role. Some central banks are examining the pros and cons of issuing their own cryptocurrencies, which would be less risky payment instruments than any private-sector solutions. In addition, a central-bank-issued cryptocurrency may serve as a single platform open to innovation on top of it, whereas the private sector is likely to introduce many competing cryptocurrencies, potentially fragmenting the basic foundation of digital finance. Private-sector cryptocurrencies should be made interoperable with each other to avoid the formation of closed payment systems. Private-sector initiatives would also need to develop under an appropriate policy framework to address any risks to financial stability and market integrity that may arise as a result.

Chapter 4 discusses how many EU banks have strategically retreated to their core business and home market in response to the 2008 financial crisis. This retrenchment hampered cross-border banking and banking-sector integration in the EU. As a result, EU banks have missed out on the opportunities offered by the single market, such as facilitating adjustment through consolidation and increased efficiency.

The benefits of cross-border banking remain unchanged, but the perception of its potential costs has changed with the experience of the financial crisis. The withdrawal of banks from certain markets during the crisis initiated a spillover of credit constraints across the EU, and authorities faced complications when supporting or resolving cross-border banks. Differences between the incentives offered by home and host authorities have also led to market segmentation. These different incentives include the ring-fencing of capital and liquidity in foreign entities and national differences in: (i) implementing anti-money-laundering procedures; (ii) taxation; and (iii) insolvency regimes. However, the Banking Union provides for common rules and supervision and a joint safety net, all of which facilitate cross-border banking.

Progress on the Banking Union could further promote cross-border banking. There are other obstacles to cross-border banking that are not related to the creation of a joint safety net and hence not covered by the Banking Union. For example, lack of access to data like the credit histories of potential customers means a competitive disadvantage for market entrants from abroad. The existence of third-party providers of auxiliary services like credit brokerage, credit evaluation, or debt collection determines entry costs for banks seeking to operate in new markets. Mergers and acquisitions have been an important way for banks to enter foreign

¹ Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC.

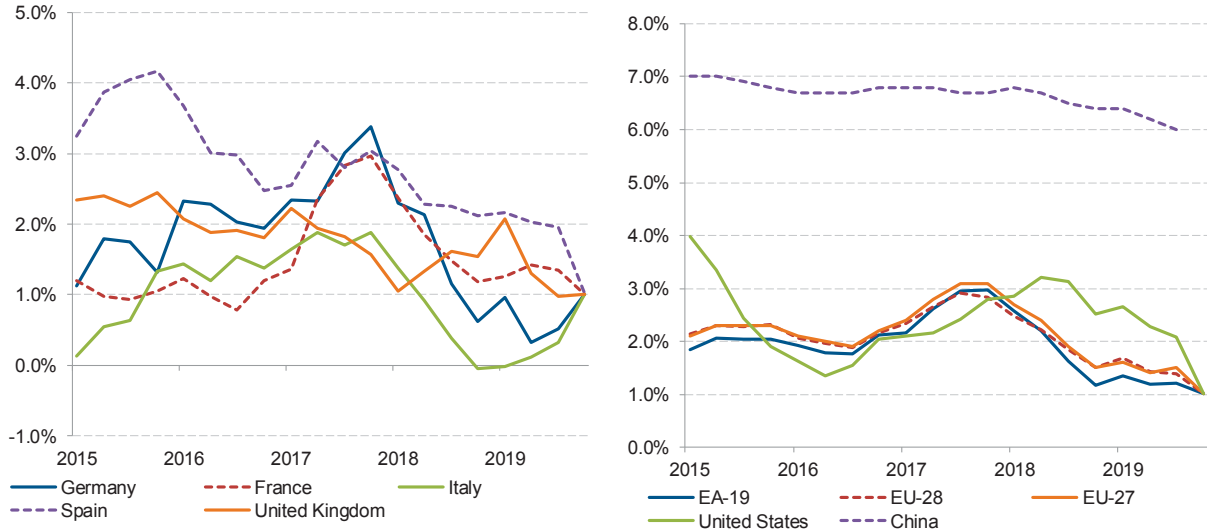
markets and in this respect, the approach taken by national authorities to cross-border mergers and acquisitions has an important role in fostering cross-border banking. Finally, digital innovations may also boost new forms of cross-border banking through FinTech firms and online banks, both of which can alleviate problems of home bias.

Chapter 1 MARKET DEVELOPMENTS

1.1 Macroeconomic and financial-market developments

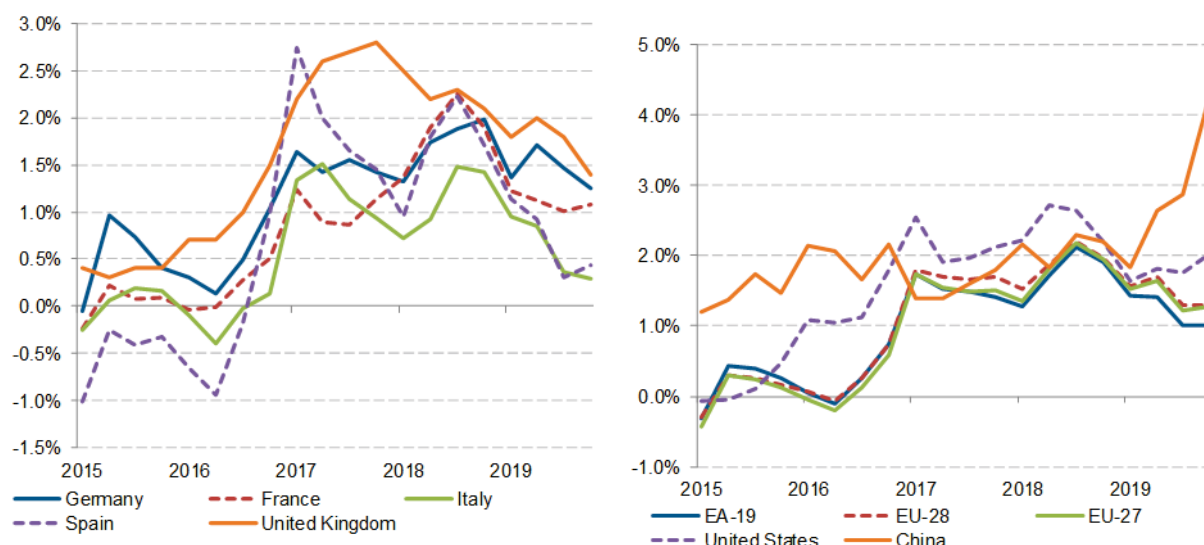
The European and world economy weakened in 2019, against a background of unabated trade tensions and greater uncertainty in policy and geopolitics. EU Member States with highly integrated global value chains and trade relations were affected the most. Real GDP growth moderated to 1.5% in the EU-27 and 1.2% in the euro area, a decrease from the 2018 growth rate of 2.1% in the EU-27 and 1.9% in the euro area. This trend is in line with the development of global GDP growth, which declined from 3.6% in 2018 to 2.9% in 2019 (see Chart 1.1). Over the same period, inflation also slowed from 1.8% to 1.4% in the EU-27, and from 1.8% to 1.2% in the euro area (see Chart 1.2).

Chart 1.1: Real GDP growth



Source: Eurostat, OECD, DG ECFIN Autumn 2019 Economic Forecast, DG FISMA calculations.
 Note: Quarterly, year-on-year data.

Chart 1.2: HICP inflation



Source: OECD.

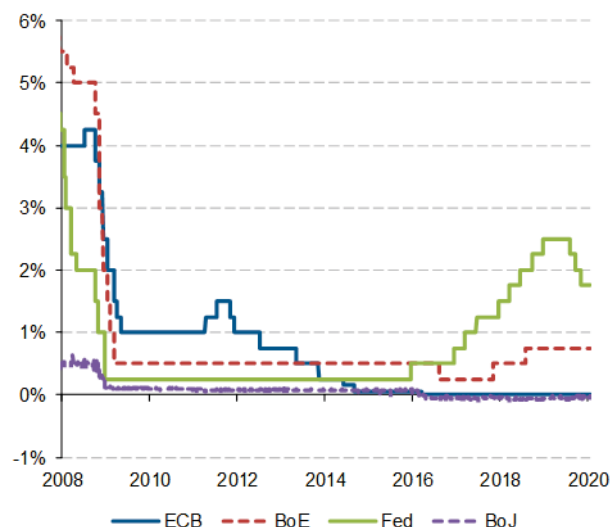
Note: Quarterly, year-on-year data. HICP refers to harmonised index of consumer prices.

Major central banks adopted a more accommodative policy stance in 2019 in response to increased macroeconomic uncertainty and muted inflationary pressures (see Chart 1.3). The European Central Bank (ECB) introduced further easing measures, while the US Federal Reserve stopped raising rates². China stimulated its economy through a number of monetary and fiscal measures to mitigate the impact of its trade conflict with the US, but Chinese economic growth nevertheless slowed down slightly to around 6%. China's economic slowdown also influenced growth in the rest of the world due to the depreciation of the renminbi (RMB), which lost value against the US dollar (USD) beyond the threshold of 7 yuan to the dollar. The euro also slightly depreciated against the US dollar in 2019 due to lower-than-expected economic growth in the euro area. The GBP/EUR exchange rate remained volatile due to uncertainty over the UK's withdrawal from the EU (see Chart 1.4).

² In 2019, the ECB extended its forward guidance on policy rates in March and June. It also announced a new easing package in September that supported favourable bank lending conditions, including a 10 bps cut in the deposit facility rate to -0.50% and new, monthly, open-ended net-asset purchases of EUR 20 billion from November onwards. In September, it also introduced: (i) a new series of quarterly, targeted, longer-term refinancing operations (TLTRO-III) that facilitate banks' access to low-cost, longer-term funding; and (ii) a two-tier system for remunerating excess bank liquidity holdings that exempts part of banks' excess liquidity holdings from the negative deposit facility rate.

In the US, the Federal Reserve reversed course following the market turmoil and four rate hikes by the end of 2018. In March 2019, the Federal Reserve signaled that no further rate hikes would be required for the rest of the year, and that the unwinding of the Federal Reserve's balance sheet would stop at the end of September 2019. It also announced that the pace of its balance sheet reduction would be reduced in the interim. Later during the year, the Federal Reserve lowered its benchmark interest rate in three steps of 25 bps each, in late July, September and October.

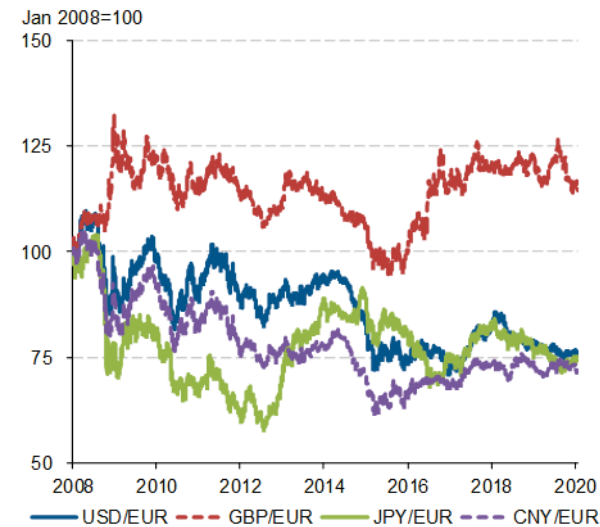
Chart 1.3: Central bank policy rates



Source: Bloomberg.

Note: ECB refers to European Central Bank, BoE to Bank of England, Fed to Federal Reserve System, and BoJ to Bank of Japan.

Chart 1.4: Foreign exchange rates



Source: Bloomberg.

Note: USD refers to US dollar; EUR to euro; GBP to British pound; JPY to Japanese yen; and CNY to Chinese yuan.

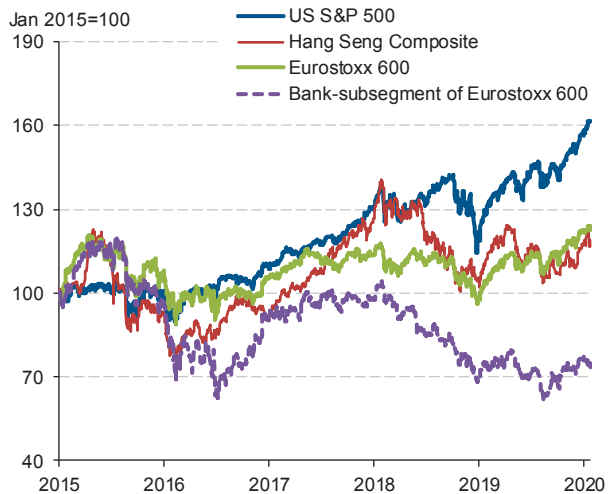
The subdued macroeconomic environment and elevated trade policy uncertainty affected investors' risk appetite and weighed on financial markets. However, the negative impact on the riskier market segments was temporary, as monetary policy announcements gave support to markets.

EU stock markets fell significantly at the end of 2018, but made good any losses in 2019 thanks, in particular, to a strong upward move at the beginning of the year (see Chart 1.5). Bank stocks in the EU underperformed³ as the low-interest-rate environment continued to weigh on their ability to increase profitability to more sustainable levels. EU stock markets performed less strongly than the US market but outperformed the Chinese markets, which suffered from the escalation in trade tensions with the US.

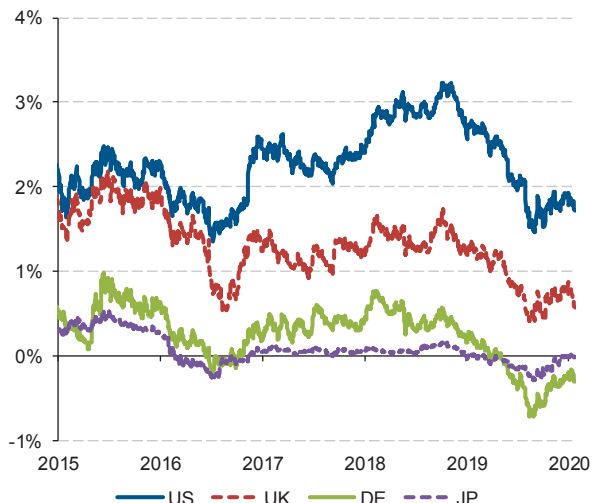
Chart 1.5: Stock market performance

Chart 1.6: Benchmark ten-year sovereign-bond yields

³ The banking sector was the worst performing sector in the EuroStoxx 600 index in 2019. The STOXX Europe banks index underperformed the Eurostoxx 600 index by about 13%. The price-book ratio of euro-area banks remained unchanged at 0.7 on average.

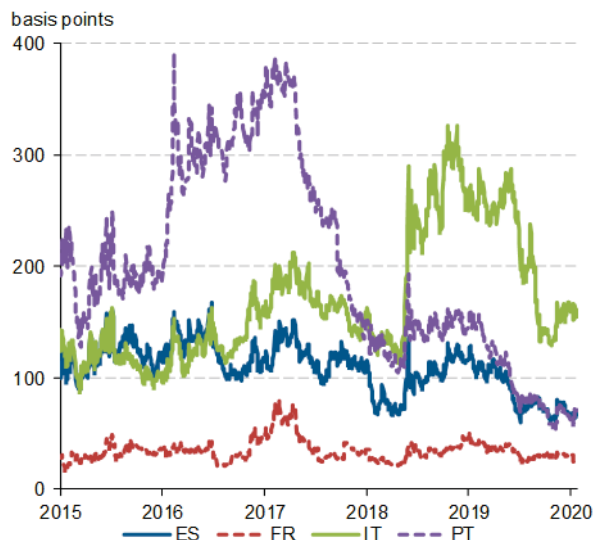


Source: Bloomberg.



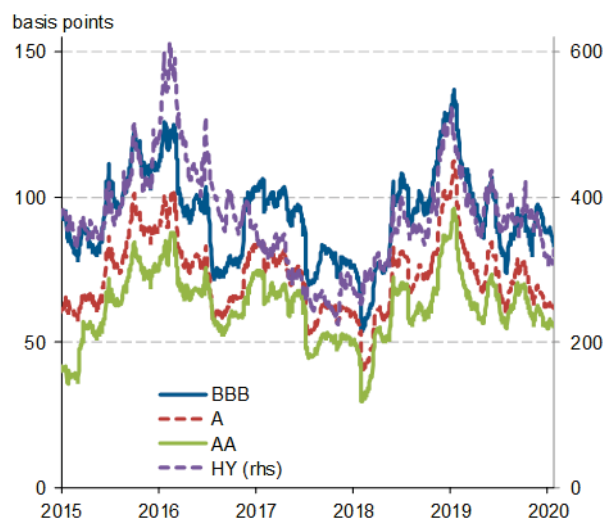
Source: Bloomberg.

Chart 1.7: Sovereign-bond spreads



Source: Bloomberg. DG FISMA calculations.
 Note: Spreads are calculated over the ten-year German Bund.

Chart 1.8: Euro-area corporate bond spreads



Source: Bloomberg. DG FISMA calculations.
 Note: Five-year maturity bond data.

Sovereign benchmark yields mostly continued to fall throughout 2019 (see Chart 1.6). The changing macroeconomic and monetary conditions led to more flattened – and in some cases, even inverted – yield curves. The German ten-year sovereign-bond yield turned negative at the end of March 2019, and decreased further to a historical low of -0.70% in mid-August before rising again to -0.30% in early December⁴. The result was an increase in the

⁴ In the US, the ten-year treasury yield dropped from 2.80% in early 2019 to 1.48% in August, and rebounded to 1.80% in December. The spread between ten-year and three-month treasury yields dropped in May and has remained below zero since then.

outstanding stock of debt with negative yields, mainly government bonds of developed countries⁵, to a peak of USD 17 trillion in August 2019.

Euro-area sovereign-bond spreads narrowed over the German Bund, with a particularly strong tightening in Greek, Portuguese, and Italian sovereign-bond spreads. The Italian ten-year sovereign-bond spread narrowed from 250-300 bps at the start of 2019 to around 160 bps in December, as investor concerns about the Italian budget and lingering political uncertainty abated. In October, Italy successfully placed its first US-dollar-denominated sovereign bond in a decade thanks to strong demand by investors in search of yield. The Greek spread also tightened to around 180 bps in early December, while the Portuguese and Spanish spreads tightened to around 70 bps by the same time (see Chart 1.7)⁶.

Corporate bond spreads in the euro area narrowed in the first half of 2019, especially for riskier bonds (see Chart 1.8). Investors appeared to continue to demand low risk premiums for taking on credit and interest-rate risks, in spite of the less supportive economic environment. As a result, bond financing conditions for firms eased significantly over the rest of the year.

Meanwhile, the outlook for EU banks remained unclear⁷. Banks are now more resilient and better capitalised than before the financial crisis. However, profitability challenges persisted and became more pronounced in 2019 amid cyclical headwinds. Bank profitability, as measured by the aggregate return on equity⁸, declined slightly to 6.0% in the first half of 2019, down from 6.2% in 2018 (see Chart 1.9). The decline was felt across the banking sector. The dispersion in profitability among banks also narrowed somewhat. Average profitability declined due to a slight increase in impairments⁹ and a small decline in operating profits. Other non-interest income and net-fee-and-commission income both declined. However, net-interest income grew by 1% supported by robust loan growth that outweighed the negative effect of shrinking margins.

Market conditions for bank funding have improved further. Wholesale funding costs have declined amid spread compression and the broad decline in yields, which partly reflects the continued search for yield by investors. MREL-eligible¹⁰ debt issuance was strong in 2019,

⁵ At the end of August, about 50% of negative-yielding bonds were denominated in euros and 40% in yen.

⁶ The spreads for Greece, Portugal and Spain in early December were respectively 220, 90 and 60 bps lower than at the start of 2019.

⁷ The ECB expects that the pressure on bank profitability will continue, and estimates a decline in ROE to 5.7% in 2020 and 5.2% in 2021. For further details, see Box 5 in ECB (2019), *Financial Stability Review*, November 2019.

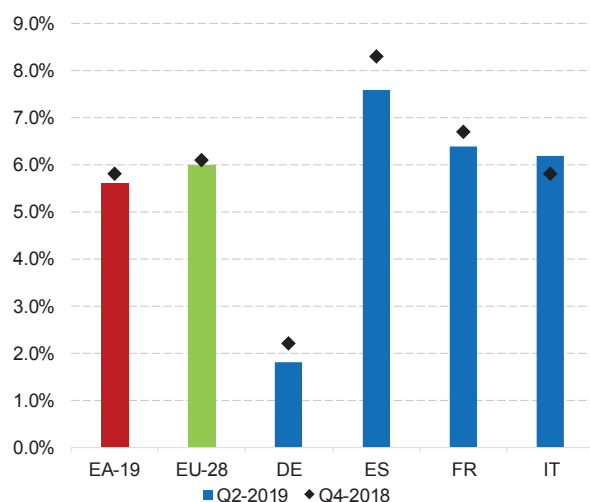
⁸ The aggregate return on equity (ROE) refers to the one of 22 euro-area significant institutions (SIs), as calculated in ECB (2019), *Financial Stability Review*, November 2019.

⁹ Banks' loan-loss provisioning costs rose slightly due to the economic slowdown.

¹⁰ MREL refers to the minimum requirement for own funds and eligible liabilities.

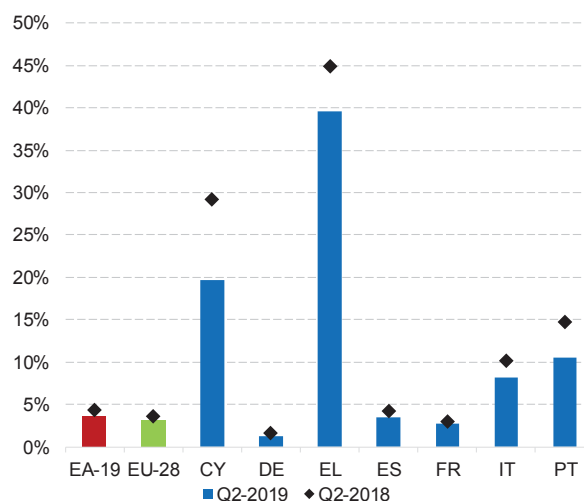
and exceeded EUR 100 billion. Only the issuances by smaller and weaker banks in non-core euro-area Member States did not follow this strong issuance trend. The renewal of the ECB’s targeted, longer-term refinancing operations (TLTROs) helped banks with limited access to viable market funding, such as Italian banks, to obtain cheaper bank funding. Bank equity issuance remained very subdued.

Chart 1.9: Return on equity



Source: ECB, CBD2 - consolidated banking data.
 Note: Data are annualised and refer to domestic banking groups and stand-alone banks.

Chart 1.10: Gross non-performing loans and advances



Source: ECB, CBD2 - consolidated banking data.
 Note: Data refer to domestic banking groups and stand-alone banks.

On average, the solvency position of EU banks was strong, and is projected to improve further¹¹. The aggregate-common-equity tier-1 (CET1) capital ratio increased slightly to 14.4% at the end of June due to retained earnings and some reduction in average risk weights. Banks have also further reduced their stock of non-performing loans (NPLs), albeit at a slower pace than in previous years¹². The downward trend in NPLs among those Member States with the highest stock of NPLs continues. In mid-2019, the stock of NPLs in Greece and Cyprus was close to 40% and 20% respectively, while in Italy and Portugal it was slightly above 8% each (see Chart 1.10). However, cyclical headwinds have led to a net increase in ‘underperforming’ assets (that are not yet categorised as NPLs). In addition, high valuations in the real-estate market of some Member States imply heightened risks ahead. Overall, these developments signal that asset quality could deteriorate in the future.

¹¹ The aggregate-common-equity tier-1 (CET1) capital ratio is expected to increase to 15.3% in 2021 thanks to high earning retentions and some reduction in average risk weights, and despite an increase in total risk exposure (due to positive loan growth). In an adverse scenario, however, the CET1-ratio would fall by up to 3.1 percentage points to 11.3% in 2021, driven in particular by rising loan losses and increased risk exposure. For further details, see ECB (2019), *Financial Stability Report*, November 2019.

¹² At the end of June, the stock of non-performing loans (NPLs) was below 2.9% of the loan book.

The insurance sector has performed well, but the mid-to-long-term market outlook looks more challenging. A prolonged low-interest-rate environment and an abrupt reassessment of risk premiums threaten to put a strain on life insurers, which make up the bulk of the insurance sector¹³. The profitability of life insurers is already under increased pressure. Investment returns have declined amid the current low-interest-rate environment, making it increasingly difficult to cover guaranteed rates on policies issued in the past. The sector is relying more and more on unit-linked and index-linked business where the market risk is borne by policyholders. Nonetheless, insurance policies with guaranteed rates still represent 80% of all euro-area insurers' technical reserves.

Life insurers are shifting their investment portfolios partly towards assets with higher credit risk, longer maturity and lower liquidity in search of yield. Insurers' exposure to real-estate markets is also substantial in certain Member States. A significant part of their assets remain invested in bonds. Their bond holdings, especially sovereign-bond holdings, continue to show significant home bias. This home bias would become relevant should concerns over sovereign or corporate debt sustainability re-surface in the EU. Non-life insurers are faced with the challenge of climate-related risks and risks stemming from cyber events. In some cases, these risks may not be adequately reflected in risk models.

Overall, the insurance sector remains adequately capitalised, but a sustained low-interest-rate environment could disrupt insurers' balance sheets over the longer term. Insurers' solvency capital requirement is strongly impacted by the prevailing yields. The solvency capital requirement (SCR) ratio of a selected group of large, euro-area insurers has dropped by around 10 percentage points, from above 220% during most of 2018 to around 210% in the first half of 2019. Pure life insurers, which are typically small and medium-sized insurers, are likely to have experienced even more significant declines in solvency than their larger peers. The recovery in yields after the summer is likely to have restored SCR ratios, but the developments in 2019 illustrate the significant impact of yields on insurers' solvency.

The persistent low-interest-rate environment also negatively affected the European occupational pension fund sector¹⁴. The drop in interest rates has left some pension funds, most of them defined-benefit pension funds, underfunded. Pension funds reacted by

¹³ The 2018 stress test conducted by EIOPA showed that life insurers are sensitive to the risk of a prolonged low-interest-rate environment and the risk of an abrupt reassessment of risk premiums.

¹⁴ The EU market for occupational pensions is mainly situated in the United Kingdom and the Netherlands, which account for about 82% of assets under management.

rebalancing their portfolios towards assets with a higher expected return, but also higher credit, duration, market or liquidity risk.

1.2 Financial stability developments

Financial stability risks have increased somewhat over the past year. An orderly and gradual unwinding of structural and financial imbalances in the system becomes more difficult as growth slows down.

The three main risks are: (i) a sustained and disruptive repricing of some of the main asset classes; (ii) a resurgence of stress in parts of the EU banking sector as persistent challenges could become more pronounced during a future cyclical downturn; and (iii) debt levels in the sovereign and non-financial corporate sector becoming unsustainable.

Investors appear to be partly ignoring the risks in most asset classes. Valuations therefore exceed, sometimes considerably, the levels justified by fundamentals. Bond prices reflect investors' assumption that interest rates will remain very low for a long period. Still, the risk of a snapback in yields is real, and could be triggered or aggravated by: (i) the prospects of ample bond issuance in the years ahead; or (ii) a possible shift in fiscal policy stances across the globe. Globally, outstanding sovereign debt grew by 6.5% in 2019, partly driven by the surge in US federal debt. Even though the US federal deficit is already over one trillion dollars (and growing), expansionary fiscal policy is unlikely to halt in the near future, going into an election year and with economic growth slowing down. In the EU and other major economies like China, there has also been a swing to expansionary fiscal policy. At corporate level, refinancing needs are high in advanced economies and emerging market economies. Investors still have strong appetite for the buoyant bond issuance and other loans issued by highly risky corporates. This is despite the deterioration in underwriting standards, creditor protection, and the average creditworthiness of borrowers. 'Covenant-lite' (where lenders have very few loan covenants to protect them if the borrower fails) seems to have become the new market standard. As a result, lenders are not in a position to intervene early if the borrower's position deteriorates. This is likely to result in lower recovery ratios in the future. In addition, developments in the leveraged loan¹⁵ market are largely driven by the issuance of collateralised loan obligations (CLOs)¹⁶. If creditworthiness eroded, for instance triggered by a downward revision of corporate earnings amid an economic slowdown, downgrades by credit rating agencies could increase strongly and push up credit-risk premiums.

In the stock market, US market valuations are currently close to all-time highs. EU stock prices point to more moderate valuations, but given the strong interconnectedness with the US market and the presence of several adverse market triggers, the risk of a sharp decline in EU stock markets remains. Although high valuations need not to be an issue if investors are willing to take risk, they might become problematic when sentiment turns and investors

¹⁵ A leveraged loan is a type of loan that is extended to companies or individuals that already have considerable amounts of debt or a poor credit history.

¹⁶ CLOs bundle and slice leveraged loans and convert most of them into investment-grade securities.

become more risk averse. Many risk factors that could trigger a change in sentiment are currently present¹⁷, underlining the risk posed by current valuation levels.

The EU's banking sector has become more resilient and better capitalised over the past years, but some EU banks still face significant challenges. Profitability remains a concern for the sector as a whole, and the low-interest-rate environment amplifies the issue. A number of banks have a very high share of NPLs, and cyclical headwinds or a downturn in overvalued real-estate markets could lead to an increase in NPLs.

EU sovereigns and non-financial corporates¹⁸ currently benefit from favourable funding conditions. Record-low corporate interest-payment burdens underpin the debt-servicing capabilities of sovereigns and firms. However, underlying vulnerabilities that are linked to the prevailing high debt levels may surface in a protracted economic downturn. A sharp increase in the credit-risk premiums of highly indebted Member States, or of lower rated firms with refinancing problems, could generate the same effect.

The EU financial system is also affected by several other risks including cyber risk; spillover effects from renewed turmoil in emerging markets; a real-estate price correction; and risks stemming from the investment fund, insurance and pension fund sector.

Cyber incidents have increased in frequency and complexity. A system-wide cyberattack could impair the functioning of parts of the financial system such as financial market infrastructures. A blackout of clearing and settlement infrastructures would significantly impair liquidity and price formation in financial markets. It would also limit the capacity of market participants to hedge or manage risks, which might trigger a loss of trust among market participants. In addition, financial data breaches are increasingly frequent, and risk adding to concerns about the integrity of proprietary data.

Another threat to financial stability comes from developments in China. Concerns remain over China's debt sustainability, in particular given the country's abating growth momentum¹⁹. The principal transmission channel of emerging markets distress to Europe still runs through EU banks. However, the non-bank financial sector, and in particular the investment fund sector, have also become more exposed to emerging markets over time.

Real-estate markets in several Member States show increasing signs of overvaluation. A downturn in real-estate markets could affect financial stability and the real economy. A decline in house prices would reduce collateral values and increase the losses that banks (and other lenders) face in the event of default. At the same time, household wealth and the prospects of the construction sector would be harmed by a decline in real-estate markets, depressing consumption and discouraging investment.

¹⁷ The market triggers include, among other factors: declining worldwide corporate earnings; a global growth shock due to a hard landing in China; US presidential elections and related political and policy uncertainty; geopolitical triggers; and a rise in interest rates.

¹⁸ The euro-area, consolidated, non-financial, corporate-debt-to-GDP ratio remains at 77.5%: relatively high by historical standards, although somewhat below levels in 2015. In comparison, the ratio in the US is at a record level, but still slightly below the euro-area value.

¹⁹ Contrary to previous cycles, in this cycle the Chinese government has adopted a more patient, long-term and risk-controlling approach to support the economy in order to avoid the current domestic imbalances and vulnerabilities from expanding further.

During the past year, investment funds have gradually increased the credit risk and duration (and thus interest rate risk) of their portfolio in search of yield. They are now the largest investors, besides banks, in leveraged loans, collateralised loan obligations (CLOs), EU high-yield securities, and BBB-rated corporate debt securities. Investment funds have also increased their exposure to emerging market economies. If credit conditions worsen and result in ratings downgrades, funds may be forced to sell their assets to meet redemptions by investors or to adhere to investment mandate restrictions. Investment funds have become a potential channel for propagating systemic stress because they are interconnected with the banking industry and have grown significantly in size.

The insurance and pension sectors have so far been rather resilient. A persistent low-yield and low-growth environment would increasingly challenge their ability to honour their liabilities. However, a sharp and unexpected rise in interest rates would also adversely affect insurers²⁰.

Overall, the current risk assessment broadly vindicates past and present EU policies to shore up the resilience of the financial sector. The structural resilience of financial institutions and markets in the EU has improved significantly since the financial crisis, making the EU financial system safer if some of the key risks (or a combination of them) materialise.

1.3 Financial integration developments

The post-crisis financial-reintegration trend in the euro area resumed in 2019²¹. This was largely driven by increased price convergence (see Chart 1.11). In perfectly integrated European financial markets, asset prices would change by the same amount in all Member States (and the indicator would have a value of 1).

On price integration, the four market segments included in the composite integration indicator developed differently. Price integration in bond markets increased significantly in 2019²², while stock market integration decreased (see Chart 1.13). The banking sub-indicator, which reveals differences in lending and deposit rates across the euro-area Member States, was halted in 2019. Put in a larger perspective, the pre-crisis level of financial integration will not be reached before 2025 if the trend over the last 3 years continues.

Chart 1.11: Euro-area price-based financial integration composite indicator

Chart 1.12: Euro-area quantity-based financial integration composite indicator

²⁰ The stress test conducted by EIOPA in 2018 pointed to the sensitivity of life insurers to both the risk of a prolonged low-interest-rate environment and the risk of an abrupt reassessment of risk premiums.

²¹ Compared to 2018, a year when financial integration stalled.

²² Analysis is based on data until September 2019.



Source: ECB financial integration indicators.
 Note: A value of 1 corresponds to the highest degree of integration. Monthly data.

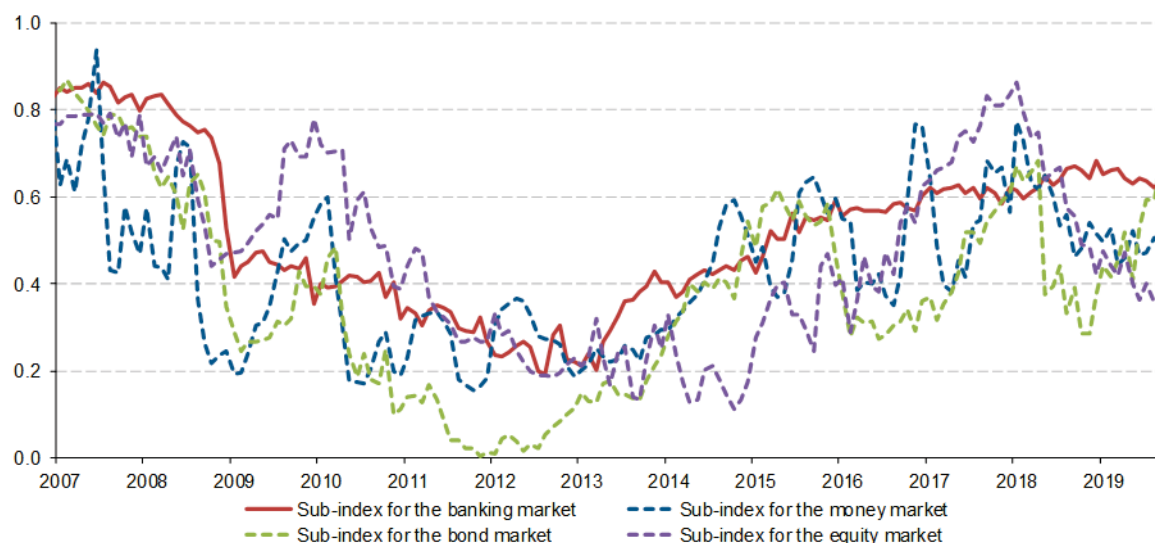


Source: ECB financial integration indicators.
 Note: A value of 1 corresponds to the highest degree of integration. Quarterly data.

The ECB quantity-based composite integration indicator, which measures the relative portfolio shares of intra-euro-area cross-border asset holdings, has developed more slowly, and increased slightly to 0.33 in Q2-2019 (see Chart 1.12). Quantity-based banking integration remains fairly low compared to pre-crisis levels. Although cross-border interbank started to pick up in 2019, it remain below pre-crisis levels. Cross-border retail lending showed a rather gradual increase in 2019, albeit from a relatively low level.

Other indicators, like the significant drop in merger and acquisition activity in the banking sector in the post-crisis period, suggest that further cross-border banking integration would be welcome. Low profitability might prevent banks from developing cross-border banking activities, but banks might also face other obstacles that are preventing them from developing cross-border activities. These issues are further examined in Chapter 2, which contains a detailed analysis of cross-border banking and the need to foster a single market for banking in the EU.

Chart 1.13: Euro-area price-based financial integration composite indicator by market segment



Source: ECB financial integration indicators.

Note: A value of 1 corresponds to the highest degree of integration. Monthly data.

In well-integrated capital markets, investors would hold portfolios that are diversified across borders. Many investors, however, still tend to prefer domestic instruments over foreign assets. If such home bias is significant, it signals poor capital-market integration²³. Intra-EU home bias slightly decreased from 79% in 2011 to 77% in 2018, indicating that investors in one Member State are now more inclined to invest in the rest of the EU. Extra-EU home bias for the EU-28 in 2018 remained high at 89%, but has fallen gradually from 91% in 2009. As this measure captures the propensity of investors in Member States to invest domestically rather than outside the EU, it shows that Member States have become slightly more interconnected with global markets.

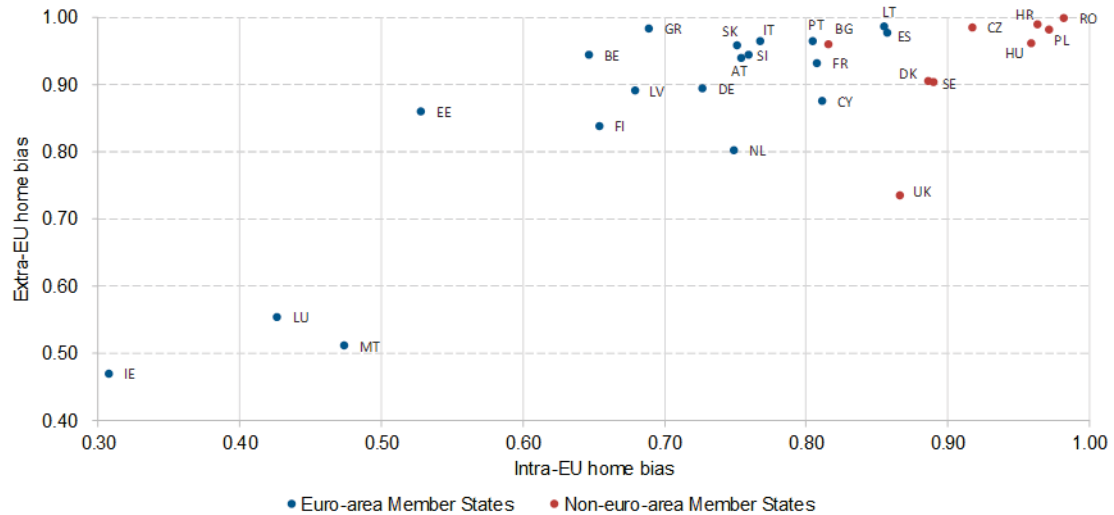
Home bias in capital markets differs across EU Member States (see Chart 1.14). On average, euro-area Member States have lower levels of intra-EU home bias over the period 2016-2018 than non-euro area countries.

The financial hubs of Ireland, Luxembourg and Malta are highly integrated with global and EU capital markets, resulting in low levels of intra-EU and extra-EU home bias.²⁴ There are also differences between integration levels in equity and debt markets. For example, the debt-capital market of Estonia, even though relatively small compared to its GDP, is well connected to EU partners, notably Luxembourg, France and Germany. However, Estonia's equity market investors remain highly biased towards their own domestic market. Home bias has decreased significantly in some Member States: the intra-EU home bias for the Luxembourg equity and Bulgarian debt markets declined by 4 and 3 percentage points respectively in 2017 compared with 2016. Malta has also experienced a strong decrease in intra- and extra-EU home bias for both debt and equity.

²³ The measure of home bias used in this chapter ranges from 0 when only foreign investment is held, to 1 when all investments are from domestic issuers. For further details, see the note to Chart 1.14, and the Nardo, M., Ndacyayisenga, N., Pericoli, F. and Poncela, P. (2018), JRC.B1 contribution to the SWD on the movement of capital and the freedom of payments, Publications Office of the European Union, Luxembourg.

²⁴ A more granular analysis of home bias could consider the investors' country of origin. For an application, see, for example, ECB (2020), *ECB Financial Integration and Financial Structures*, 136.

Chart 1.14: Intra- and extra-EU home bias in equity and debt portfolios per Member State



Source: JRC-ECFIN FinFlows database for foreign portfolios. Market capitalisation is based on Bank for International Settlements (BIS) debt securities for debt and Eurostat national account for equity. Joint Research Centre (JRC) computations.

Note: Home bias measures domestic investors’ preference for domestic portfolio investments. Intra-EU and extra-EU home bias per Member State are reported, with values closer to 1 indicating that the Member State overweighs domestic investments in its portfolio. Intra-EU home bias is calculated as the proportion of domestic portfolio investments over portfolio investments within the rest of the EU, scaled by the ratio of a Member State’s bond and equity capitalisation to the world portfolio, bond and equity market capitalisation. Extra-EU home bias is calculated as the proportion of domestic portfolio investments over portfolio investments outside the EU, scaled by the same ratio as for the intra-EU home bias. The value reported is the average of home bias for debt and equity, averaged for the years 2016-2018. Foreign portfolios include portfolio foreign investment debt and equity including listed, non-listed and investment funds. Equity includes listed equity, non-listed equity, other participations and investment funds.

Overall, integration has resumed since its decline in the immediate aftermath of the financial crisis. However, quantity-based measures of integration (that are based on cross-border holdings) remain low. Further integration thus remains a main priority to help consumers and companies reap the full benefit of the single market.

Chapter 2 INVESTMENTS IN INTANGIBLE ASSETS: IMPLICATIONS FOR FINANCIAL INTERMEDIATION

2.1 Introduction

The digital transformation of the economy is associated with higher investment in intangible assets, which have very different characteristics compared to tangible assets. It is this shift to intangible assets that seems to be driving a reduction in the overall demand for external financing by firms. Furthermore, this shift implies structural changes in the composition of corporate demand for finance by favouring equity instruments over bank loans. This chapter explores the current trends in intangible asset investment; discusses the unique characteristics of intangible investment; reviews the impact of intangible assets on the EU financial system, and on the banking sector in particular; and looks at . It concludes by discussing some policy considerations.

2.2 Transition to a digital knowledge economy

Although the knowledge economy (or ‘knowledge-based economy’) does not have a generally accepted definition, it is a concept of economic development where innovation based on access to information and knowledge drives productivity growth²⁵. The term ‘knowledge economy’ was coined in the 1960s to describe a transition from traditional economies to economies where the production and use of knowledge played a central role. The more recent advance of digitalisation and the corresponding commoditisation of knowledge have given the term ‘knowledge-based economy’ a whole new meaning. This is because modern information and communication technologies (ICT) greatly facilitate this transition. Firms have now become increasingly reliant on data, information and knowledge²⁶ to remain productive and retain their competitive edge. As this process develops, firms are increasingly investing in intangible assets, which have very different characteristics to tangible assets. This has implications for financing.

2.2.1 *The central role of intangible assets*

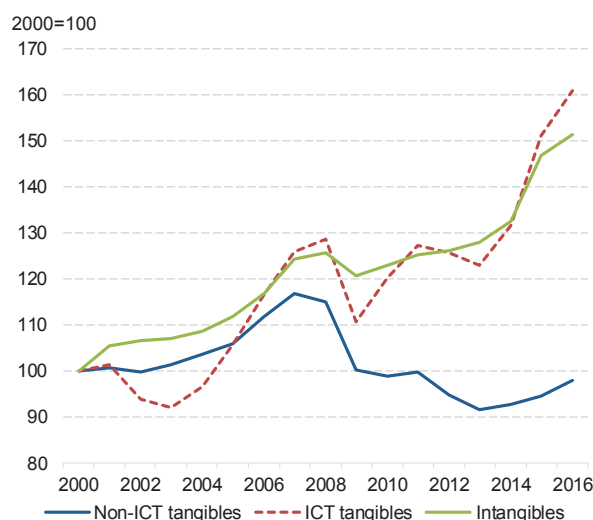
Economic growth relies on investment, which is required to build future productive capacity. Historically, the bulk of investment has been in tangible assets, such as land, buildings, equipment and machinery. The aggregate capital stock still resembles this legacy of the industrial era. Nevertheless, tangible investment also includes investment in computing and communications equipment, which is relevant in a knowledge economy. At the same time, there has been a growing shift towards intangible investments such as: research and development; computer software and databases; entertainment, literary or artistic originals

²⁵ The World Bank considers that an economy becomes knowledge-based when the sustained use and creation of knowledge are at the centre of its economic development process.

²⁶ ‘Data’ refers here to raw data; ‘information’ implies processed data; and ‘knowledge’ means information put into context.

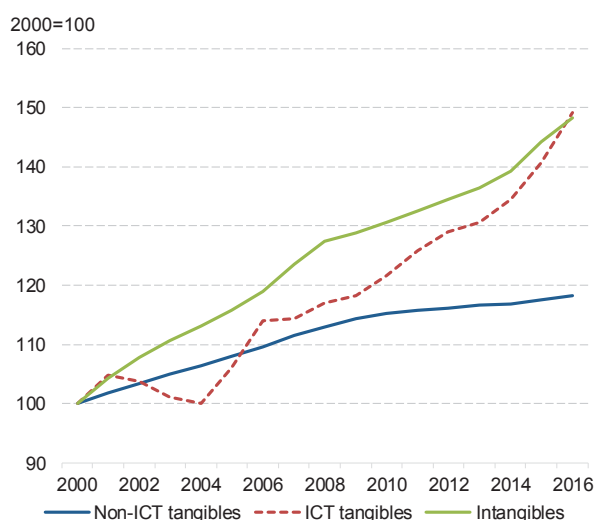
and other intellectual property products; design and other product developments; advertising, market research and branding; organisational capital; and vocational training and skills.

Chart 2.1: Investment in euro area



Source: EU KLEMS database. DG FISMA calculations.
Note: Euro area, missing data for BE, CY and MT.

Chart 2.2: Capital stock in euro area

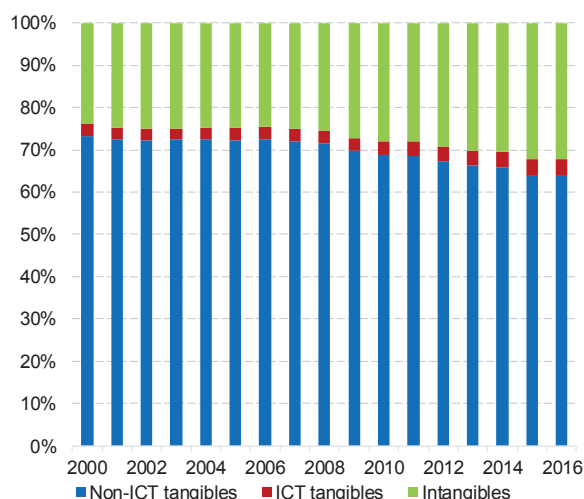


Source: EU KLEMS database. DG FISMA calculations.
Note: Euro area, missing data for BE, CY and MT.

As Chart 2.1 shows, total economy investment in intangibles and ICT tangibles follow the same trend, although ICT tangible investment follows a more volatile path²⁷. Investment in non-ICT tangibles, in turn, has been on a downward-sloping trend since the last financial crisis. Since 2013, it has gradually recovered to barely reach the levels it reached in 2000. In terms of composition, however, non-ICT tangibles still accounted for 91.3% of the capital stock in 2016, down by about 1 percentage point over a decade (see Chart 2.4). ICT tangibles grew slightly from 1% to 1.2% between 2000 and 2016, whereas the stock of intangible assets increased by about 1 percentage point over the same period to reach 7.5%. As for investment composition, the share of non-ICT tangibles dropped by 9.5 percentage points over a decade to 63.8% in 2016, with ICT tangibles growing to 4.1% and intangibles increasing by about 8.5 percentage points to 32.1% (see Chart 2.3).

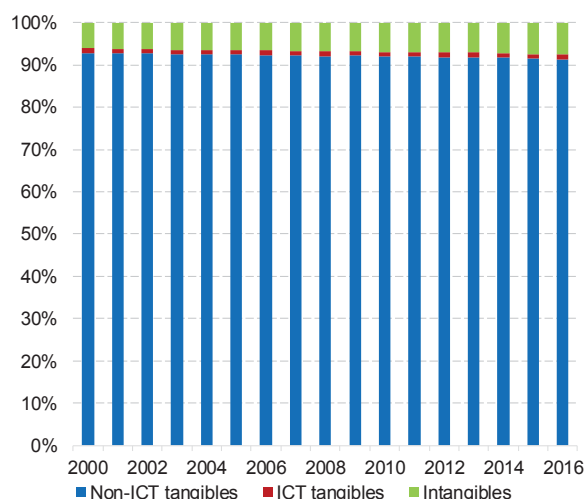
²⁷ ICT tangibles are distinguished from other tangibles, since they are often a natural companion to intangible investment. For example, new software may require also new hardware to be useable.

Chart 2.3: Investment composition in euro area



Source: EU KLEMS database. DG FISMA calculations.
 Note: Euro area, missing data for BE, CY and MT.

Chart 2.4: Capital stock composition in euro area



Source: EU KLEMS database. DG FISMA calculations.
 Note: Euro area, missing data for BE, CY and MT.

The investment rate²⁸ is much higher for both intangibles and ICT tangibles, as compared to non-ICT tangibles. In addition, the investment rate for both intangibles and ICT tangibles has also grown since the financial crisis, whereas that of non-ICT tangibles has fallen. Over a decade, the investment rate for non-ICT tangibles shrank from 6% to 5% in 2016, whereas the investment rate for ICT tangibles grew from 22.2% to 23.9%. The investment rate for intangibles increased from 29.4% to 31% over the same period. Overall, this shift in investment towards intangible assets has direct implications for financing that will be discussed below.

The data presented above come from the EU KLEMS database, which also capitalises intangible investment currently accounted for in national accounts as intermediary products²⁹. A further intangible asset category from EU KLEMS not capitalised in national accounts concerns intangible assets that are purchased or developed in-house. Purchased intangible assets include designs; advertising and brand marketing; purchased organisational capital; and vocational training and skills. Organisational capital investment is one of the key drivers of intangible capital formation, accounting for three times more investment than R&D at national level³⁰. Stehrer et al. (2019) estimate that capitalising this investment adds between 2% and 6% of GDP to EU Members States' overall gross fixed capital formation. The full set of tangible and intangible assets covered by the EU KLEMS database is summarised in Table 2.1.

Table 2.1: Capital services aggregates

Tangible assets		Intangible assets		
Non-ICT	ICT	Computerised information	Innovative property	Economic competencies
Residential structures	Computing equipment	Purchased and own-account software	Research & Development	Advertising, market research and branding
Total non-residential	Communications	Databases	Entertainment, literary	Purchased organisational

²⁸ Investment rate is defined as investment in period t over capital stock at the end of period $t-1$.

²⁹ See Stehrer, R., Bykova, A., Jäger, K., Reiter, O., and Schwarzhappel M. (2019), Industry level growth and productivity data with special focus on intangible assets, Wiiw, Statistical Report 8, 29 October 2019. Data are available at <https://euklems.eu>.

³⁰ See Piekkola (2011).

investment equipment	or artistic originals	capital
Other machinery and equipment	Other intellectual property products	In-house organisational capital
Transport equipment	Design	Vocational training
Cultivated assets	Mineral exploration and evaluation	

Source: Stehrer et al. (2019).

Note: The following items are not capitalised in national accounts: design; advertising, market research and branding; purchased and in-house organisational capital; and vocational training.

At firm level, accounting practices also still treat some intangible investment as expenditure, which can distort the information investors use to value firms³¹. For mergers and acquisitions, such accumulated intangible capital is usually accounted for via the catch-all term ‘goodwill’. However, this does not provide details that would make the valuation task easier. Thus, this mismatch drives a divergence between firms’ book value and their market value. As intangible assets become an increasingly important economic resource for many firms, estimating the value of these assets therefore remains a challenge for external investors. This problem is made worse by the fact that most intangibles do not have an actively traded market. At the same time, intangibles account for a substantial part of the market value of companies³². While the price-to-book ratio of the Euro Stoxx 600 index is around 2, many EU companies have much higher ratios³³.

2.2.2 Economic characteristics of intangible assets

Depending on the type of intangible investment, four important economic characteristics may distinguish it from tangible investment³⁴: (i) it is more scalable; (ii) it involves sunk costs to a greater extent; (iii) it generates spillovers; and (iv) it has synergies. The paragraphs below deal with each of these characteristics in more detail.

Tangible assets can only be used in one place at one time. However, intangible assets can be used in more than one place by more than one user at the same time³⁵. For example, the costs of developing software can be spread over an infinite number of copies across the firm’s client base, as the marginal cost of producing additional copies of software is close to zero. Scalability makes intangible investment ideal for reaping network effects. The combination of scalability with network effects is a major reason why incumbent digital platforms command such a high market share.

Sunk costs imply the difficulty of recouping costs when things do not go as expected. When a factory is built and fitted with production machinery, it is usually possible to recover some of these costs if production ever stops. This recovery would involve selling the building and machinery, which can then be used by another firm. For intangible assets, this is rarely possible given that there is much less standardisation and there is no established secondary market for such assets, not to mention research and development activities that are in progress and have not yet resulted in a marketable product or service. Even patents can often be more

³¹ In this context, the Commission will review the Non-Financial Reporting Directive by the end of 2020 also with a view to explore the possibility of enhancing company reporting on human capital including on skills development of employees.

³² See Piekola (2011).

³³ For instance, the price-to-book ratios of Computacenter (IT) or Boohoo (retail) in December were 367 and 1311, respectively (source: Yahoo Finance).

³⁴ For a wider discussion, see Haskel and Westlake (2017).

³⁵ This characteristic is also sometimes referred to as ‘non-rival’.

valuable to the original owner firm than to someone else who buys the patent. These characteristics render intangible assets rather poor collateral to be pledged in exchange for financing.

Intangible investment also has spillovers, in the sense that other firms may benefit from investment they did not make. The most obvious example is a situation where a skilled and knowledgeable employee leaves to a competitor firm, though there exist legal instruments how to reduce such effects, for example through non-compete and training payback clauses. It is also not always easy to prevent other firms copying ideas and processes, even when those ideas and processes are protected by intellectual property rights. This is because the rules and ownership rights for intangible assets are much more contested than those for tangible assets. Synergies arise when one type of intangible investment combines in unexpectedly productive ways with another.

As a result of these characteristics, intangible investment often involves more uncertainty than tangible investment: it can have substantially more upside when things go well, but it may also be difficult or in some cases close to impossible to recoup any costs if things go wrong. Scalability, synergies and spillovers (when benefiting from other firms' investment) cater for the enhanced upside, while the sunk nature of costs and spillovers (when competitors benefit from your investment) feed the downside. Thus, intangible investment tends to be more risky in itself, and intangible assets can be more difficult to use as collateral. This makes it relatively unsuitable for debt financing, especially in the form of bank loans. Equity financing is much more suitable to finance intangible assets, because it is an inherent risk-sharing instrument and it uses different forms of vesting that link the value of equity to the ongoing commitment of firm's employees. Vesting limits the tradeability of equity capital, sometimes over a period of several years. Firms that own valuable intangible assets and are good at absorbing the spillovers from intangible investment by other businesses are likely to invest more in intangible assets. They will exhibit high productivity and profitability, leaving their competitors behind.

2.2.3 Productivity implications of intangible assets

There is evidence that firms and their productivity are increasingly diverging: the most productive firms thrive while the least productive ones are failing to keep up³⁶. This productivity dispersion has significantly increased over the past decade, which raises market efficiency questions with respect to continued operations of unproductive firms. Most of this dispersion is driven by intra-sector productivity differentials across firms rather than cross-sectoral differences. Between 2001 and 2013, average labour productivity at the most productive firms grew at an average annual rate of 2.8% in the manufacturing sector and 3.6% in the market services sector, while the corresponding growth rate of all other firms was around 0.5% in the two sectors³⁷.

³⁶ See Berlingieri, G., Blanchenay, P., and Criscuolo, C. (2017), The great divergence(s), *OECD Science, Technology and Industry Policy Papers* 39.

³⁷ See Andrews, D., Criscuolo, C., and Gal, P. (2016), The global productivity slowdown, technology divergence and public policy: a firm-level perspective, *Background Paper for OECD Global Forum on Productivity*. July 2016. The sample includes the following EU countries: AT, BE, CZ, DK, EE, FI, FR, DE, UK, EL, HU, IT, IE, NL, PL, PT, ES, SE, SI and SK.

Among other things, the aggregate productivity slowdown³⁸ may be a symptom of the failure by many firms to adopt new technologies and best practices, which would imply insufficient spillovers from investment in intangible assets. There are four key factors for innovation diffusion to function well: (i) global connections, so that firms can learn from foreign counterparts; (ii) market entry and experimentation with new technologies and business models; (iii) better matching of the most productive firms with resources (labour, skills and capital); and (iv) bundling of various kinds of intangible investment to reap synergies³⁹.

2.3 Implications for the financial system

As a result of the investment shift towards intangible assets, firms are likely to use less external financing in general, as well as less bank debt in particular. The lower need for external financing is driven by the generally lower upfront investment needs for intangible assets. The lower use of bank debt, in turn, comes from the fact that bank debt is less suited to finance investment in intangible assets, which make poor collateral.

2.3.1 *The current corporate funding mix*

Firms tend to finance their investment activities to a large degree through internal resources. In non-financial corporations, internal funds, such as owners' equity and retained earnings, account for approximately 48% of the total liabilities of an average firm in the EU-27 at the end of Q3 2019. About 3% of total liabilities are sourced through intra-group funding, such as loans from a parent company. For external financing, bank loans are the main source, accounting for about 29% of total liabilities on average. The use of debt and equity markets by non-financial corporations remained somewhat limited, with debt securities and listed equity accounting for approximately 3% and 14% of total liabilities, respectively⁴⁰.

At aggregate level, firms have been net lenders to the rest of the economy in most EU Member States over the last decade (see Chart 2.5). Disaggregating by sector, Chart 2.6 shows that financial corporations have consistently acted as net lenders to the rest of the economy (even before the great financial crisis), but that non-financial corporations have alternated between being net lenders and net borrowers. Non-financial corporations were net borrowers in the run-up to the crisis, but then changed to become net lenders all the way up to 2018, when they again changed to become net borrowers.

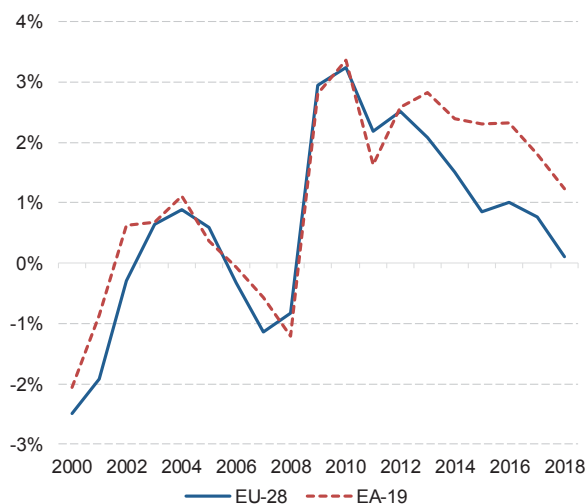
Chart 2.5: Net lending or borrowing of EU corporates

Chart 2.6: Net lending or borrowing in the EU

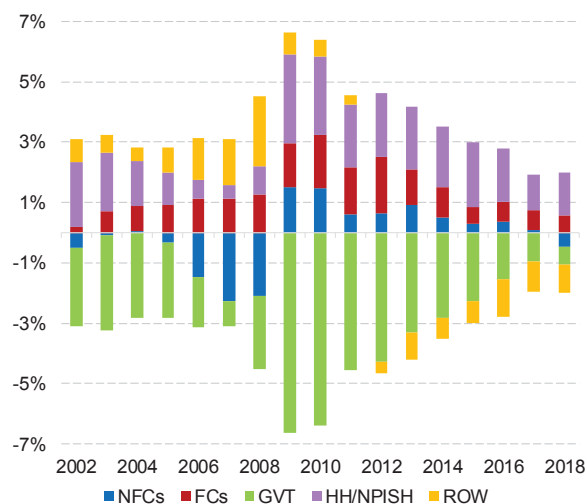
³⁸ See e.g. <https://wiiw.ac.at/dissecting-the-global-growth-and-productivity-slowdown-n-400.html>.

³⁹ See Criscuolo, C. (2015), Productivity is soaring at top firms and sluggish everywhere else, *Harvard Business Review* 24 August 2015.

⁴⁰ Trade credits and miscellaneous liabilities constituted around 26% of total liabilities of EU-27 NFCs. Figures are based on ECB, SDW sector accounts and DG FISMA calculations. Some marketable instruments, notably NFC debt securities, show a small medium-term upward trend in the euro area. For further details, see ECB (2020), *ECB Financial Integration and Financial Structures*, 136.



Source: Eurostat. DG FISMA calculations.
 Note: Figures are expressed as a percentage of GDP.



Source: Eurostat. DG FISMA calculations.
 Note: EU-28 data. Figures are expressed as a percentage of GDP. NFCs stands for non-financial corporations; FCs for financial corporations; GVT for general government; HH/NPISH for households and non-profit institutions, serving households; and ROW for rest of the world.

2.3.2 The partly self-funding nature of intangibles⁴¹

A substantial part of intangible investment takes the form of human capital investment, which implies a high share of staff compensation in the cost structure of firms with a high degree of intangible assets. Thus, their upfront investment needs may be lower than the investment needs of traditional firms, which mostly rely on tangible investment. For example, building a factory and equipping it with machinery must all be financed in the early investment stages, while the cost of staff salaries is stretched out over time. Furthermore, it can be difficult for firms to appropriate some forms of intangible capital, which is developed in-house by a skilled workforce, such as software developers. Because such employees possess the non-transferable knowledge required to make the capital productive, they are also the ones who reap the associated rewards. This is why firms choose to reward and retain talented staff through some form of deferred compensation to ensure their commitment over time. Typically, this compensation is in the form of share or option grants, or by offering employees the opportunity to become partners in the firm. As a result, the upfront investment needs of firms with a high degree of intangible assets are less than would be the case if they remunerated staff in cash only.

Greater investment in intangible assets is also associated with lower leverage. The specific nature of intangible assets makes them less prone to be used as collateral since they tend to be firm-specific and valuable only in combination with other intangible assets, or specific labour skills. Even patents and copyrights that can be sold are difficult to pledge as collateral due to the complexities related to their valuation. There are other open questions about the value of intangible assets, such as the ability to seize such assets if a company defaults on its debt. All these reasons explain why firms with a high share of intangibles generally have less debt and more equity. Furthermore, such firms also have higher cash holdings, which may partly be a

⁴¹ For a wider discussion, see Dötting, R., Ladika, T., and Perotti, E. (2018), The (self-)funding of intangibles, *CEPR Discussion Paper* 12618.

precautionary response to their reduced debt capacity, but also a reflection of the higher staff compensation share in their cost structure. A higher cash buffer also enhances the value of unvested equity. The combination of cash accumulation and share repurchases works to contain the number of shares in the deferred equity compensation package that are needed to retain skilled employees, ultimately reducing the future dilution of existing shareholders⁴².

In sum, the potential difference between firms with a high share of tangible assets and firms with a high share of intangible assets is as follows: traditional firms that invest mostly in tangible assets may be facing larger upfront investment needs, but these assets can be more easily pledged as collateral to external creditors. High-intangible firms, in turn, may experience smaller upfront investment needs, but their assets are difficult to pledge as collateral to raise external financing. As a result, these firms may be resorting less to external financing and holding more cash than traditional firms.

2.4 Impact on the banking sector

In light of both increased investment in intangible assets and the economic characteristics of intangible assets, one would expect to see fewer loans and more deposits due to the growth of cash-rich non-financial corporations reliant on intangible assets. Although investment in intangible assets is not likely to constitute the sole factor behind this recent trend, the data show that deposits by non-financial corporations have continued growing at a steady pace since the crisis, while the stock of loans attributed to non-financial corporations has levelled off.

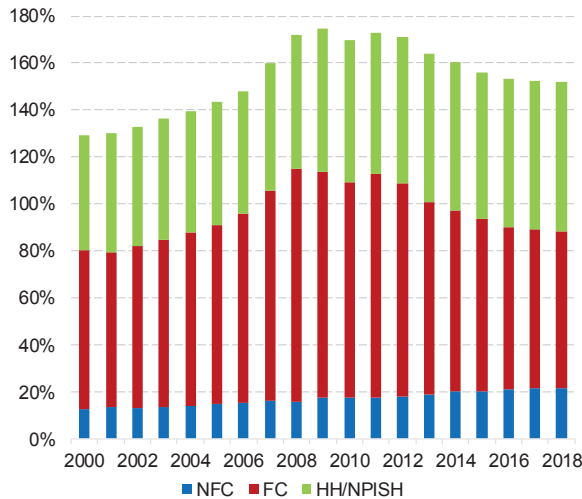
Although the aggregate stock of deposits held by the private sector has been on the decline as a percentage of GDP since 2009 (see Chart 2.7), there are marked differences by sector. As depicted in Chart 2.8, only private financial corporations reduced the stock of their deposits since the crisis. The growth of deposits by non-financial corporations has continued uninterrupted by the crisis, as has the growth of retail deposits. The retail deposit growth is underpinned by growing wealth, since deposits are viewed as the safest type of private assets, and a stable share of assets is allocated to them⁴³. In addition to some cash accumulation as a potential response to general post-crisis liquidity constraints, the deposit growth of non-financial corporations may also be due to the effects of growing investment in intangible assets. This implies lower upfront investment needs overall, along with cash accumulation as a hedge against financial distress, as described in Section 2.2.2.

**Chart 2.7: Euro-area deposits by counterpart
(% of GDP)**

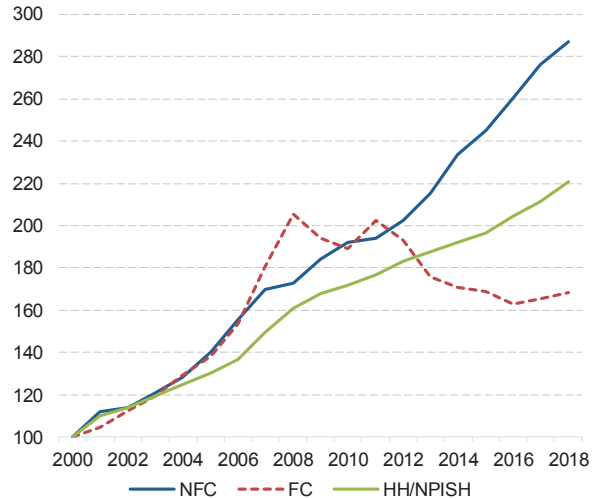
**Chart 2.8: Euro-area deposits by counterpart
(2000=100)**

⁴² Dividends constitute a payout to the holders of vested equity only, whilst share repurchases support the price of both vested and unvested equity.

⁴³ See Golec, P., and Perotti, E. (2017), Safe assets: a review, *ECB Working Paper 2035*, March 2017.



Source: ECB, Eurostat. DG FISMA calculations.
 Note: Euro area, changing composition. NFC stands for non-financial corporations; FC for financial corporations; and HH/NPISH for households and non-profit institutions serving households.



Source: ECB. DG FISMA calculations.
 Note: Euro area, changing composition. NFC stands for non-financial corporations; FC for financial corporations; and HH/NPISH for households and non-profit institutions serving households.

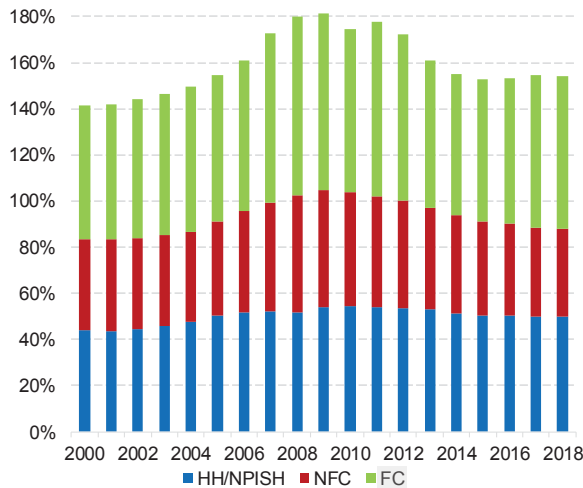
The stock of bank lending to the euro-area private sector has been on the decline relative to GDP across all categories since 2009 (see Chart 2.9). Interbank loans still form the largest category of this bank lending, followed by loans to households and non-financial corporations. Loans to non-financial corporations have experienced the steepest drop, falling from almost 51% of GDP in 2009 to 38% of GDP in 2018. In terms of portfolio shares shown in Chart 2.10, loans to non-financial corporations fell to 22.8% of the total of bank lending stock in October 2019. Interbank lending (the MFI line in the chart) recuperated from its low point in spring 2014 to reach 36% of total lending stock by 2019, mainly due to lending to domestic counterparts, although there has also been some revival in cross-border lending since September 2017. Household lending (the HH/NPISH line in the chart) grew to 29.9% of total lending stock in 2019. In terms of levels, both interbank and household lending are now above their pre-crisis peaks, while non-financial corporation lending has yet to reach it. Loans to non-financial corporations were growing approximately the same pace as deposits up until the financial crisis. However, since the crisis, a marked divergence can be observed (see

Chart 2.11) whereby deposits by non-financial corporations follow the pre-crisis trend line, while loan growth reverses. As a result, the aggregate stock of loan growth at euro-area banks has now dipped below the 2000 level as a percentage of GDP. In 2018, the stock of loans to non-financial corporations at euro-area banks constituted roughly the same volume as the stock of residential mortgages (see

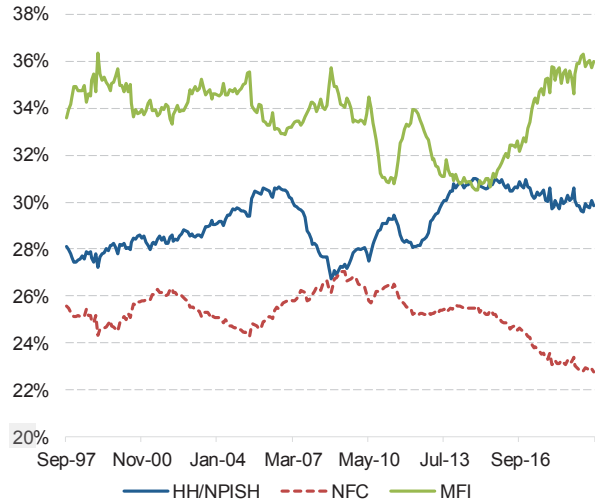
Chart 2.12). Although the post-crisis decline in bank lending to non-financial corporations must partly be caused by the deleveraging process in the banking sector, the shift towards intangible investment and lower demand for bank loans may also be a contributing factor.

Chart 2.9: Stock of MFI loans by counterpart in the euro area

Chart 2.10: Stock of MFI loans by counterpart in the euro area

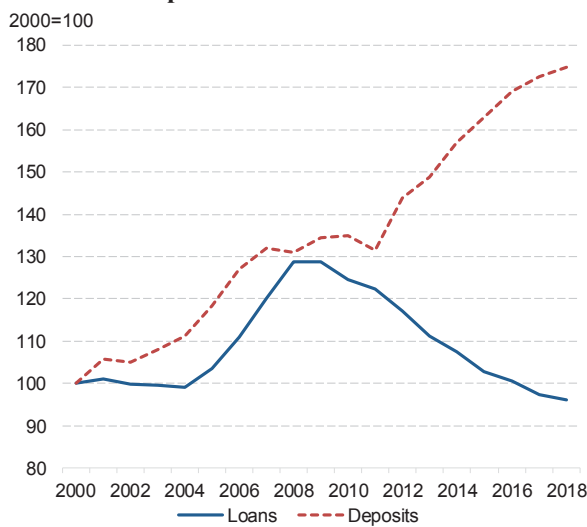


Source: ECB.
 Note: Figures are expressed as % of GDP. Euro area, changing composition. MFIs refers to monetary financial institutions excluding the European System of Central Banks, HH/NPISH to households and non-profit institutions serving households; NFC to non-financial corporations; and FC to financial corporations.



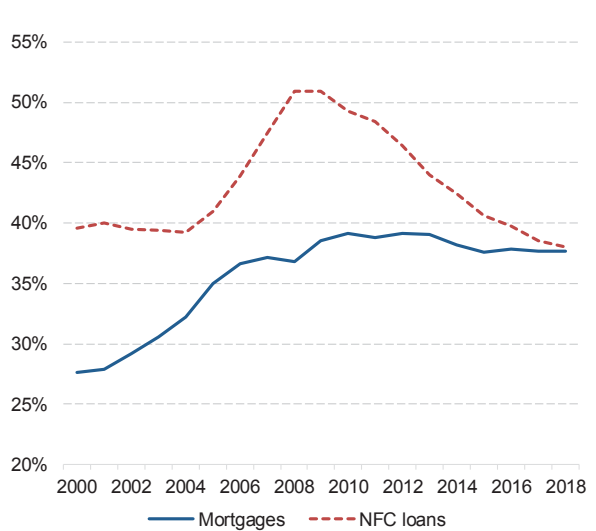
Source: ECB. DG FISMA calculations.
 Note: Figures are expressed as % of total. Euro area, changing composition. MFIs refers to monetary financial institutions excluding ESCB reporting sector, HH/NPISH to households and non-profit institutions serving households; NFC to non-financial corporations; and MFI to monetary and financial institutions excluding the reporting by the European System of Central Banks.

Chart 2.11: MFI positions vis-à-vis non-financial corporations in the euro area



Source: ECB. DG FISMA calculations.
 Note: Figures represent an index with 2000 as the base year. Euro area, changing composition. MFIs refers to monetary financial institutions excluding ESCB reporting sector.

Chart 2.12: MFI loan stock in the euro area

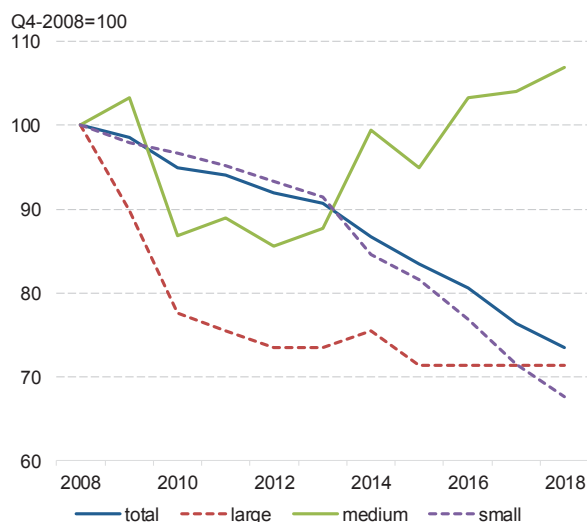


Source: ECB, Eurostat. DG FISMA calculations.
 Note: Figures are expressed as % of GDP. Euro area, changing composition. MFIs refers to monetary financial institutions excluding ESCB reporting sector.

Provided the current trend of shrinking corporate demand for bank financing continues, as can be expected in a growing knowledge economy, banks will face structural shifts on the asset side of their balance sheet. These structural shifts will affect banks irrespective of whether the deleveraging process continues. Structural change in the banking sector is evident in the decline in: (i) the absolute number of banks; (ii) the total assets they hold; and (iii) their share

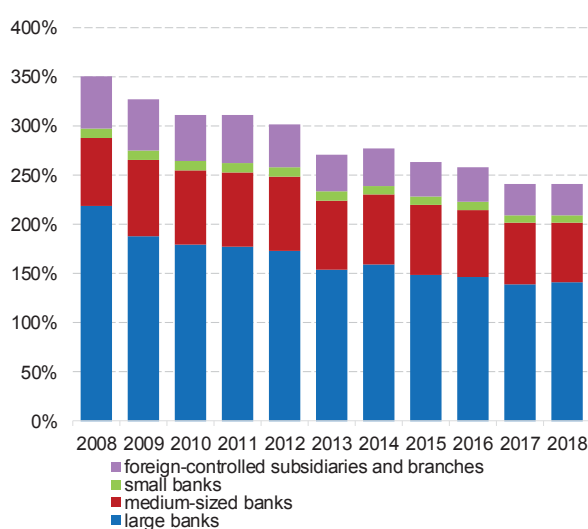
in the economy's value added⁴⁴. The number of larger banks fell in the immediate aftermath of the financial crisis and has been stable over the last 5 years. There are now much fewer smaller banks on the market than a decade before, while the number of medium-sized banks has increased. That the medium-size banks are larger than a decade before (i.e. that they hold more assets) suggests that the decline in the number of smaller banks is not only driven by market exit, but also by mergers to larger entities.

Chart 2.13: Number of credit institutions in the EU



Source: ECB. DG FISMA calculations.
Note: Figures are based on quarterly data.

Chart 2.14: Bank assets in the euro area



Source: ECB. DG FISMA calculations.
Note: Figures are expressed as % of GDP and based on consolidated data.

Banks are bound to rely more on other asset types than traditional corporate credit in a knowledge-based economy. Real-estate lending is one alternative, both commercial and retail. Consumer credit or high-risk corporate lending, such as leveraged loans, are other alternatives. Bank credit to the non-financial sector has expanded less than nominal GDP for many years, while credit to households, chiefly for house purchases has become a more significant target of banks' lending activity. As shown above in Chart 2.10, the volume of residential mortgages roughly equalled the stock of loans to non-financial corporates in 2018⁴⁵. Moreover, within lending to the corporate sector, the share of credit absorbed by manufacturing and construction declined. Instead of investment in machinery and equipment in these industries, a rising share of corporate lending went into the real-estate sector. Banks could also embrace this shift in the economy and devise new products that are more suited for investment in intangible assets. Lending could perhaps be guaranteed against intellectual property, such as patents and copyrights, or even brands. It could also be simply

⁴⁴ In Q4-2018, there were 2,887 credit institutions, of which 35 were large, 617 were medium-sized, and 2,235 were small. For further details, see Chart 2.13.

⁴⁵ There is also evidence that US banks have already shifted the composition of their loan portfolios in response to higher intangible investment. Specifically, they are substituting a combination of residential real estate loans and safe assets for commercial loans. For more details, see Dell'Araccia, G., Kadyrzhanova, D., Minoui, C., and Ratnovski, L. (2017), Bank lending in the knowledge economy, *IMF Working Paper* 17/234, 7 November 2017.

backed up by cash flows. However, it remains to be seen whether such products are feasible and whether there would be a demand for them.

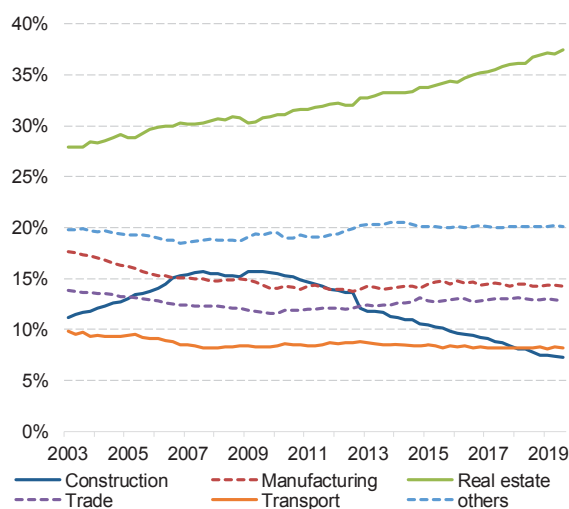
Even though the move in investment patterns towards intangible assets may entail a decline in the demand for bank credit, this is not synonymous with declining demand for banks' financial services to the corporate sector.

However, the type of financial service may change, and will likely lead to an increase in banks' fee income compared to their interest income. Already over the period 2014-2018, EU banks' net-fee-and-commission income increased by 10% (or 2.5% per year), thereby compensating for the decline in other revenues.

The economic literature attributes special advantages to banks over capital markets in areas such as the evaluation of investment projects⁴⁶, the monitoring of debtors⁴⁷ and the re-negotiation of contracts⁴⁸. Each of these three advantages are discussed in more detail in the bullet points below. They arise because the bank is able to form a longer-term relationship with its customers and has access to a set of comparable past events from which it can learn.

- Banks' advantage over capital markets in the evaluation of investment projects applies particularly to tangible capital. For intangible capital, however, the profitability and risks of credit demand are more difficult to derive from comparisons with past projects in the same or comparable industries and firms. As already noted above, the innovative character of intangible investments lowers the value of past credit histories and long-term customer relationships. Banks may still add value in the evaluation stage of such investment by providing the technical work that is required to issue financial instruments (such as the production of prospectuses and information material, identifying the potential investor base, identifying the suitable instrument, and drawing up contract terms). Banks will be paid a fee for such services as they can do this more effectively than the investor, benefiting from technical and legal expertise in the issuance of financial instruments.
- If the banks combined their role as arranger with that of administering the investors' payment streams, they would be in the position to perform the monitoring of investment

Chart 2.15: Corporate credit by economic activity, market share



Source: ECB, DG FISMA calculations.

Note: Estimated loans granted by MFIs to euro-area non-financial corporations broken down by NACE Rev. 2 classification. Figures are based on quarterly data.

⁴⁶ See Leland and Pyle (1977).

⁴⁷ See Diamond (1984).

⁴⁸ See Gorton and Kahn (2000).

projects on behalf of the investors. And if they keep a stake in the investment, the banks would benefit from the upside risk. Moreover, their participation in the funding would also serve as a signal to other investors. The design of contracts that combine and align the incentives of all parties involved could take forms beyond the standard debt contract, combining ‘skin in the game’, success-dependent compensation, and special-fee elements⁴⁹.

- The larger and more dispersed the creditor base, the more difficult it will be for an indebted firm to adjust the credit terms. On the negative side, missing repayment dates can cause default if it is too difficult to organise forbearance measures among the creditors. On the positive side, firms may want to expand or restructure their business. When banks are the only creditor, their function in restructuring debt leads to non-performing loans or an expansion of their balance sheet. If instead they are the lead monitor, their task changes to organising the debt restructuring and dealing with hold-out investors.

2.5 Policy considerations

There are several possible policy implications of the observed shift to intangible investment. For instance, the quality of information that is available to investors should allow them to make a sound valuation of intangible assets. In this respect, the Commission will review the Non-Financial Reporting Directive by the end of 2020 to explore the possibility of enhancing company reporting on human capital, including on skills development of employees. Although further research would be necessary to establish that the shift to intangible investment is directly causing changes in the corporate demand for bank debt, the ongoing trends highlighted in this chapter point towards: (i) lower corporate demand for external finance; and (ii) a shift away from bank lending towards capital-market instruments, and in particular equity capital which is more suitable for funding uncertain and inherently risky enterprises than bank lending. Firms are however expected to use both bank loans and debt-market finance to finance tangible investment, especially as the tax treatment of debt in many jurisdictions favours debt over equity.

With its Capital Markets Union initiative, the EU has a dedicated policy framework in place to promote market-based finance, including equity funding. The Capital Markets Union is however currently not yet fully achieved.

Given the EU corporations historically relied heavily on bank loan funding, the shift towards intangible investment may also prove challenging for the EU banking sector. EU banks will have to find ways to plug the likely gap left by lower demand for corporate loans. The supervisory authorities, in turn, will have to make sure that this does not endanger EU financial stability, either in the form of: (i) a pivot towards overly risky financial products; or (ii) increased concentration of existing exposures. Risky financial products may emerge, for instance, as innovation to accommodate intangible investment. Concentration of existing exposures may relate to real-estate lending, consumer credit or even sovereign debt. Any

⁴⁹ The currently used securitisation vehicles might emerge as a blueprint for future relationships between debtors, creditors and intermediaries.

ensuing decline in diversification could have a negative impact on the resilience of the banking system. A shift to higher levels of mortgage lending would also likely increase house price inflation.

The shift towards more intangible investment can also be expected to cause structural change in the market for investable assets. The supply of safe assets in the form of sovereign debt has been shrinking due to the combination of predominantly balanced fiscal policy across the EU and the quantitative easing programmes run by central banks. As a result, interest rates are likely to remain subdued. All else being equal, this may result in increased mortgage lending, and banks increasingly substituting real-estate lending for corporate credit.

At the same time, the low yields on large parts of the bond universe may strengthen incentives for the asset management sector to search for yield by shifting some investments into riskier assets. However, this may not necessarily be a negative development, especially if it is investment in equities, as it may enable firms with a high share of intangible assets to have wider access to external financing. Although there is now evidence that public stock markets are increasingly an instrument used to return capital rather than raise it⁵⁰, public listing is still very important for offering exit opportunities to earlier private equity investors and enabling share repurchases that underpin stock compensation schemes. However, when it comes to investment in debt securities and similar instruments, investors would likely be getting a relatively low return while bearing higher concentration risk.

To conclude, the general shift towards more diversified and market-based corporate funding contributes to a more balanced and financially stable financial system in the EU. However, the banking sector itself may become more vulnerable as a result of the low-growth environment and higher risk due to either new products or a concentration of existing exposures. This is why EU bank supervisors must remain alert and continue to follow these developments closely. With its Banking Union architecture, the EU has a policy framework in place to support the structural changes in the banking sector, which may involve cross-border bank mergers as well as bank resolution. Nevertheless, further efforts are needed to complete this architecture.

⁵⁰ See e.g. Ljungqvist, A., Persson, L., and Tag, J. (2016), The incredible shrinking stock market: on the political economy consequences of excessive delistings, European Corporate Governance Institute (ECGI), *Finance Working Paper* 458/2016.

Chapter 3 CRYPTOCURRENCIES: THE IMPACT ON BANKS AND THE WIDER FINANCIAL SYSTEM

3.1 Introduction

Cryptocurrencies have been the subject of intense discussions among both policy-makers and the research community. These discussions started with the first significant price increases in bitcoin at the end of 2013⁵¹, followed by the launch of ethereum⁵² in 2015, which greatly facilitated the issuance of private cryptocurrencies. The discussions continued more recently in the context of the libra whitepaper⁵³ published in June 2019. The purpose of this chapter is to review cryptocurrency technology and its place in the financial system in comparison with other types of digital money and cash. This chapter highlights the differentiating features of cryptocurrencies and reviews some possible policy considerations. The scope of this chapter is broad, encompassing all types of digital money, such as existing commercial bank money, electronic money, and cryptocurrencies (including cryptocurrencies issued by a central bank).

3.2 Functions, attributes and types of money

3.2.1 *The functions of money*

The three main functions of money are well established, i.e. as a unit of account, a medium of exchange, and a store of value. Each of these functions emerged to overcome a specific economic friction. As a unit of account, money mitigates the problem of tracking the relative prices of various goods and services in the economy, making it possible to communicate value in an easily understandable way. A monetary system with a single unit of account plays an important role in ensuring the efficient operation of markets and risk sharing. As a medium of exchange, money removes the basic friction of barter economies, in which counterparties enter into a trade only if both of them want each other's good or service. Given the abundance of goods and services in modern economies, such coincidences would be rather rare, requiring a long chain of transactions to obtain the desired good or service. Finally, as a store of value money allows economic agents to smoothen out their consumption over time.

3.2.2 *The attributes of money*

Adrian and Mancini-Griffoli (2019)⁵⁴ offer a conceptual framework with four attributes of money to compare and contrast different means of payment, although there are also other alternative frameworks⁵⁵. Synthesising these frameworks, it is useful to keep in mind the following attributes of money: form; value; issuer; and settlement technology.

⁵¹ The bitcoin white paper, however, was published in October 2008. See Nakamoto, S. (2008), Bitcoin: A peer-to-peer electronic cash system, <https://bitcoin.org/bitcoin.pdf>

⁵² <https://ethereum.org/>

⁵³ Libra Association Members, An introduction to Libra, *White Paper*, https://libra.org/en-US/wp-content/uploads/sites/23/2019/06/LibraWhitePaper_en_US.pdf

⁵⁴ See Adrian, T., and Mancini-Griffoli, T. (2019), The rise of digital money, *IMF FinTech Note* 19/01, July 2019.

⁵⁵ See e.g. Bech, M., and Garratt, R. (2017), Central bank cryptocurrencies, *BIS Quarterly Review*, September 2017.

First, money can take different forms. It can be a (physical or digital) object used as a means of exchange (known as token-based money), or it can represent a claim (known as account-based money)⁵⁶. It should be noted, however, that these two forms are not always mutually exclusive: cash is a physical object not tied to any account, while it technically also represents an anonymous claim on the central bank. However, gold coins that were used as money in the past were pure objects that were valuable in themselves. Cryptocurrencies, such as bitcoin, are generally viewed as objects, although they could theoretically represent a claim⁵⁷. The traditional financial system works with pure account-based money except for cash. Cryptocurrencies are generally viewed as digital counterparts to physical cash due to their settlement process, which enables direct peer-to-peer transfers.

Second, token-based money derives its value from either the intrinsic value of the exchange object itself, as was the case for gold coins, or its convertibility value in terms of the goods, services, assets or other currency units it can buy. For example, some fiat money used to be convertible into a specific amount of gold, pegging its value to that of the yellow metal. Account-based money can have either a fixed or a variable value in terms of the domestic unit of account. Fixed-value claims guarantee redemption at face value in the domestic unit of account, thereby resembling debt instruments. For example, a bank deposit of 100 euros can be exchanged for 100 euros worth of cash. Variable value claims imply redemption at the market value of the assets that back the claim, which fluctuates in terms of the domestic unit of account, thereby resembling equity-like instruments with both upside and downside risks. This would be the case with the originally proposed design of Libra (see Box 1).

Thirdly, the issuer determines whether the money is backstopped by the government or the private sector. If backstopped by the private sector, the money often relies on prudent business practices and legal structures put in place by the issuer, which may either be mandated by law or rely solely on the issuer's private commitments. As a result, issuer credibility has a direct bearing on user trust in the various forms of money and, by extension, its value.

Finally, the settlement technology can be either centralised, decentralised or purely bilateral. A physical object, such as cash, enables a peer-to-peer payment transaction that is immediately settled on a bilateral basis as the cash is handed over. Although cryptocurrencies also enable peer-to-peer transactions, they are not settled bilaterally but rather by an independent third party (a publishing node in the case of blockchain⁵⁸). In the traditional financial system, the central bank settles transactions between commercial banks on its centralised ledger, while commercial banks settle transactions between other corporations and individuals on their respective centralised ledgers. Decentralised settlement of cryptocurrencies, in turn, is generally limited to the blockchain environment.

⁵⁶ The key difference between these two forms of money lies in the verification process. Account-based money requires verification of the payers' identity to ascertain their asset ownership rights, while token-based money requires verification of the authenticity of the exchanged object itself. For a wider discussion, see Brunnermeier, M., James, H., and Landau, J.-P. (2019), *The digitalization of money*, *NBER Working Paper* 26300, September 2019.

⁵⁷ Although they can be viewed as digital objects in the context of object-oriented programming, so can all the other types of digitally recorded balances. Ultimately, cryptocurrencies represent a digital record on a distributed ledger.

⁵⁸ As the name blockchain implies, this technology groups transactions into blocks that are consequentially added to the historical chain of previous transaction blocks. Blockchain solutions are superior to other distributed ledger technologies in fully public (permissionless) networks due to the fact that they do not require trust.

3.2.3 *Various types of traditional money*

Various types of money co-exist in our modern economies, including central bank money, commercial bank money and electronic money.

Central-bank money consists of banknotes and coins in circulation (cash) and the electronic accounts held at the central bank (referred to as reserves in the case of credit institutions). These reserves are mainly used for centralised interbank settlement purposes. Together, the two types of central-bank money are known as ‘base money’, which consists of cash in circulation and the deposits that credit institutions hold at the central bank. Central-bank deposits are considered the safest asset in the economy, since the default risk of the central bank is virtually zero and there is no risk of loss through theft or negligence, because this money does not exist outside the centralised internal accounting systems of the central bank. While cash has also virtually no default risk, it is subject to the risk of loss, unlike reserves. Moreover, cash is not an interest-bearing instrument, whereas central-bank deposits are.

At the next level, there is *commercial bank money* used for the settlement of transactions between all other agents. The many types of payment instruments, such as payment cards, generally represent an additional technological layer on top of the network of bank accounts. There are even additional layers above this technical layer, such as Paypal, that can be linked to a payment card, which itself is linked to a bank account. Importantly, most money creation in modern economies takes the form of commercial bank money as banks create deposits through the extension of loans⁵⁹. Commercial bank money is partly backstopped by the government, as a defined amount on the accounts is protected by a deposit guarantee scheme. In addition, banks are subject to strict regulatory standards and they are closely supervised to safeguard their solvency.

There is also *electronic money* (e-money), which is issued at par value in return for a fiat currency deposit. This means that e-money issuance does not have an impact on money creation in the economy. E-money can be used for payment within a closed network or several networks as long as the latter are rendered interoperable. Under dedicated regulatory frameworks, such as the EU Electronic Money Directive⁶⁰, e-money gives the holder the right to be redeemed at par value on demand. Although e-money is not directly backstopped by the government, there are strict regulatory requirements⁶¹ that govern the safekeeping of the deposits against which it has been issued. E-money issuers generally keep these funds in bank deposits and are thus exposed to counterparty risk. In this sense, commercial bank money within the limits of the applicable deposit guarantee scheme is safer than e-money. Despite not being as safe as the commercial bank money covered by the deposit guarantee scheme, e-money can have other advantages. Notably, e-money tends to be better integrated in the digital economy, because its non-bank issuers have a better understanding of user-centric design and social media⁶².

⁵⁹ For an overview, see McLeay, M., Radia, A., and Thomas, R. (2014), Money creation in the modern economy, Bank of England, *Quarterly Bulletin* 2014 Q1, March 2014.

⁶⁰ Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

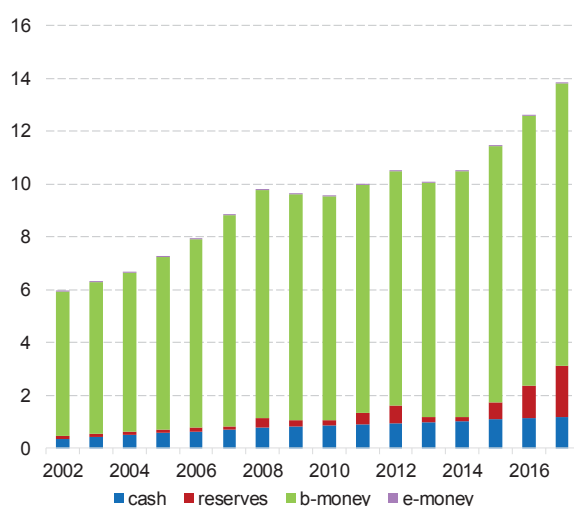
⁶¹ See *infra*.

⁶² For a discussion on other potential advantages, see Adrian, T., and Mancini-Griffoli, T. (2019), The rise of digital money, *IMF FinTech Note* 19/01, July 2019.

Recently, some central banks have introduced the possibility for non-banks, including e-money issuers, to hold funds at the central bank⁶³. Even in this case, individual holders of e-money would have to submit their claims as part of the general bankruptcy proceedings should the e-money issuer default. However, allowing e-money issuers to hold funds at the central bank makes it possible for non-bank e-money issuers to settle in central-bank money across the different e-money schemes, contributing to interoperability at a much higher level of safety. This safety is due to the fact that the deposit funds would no longer be exposed to counterparty risk. This should: (i) contribute to higher trust of e-money issuers in one another; and (ii) improve the competitive position of non-bank e-money issuers in relation to banks. Ultimately, this should also increase the trust of users in e-money.

In the EU, e-money is regulated by the EU Electronic Money Directive and issued by electronic money institutions (EMIs) that include banks and other entities. At the end of 2017, some 69% of all outstanding e-money in the euro area had been issued by banks. The stock of e-money was still negligible at EUR 12.85 billion, representing a mere 0.1% of total ‘broad money’⁶⁴ and central-bank reserves (see Chart 3.1). At the same time, issuance of e-money has experienced very steep growth since 2002, multiplying by a factor of almost 50 in the euro area (see Chart 3.2).

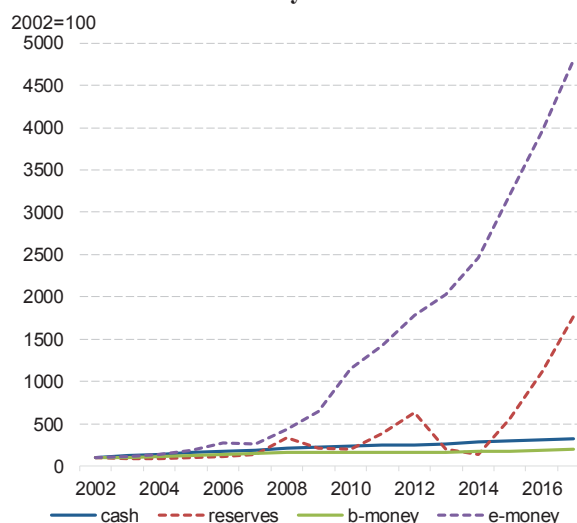
Chart 3.1: Types of money in the euro area



Source: ECB. DG FISMA calculations.

Note: Figures are expressed in trillions of euro. Euro area, changing composition. B-money stands for commercial bank money.

Chart 3.2: Stock of money in the euro area



Source: ECB. DG FISMA calculations.

Note: Euro area, changing composition. B-money stands for commercial bank money.

The only other type of money that has experienced high growth lately is that held in current accounts at the central bank (i.e. bank reserves), which has grown by about 13 times since 2014. However, the volume of reserves is much more volatile than that of any other type of money. In 2017, reserves accounted for 14% of the sum of broad money and central-bank reserves in the euro area, while cash constituted some 8.7%, and commercial bank money

⁶³ For example, this is currently possible in Latvia, Lithuania and the UK.

⁶⁴ Broad money (M3) is associated with the total resources available in the economy for the purchase of goods, services and non-monetary assets as well as for investment expenditures. It consists of very liquid liabilities of domestic credit institutions towards the money-holding sector (i.e. all the other economic agents except for the central government). Broad money includes currency in circulation, overnight deposits, deposits with maturities of up to 2 years, deposits redeemable at notice of up to 3 months, repurchase agreements, money-market-fund shares/units, and debt securities of credit institutions with a maturity of up to 2 years.

accounted for the remaining 77.2%. However, the share of commercial bank money has shrunk considerably from almost 92% in 2002, although its stock now stands at about twice its level in 2002. It is also notable that the use of cash continues to grow; cash is nowhere near extinction.

3.3 Cryptocurrencies as a technology

First and foremost, cryptocurrencies represent a technology that can serve many purposes, including that of a payment instrument in the real economy. As a matter of fact, a core function of native cryptocurrencies is their use as a means of exchange⁶⁵, without which the operation of the respective blockchain would not be possible. In particular, these cryptocurrencies are used to reward the publishing nodes for processing transactions by means of transaction fees and the so-called block reward. The global market capitalisation of cryptocurrencies reached some EUR 190 billion at the end of November 2019, with bitcoin alone accounting for some two thirds of that at EUR 125 billion⁶⁶.

3.3.1 *The promise of programmable money*

Cryptocurrencies are very diverse, since the only commonality among them is the underlying distributed ledger technology (DLT)⁶⁷. Issuers have technological freedom when it comes to the specific features of each individual cryptocurrency. There are established cryptocurrencies that have their own unit of account and the value of which is not linked to anything else, such as bitcoin, litecoin and ether. Cryptocurrencies can serve as e-money in the legal sense of this term, provided they are issued in full compliance with the applicable regulations. As a matter of fact, licenced e-money issuers on a distributed ledger⁶⁸ already exist, and a project called Finality has been launched to bring cryptocurrency technology to the wholesale banking markets in 2020⁶⁹.

Ultimately, cryptocurrency technology enables programmable money, i.e. money that can be used in fully automated machine-to-machine transactions without any need for third-party intervention. These additional capabilities offered by cryptocurrencies relate to the potential use of so-called smart contracts. Smart contracts are pieces of code that transfer cryptocurrency from one address to another based on a predefined condition (trigger). Thus, they allow for automatic execution⁷⁰ of both commercial and financial transactions in accordance with a set of hard coded rules, which are set in advance. This holds the promise of substantial efficiency gains by avoiding the need for either manual processing or third-party intervention altogether. Allowing for direct machine-to-machine transactions is important for

⁶⁵ ‘Native’ means that the cryptocurrency is embedded in the distributed ledger (e.g. blockchain in the case of bitcoin) at protocol level and forms an integral part of the distributed ledger that is indispensable for its functioning.

⁶⁶ As reported on <https://www.coinmarketcap.com>.

⁶⁷ DLT refers to protocols and the supporting infrastructure that allow a distributed network of computers to propose and validate transactions, updating numerous copies of the same ledger in a synchronised way across the entire network. Blockchain is one type of DLT infrastructure, whereas other DLT solutions allow for consensus on an individual transaction basis instead of blocks.

⁶⁸ See e.g. <https://www.monerium.com>.

⁶⁹ <https://www.coindesk.com/finality-utility-settlement-coin-central-bank-token-blockchain>

⁷⁰ The adjective ‘smart’ mainly refers to the ‘automated’ execution. Legally speaking, however, the use of smart contracts does not preclude the possibility that a party to such a contract contests its validity after it has been executed.

the general efficiency of the digital economy and the roll-out of the so-called internet-of-things infrastructure⁷¹.

Automated transaction execution can improve efficiency in the financial sector when it comes to contract enforcement. Smart contracts may also eliminate counterparty risk in specific financial transactions by ensuring that a payment is made only after the smart contract has received the reciprocal item for which the payment is due. For example, smart contracts could be used for securities transactions to ensure real time delivery against payment without counterparty risk. This would not only be much more efficient than today, but it would also save banks a lot of money in regulatory capital and operational cost⁷².

Several pilot projects have been implemented in the private sector, on both the primary issuance of securities and the tokenisation of existing securities⁷³. At present, the settlement of such transactions typically takes 2 days, which is inefficient from a risk-management perspective. In addition, asset managers see potential in applying DLT to asset transfers; ownership registry management; know-your-customer (KYC) processes; and automated execution of business rules. These examples illustrate how cryptocurrency functionality may go far beyond simple payments when combined with other DLT-based applications. Thus asset managers also see a pressing need for putting fiat currency on a distributed ledger. The latter is also referred to as ‘cash on ledger’, which can effectively mean either privately issued cryptocurrency (e.g. under the legal framework of e-money as discussed below) or central-bank cryptocurrency (CBCC), which is discussed in Section 3.4.

3.3.2 *The quest for stability: ‘stablecoins’*

The wider adoption of cryptocurrencies as a means of payment has been hampered by the high volatility of their value in terms of an official unit of account, such as the euro. To remedy this problem of volatility, there have been numerous attempts to design a stable cryptocurrency, generally referred to as ‘stablecoin’. A recent survey of EU national supervisory authorities, carried out by ESMA, collected feedback on market developments around stablecoins and their possible regulatory status. Private-sector firms have approached 10 of the national supervisory authorities to discuss specific stablecoin designs. 7 out of those 10 supervisors have analysed the potential regulatory qualification of such stablecoin designs, with 2 of them issuing guidance or public statements⁷⁴.

Depending on the specific implementation analysed, supervisors found that some of the stablecoins could qualify as e-money, and some as transferable securities. They also found

⁷¹ The internet of things involves a network of publicly accessible sensors and other data captors that are open to be called by external computer programmes via application programming interfaces (APIs) against a fee. This kind of automated machine-to-machine interaction requires a trusted digital payment instrument on a distributed ledger to function. For example, see https://www.commerzbank.com/en/hauptnavigation/presse/pressemittelungen/archiv1/2019/quartal_19_03/presse_archiv_detail_19_03_82762.html.

⁷² The use of DLT could save banks some EUR 15 billion annually as a result of increased efficiency and reduced reconciliation costs in securities clearing and settlement according to Santander, InnoVentures, Oliver Wyman, and Anthemis Group (2015), The FinTech 2.0 paper: rebooting financial services, https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2015/jun/The_Fintech_2_0_Paper_Final_PV.pdf.

⁷³ Tokenisation implies putting existing securities onto a distributed ledger in a similar manner to money.

⁷⁴ See <https://www.mfsa.mt/wp-content/uploads/2019/04/PR-VFA-Agents-In-Principle-Approvals-02-04-20191.pdf> and <https://www.fca.org.uk/news/speeches/regulating-financial-innovation-going-behind-scenes>.

that one could qualify as a money market instrument, one as a unit in a collective investment undertaking (UCITS), and one as a derivative instrument. Overall, supervisors highlighted the need for a case-by-case approach for qualifying stablecoins. Furthermore, several supervisors mentioned that the Markets in Financial Instruments Directive (MiFID II)⁷⁵, Payment Services Directive (PSD2)⁷⁶ and Anti-Money Laundering Directive (AMLD5)⁷⁷ could apply to stablecoins, with one supervisor highlighting that AMLD5 implementation would lead to a requirement that all stablecoins must have licences to operate. Other supervisors highlighted that there would be implications for licensing/registration requirements depending on whether the stablecoin: (i) had a legal qualification as a financial instrument or e-money; and/or (ii) was traded on an exchange.

Considering the role of stablecoins in the wider financial system, their payment related functions may fall under the Eurosystem oversight in accordance with the ECB's mandate to promote the smooth operation of payment systems. Notwithstanding the eventual qualification of specific stablecoins under EU financial regulation, entities within a stablecoin ecosystem that provide for the transfer of stablecoins or offer end-users electronic payment instruments enabling the transfer or withdrawal of value, could be subject to the Eurosystem oversight framework for payment systems, payment schemes or payment instruments.

The ECB performed economic analysis of 54 stablecoins and categorised them according to their backstop, differentiating among: fiat-backed, collateralised and algorithmic stablecoins⁷⁸. The total market value of global stablecoins almost tripled between the start of 2018 and mid-2019 to reach EUR 4.3 billion. Out of the 54 stablecoins studied, 30 fall into the category of fiat-backed, 13 are collateralised and 11 algorithmic. 4 fiat-backed stablecoins and 2 other stablecoins are based in the EU-27. The largest stablecoin backed by the euro (stasis euro) has some 32 million coins in circulation, representing just 0.25% of the e-money issued in the euro area (see Section 3.2.2).

Fiat-backed stablecoins are backed by fiat money that the issuer holds for safekeeping, either directly or via a custodian to ensure redemption. If issued at par against the domestic unit of account, and provided holders enjoy a direct right of redemption from the issuer, this approach would differ from the traditional e-money approach or other pre-funded payment systems in nothing but the underlying technology used. The business model of fiat-backed stablecoins predominantly relies on redemption fees (changing the stablecoin back into the fiat currency itself), which typically constitute up to 3% of the value of the stablecoin itself. In principle, fiat-backed stablecoins are designed to have a fixed value in the respective fiat currency, except when they are backed up by a mix of different currencies, as initially proposed in the case of libra (see Box 1). Depending on their particular features, stablecoins

⁷⁵ Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61.

⁷⁶ Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC.

⁷⁷ Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU.

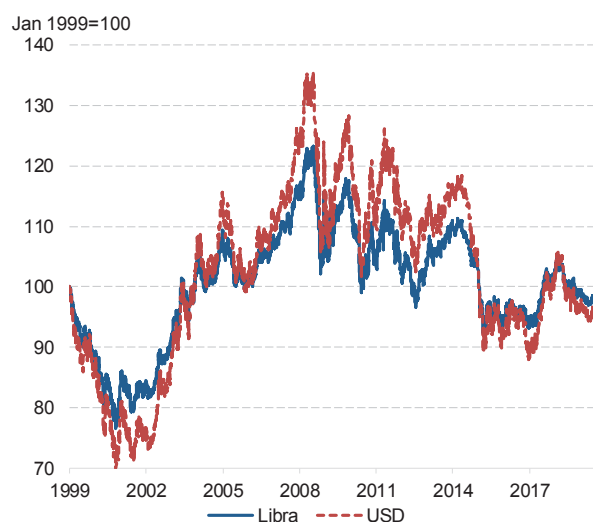
⁷⁸ Bullmann, D., Klemm, J., and Pinna, A. (2019), In search of stability in crypto-assets: are stablecoins the solution?, ECB, *Occasional Paper Series* 230, August 2019.

backed by a single fiat currency can qualify as e-money⁷⁹ and they can effectively be fungible with other types of money denominated in the same unit of account. However, not all stablecoins involve a direct redemption right. Instead, access to such stablecoins takes place via an exchange, and their value is rather variable⁸⁰. Ultimately, the value of fiat-backed stablecoins is truly stable only to the extent that users have full trust in the issuer.

Box 1: The case of the libra stablecoin

The libra stablecoin proposed by Facebook was initially intended to be backed by a basket of currencies and would not grant holders any direct redemption rights. This means that it would not really have been stable in any of the individual basket currencies. From the perspective of the euro unit of account, libra would largely track the EUR/USD exchange rate, albeit with lower volatility, due to the 50% weight of USD in the basket⁸¹. As can be seen in Chart B1.1, the stablecoin Libra would have actually fluctuated roughly within a 20% band against the value of the euro. It can therefore hardly be described as stable in euro terms. More recently, however, it has been announced that Facebook may not choose to follow this approach after all and is also open to introducing a simple fiat-backed stablecoin tracking a single fiat currency⁸².

Chart B1.1: Libra and USD versus EUR



Source: ECB. DG FISMA illustrative calculations based on the September 2019 announcement that the reserve basket backing up Libra would be denominated in its constituent currencies with the following weighting: 50% USD; 18% EUR; 14% JPY; 11% GBP; and 7% SGD (Singapore dollar).

The ECB paper concluded that stablecoins do not seem to have the potential to radically change the area of retail payments in economies with a reputation for price stability and well-functioning payment systems⁸³. To further complicate matters, there are regulatory requirements for the use of specific types of money in wholesale transactions, such as securities transactions, that require settlement in either central-bank money or money with minimal liquidity and credit risk. In addition, the ECB paper considered that competition from banks based on traditional commercial bank money and/or e-money on a distributed ledger should not be underestimated. Trusted entities could use the same technologies to reap the promised efficiency gains in the same way as stablecoin issuers. Nevertheless, the paper notes

⁷⁹ Notably, the EU Electronic Money Directive requires issuers to redeem e-money at par on demand and to hold the funds backing up the e-money in a bankruptcy remote account. Licensed e-money institutions are also subject to capital and liquidity requirements. For further details, see Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

⁸⁰ See for example the case of the tether (USDT) stablecoin referred to in Bullmann, D., Klemm, J., and Pinna, A. (2019), In search of stability in crypto-assets: are stablecoins the solution?, ECB, *Occasional Paper Series* 230, August 2019.

⁸¹ <https://www.coindesk.com/facebook-reveals-libra-cryptos-currency-basket-breakdown-report>.

⁸² <https://www.reuters.com/article/us-imf-worldbank-facebook/facebook-open-to-currency-pegged-stablecoins-for-libra-project-idUSKBN1WZ0NX>.

⁸³ Bullmann, D., Klemm, J., and Pinna, A. (2019), In search of stability in crypto-assets: are stablecoins the solution?, ECB, *Occasional Paper Series* 230, August 2019.

that stablecoins could present some opportunities in terms of cheap, fast and efficient cross-border payments outside the EU.

3.3.3 *Operational risk related to custody*

Although cryptocurrencies may indeed hold promise for substantial innovation, the custody of cryptocurrencies is not without risks. The related operational risk is currently very high in the cryptocurrency environment compared to the traditional financial system. This is because the cryptocurrency environment involves the safekeeping of the so-called private key that enables users to sign their transactions. In the crypto-asset environment, the person who possesses the private key has de facto control over the assets. This makes cryptoassets highly vulnerable to the risk of loss, either due to theft through hacking or through misplacing or losing the private key. In September 2018, Chainalysis estimated that lost private keys were responsible for the immobilisation of at least 7% of the entire bitcoin supply, which amounted to 1.5 million bitcoins with a total market value of some EUR 8 billion at the time. The crypto-asset custody-services provider Ledger estimates that an additional EUR 1.5 billion in cryptocurrency was stolen last year, and that over EUR 3.5 billion was stolen in the first 10 months of 2019⁸⁴.

There are broadly three ways to manage the custody of cryptocurrencies: self-custody, custodial wallets and co-signing services. Self-custody and custodial wallets largely share similar technology, with the only difference being the location of private keys. In addition, the safety of custodial wallets can be enhanced through accumulation of dedicated reserves and/or insurance.

As suggested by the name, self-custody means that users store the private key themselves. Custodial wallets imply that the assets are kept in custody on behalf of users by a third party, typically a cryptocurrency exchange. Self-custody is mostly used by private individuals or small asset managers. There are three options for self-custody: paper wallets, software wallets and hardware wallets. It is important to note that providers of such software and hardware solutions cannot be considered custodians, since it is the asset owner that assumes full responsibility for the safekeeping of the private key.

Paper wallets imply the printing of private keys onto a piece of paper and then storing that piece of paper somewhere. Even though more innovative approaches exist, such as engraving the private key onto a piece of metal that is resistant to high temperatures, paper-wallet methods do not sound like a very robust form of safekeeping. Software wallets are a computer programme that stores the private key on a computer, which can either be connected to the internet ('hot storage') or not connected ('cold storage') to mitigate the risk of hacking. Finally, hardware wallets store the private key on a small encrypted device, which is plugged into a computer only to perform a transaction. Co-signing services, where none of the individual parties are able to sign off a transfer on their own, also do not involve a third-party custodian.

There is a general market trend towards the adoption of custodial wallets as the most optimal form of risk management. Asset managers are not specialists in the safekeeping of

⁸⁴ <https://www.theblockcrypto.com/post/45706/ledger-vault-is-transforming-cryptocurrency-custody-for-institutions>

cryptoassets and this is why they are migrating from self-custody to third-party custodial services. On the supply side, regulated financial firms, such as Fidelity and Nomura⁸⁵, are already entering this business in the US to meet the growing demand from institutional investors. As an alternative, custodial wallets run by cryptocurrency exchanges, such as Coinbase, are also likely to continue their growth. Coinbase is also likely to remain a highly popular choice for retail clients. Some EU Member States are also adjusting their regulatory frameworks to cater for the supply of crypto-asset custody services⁸⁶.

3.4 Central-bank-issued cryptocurrency

The demand for a stable cryptocurrency has fuelled the wider discussion about the usefulness and the associated risks of cash on ledger, which can be either privately or publicly issued. This section discusses fully-fledged central-bank cryptocurrency (CBCC).

3.4.1 CBCC design choices

The first key challenge is the issuance of CBCC. Some central banks experimenting with DLT have considered using digital depository receipts, whereby wholesale-only CBCC is issued against central bank reserves held in a segregated account. A project led by the Bank of Canada created CBCC at the beginning of the day and redeemed it at the close of business, leaving no open positions overnight. However, this approach seems to constrain unnecessarily the efficiency potential of CBCC, which should be accessible on a 24/7 basis. A project led by the Monetary Authority of Singapore followed a different approach by not limiting access to CBCC to its own opening hours. A third approach could be a more general-purpose CBCC⁸⁷, which could be issued against commercial bank reserves at the central bank in the same way as cash.

The Bank for International Settlements has compiled a list of the various design choices for a CBCC⁸⁸, including: access (universal versus restricted), degree of anonymity, operational availability (opening hours only vs 24/7), and interest-bearing features⁸⁹. To ensure 24/7 availability of a general-purpose CBCC, some central banks are even looking into the offline capabilities of digital wallets, so that CBCC would be available even without internet access. The case for wholesale-only CBCC would depend on its ability to improve settlement efficiency in operational costs, collateral use and liquidity. If non-banks were also allowed to participate in the settlement process, CBCC benefits would increase further in the areas of asset transfer, authentication, record-keeping, data management and risk management. CBCC

⁸⁵ <https://www.globalcustodian.com/nomura-jv-gains-regulatory-approval-crypto-custody-depository-services-jersey/>

⁸⁶ For example, Germany has subjected crypto-asset custody services to financial-sector supervision and introduced a licencing requirement as of January 2020.

⁸⁷ Many central banks have been analysing the pros and cons of CBCC, with the debate largely organised into two somewhat separate discussions: CBCC at wholesale level and that at retail level. The first would serve the purpose of a restricted-access digital settlement money for wholesale payment (i.e. payment between financial institutions) applications, while the second would be a universally accessible payment instrument at retail level. Nevertheless, this distinction is predicated on the existing practice of dividing payments into retail and wholesale segments, which may prove less relevant in a CBCC world. This is why 'general purpose' is substituted for 'retail' in this chapter, as also used in Bank for International Settlements (2018), *Central bank digital currencies*, BIS, CPMI Markets Committee, BIS, March 2018.

⁸⁸ Bank for International Settlements (2018), *Central bank digital currencies*, BIS, CPMI Markets Committee, BIS, March 2018.

⁸⁹ For example, Sweden's e-krona may have a built-in interest payment capability.

therefore has the potential of becoming a liquid and credit-risk-free asset that can facilitate final settlement.

Most of the alleged benefits of general-purpose CBCC could be achieved by simply giving the general public access to accounts at the central bank⁹⁰. However, general-purpose CBCC would offer the additional benefit of enabling automated transaction execution via smart contracts. Moreover, the transaction traceability associated with CBCC may also present benefits for anti-money-laundering (AML) and counter-terrorism-financing (CFT) requirements. At the same time, it is highly unlikely that central banks would want to provide custody services to the general public due to the various steps involved in the process, such as KYC, and AML/CFT requirements. These steps would be costly and might put a central bank's reputation at risk. The private sector is likely to have a comparative advantage in providing these services, partly due to the positive effects of competition in the market.

Non-interest-bearing general-purpose CBCC might primarily substitute for cash, whereas interest-bearing CBCC would likely prove attractive to financial market participants, such as asset managers. If it were available to institutional investors, CBCC could assume the role of a safe asset for investment, akin to tradeable, interest-bearing central-bank reserves or reverse repo facilities. CBCC could also theoretically serve as a safe asset for individual investors. However, it is not obvious that CBCC could be considered as being on a par with central bank accounts in terms of safety due to the operational risk related to custody of cryptocurrencies in general (see Section 3.3.3). To reach the same level of safety, CBCC would have to be stored in custodial wallets run by the central bank. As long as CBCC was stored outside the central bank, it would be subject to: (i) the risk of theft or loss in cases of self-custody, just as cash is; and (ii) the default risk of a custodian in the case of custodial wallet solutions. Depending on its design, CBCC may also involve the risk of disintermediating banks and changing the role central banks play in the economy, as discussed below.

3.4.2 Potential impact on monetary policy

General purpose CBCC could open up a direct monetary policy channel to the general public, even if the central bank is not a custodian of this money, as CBCC could be an interest-bearing instrument. The monetary policy implications could be more pronounced if CBCC also became an attractive asset to hold. Negative rates on CBCC could provide the monetary stimulus needed in extreme circumstances. Overall, however, the Bank of International Settlements considers that there are other ways to achieve similar effects with conventional monetary-policy tools.⁹¹

It could be argued that general purpose CBCC would cannibalise traditional cash and negatively affect commercial bank deposits for transaction purposes. Demand for CBCC could drain the amount of commercial bank reserves in the same way as demand for cash does. In particular, CBCC could outcompete cash if it is interest-bearing. If CBCC really took off, some of the money creation might shift to central banks. For example, should commercial bank loans be immediately swapped into CBCC, this would act as a permanent drain on

⁹⁰ Bech, M., and Garratt, R. (2017), Central bank cryptocurrencies, *BIS Quarterly Review*, September 2017.

⁹¹ Bank for International Settlements (2018), *Central bank digital currencies*, BIS, CPMI Markets Committee, BIS, March 2018.

commercial bank reserves at the central bank. Hypothetically, a substantial shift of funds from existing commercial bank deposits into CBCC would have similar effects. However, the insured share of commercial bank deposits could still remain a very attractive safe asset from the savers' point of view, acting as a break to any deposit flight into CBCC.

All flows in and out of CBCC would need to be compensated for through open market operations to maintain the desired amount of reserves. In this sense, CBCC would not alter the basic mechanics of monetary-policy implementation. Should demand for CBCC become very high, this could either: (i) substantially constrain money supply due to the shortage of eligible collateral; or else (ii) lead to worsening collateral quality should the central bank expand the basket of eligible collateral in response, part of which would presumably be composed of riskier and less liquid securities, affecting their prices and market functioning. Thus, central banks could end up exerting a large impact on financial conditions, also for sovereigns, and having a riskier balance sheet.

Funding market liquidity could also change should the demand for CBCC exceed the corresponding decline in the demand for cash and commercial bank reserves. This could lead to a decline in the depth of repo and short-term government bond markets, reducing interbank activity and the price discovery role of wholesale markets. Money market issuers and borrowers in repo markets might see more competition and therefore higher rates. Issuers of claims bought by the central bank would, in turn, experience higher demand. They would also gain from the downward pressure on the yields of such claims. Ultimately, this might have financial stability implications.

3.4.3 *Potential impact on financial intermediation*

To the extent that CBCC would further open payment markets to non-banks (since payments entirely outside the current-account-based system would become possible) commercial banks might see their payment revenues decline as a result of more intense competition. Private-sector financial market infrastructures, such as central counterparties and securities-settlement systems, could also be negatively affected by CBCC. This is because CBCC might allow market participants to interact directly without these intermediaries. However, this is precisely the objective of introducing CBCC in the first place.

General purpose CBCC could have a large impact on financial intermediation⁹². Any substantial flow of retail deposits into CBCC could drain commercial banks of low-cost and stable funding. Banks could counter this through a combination of the following three actions: (i) improving their service offering; (ii) tapping other funding sources (such as more costly wholesale funds); and/or (iii) paying higher interest on their deposits. The second and third action would be likely to have a negative impact on bank profitability unless banks simultaneously increased lending rates. Some banks might even have to shrink their balance sheets. Financial stability implications could arise if banks attempted to offset a higher cost of funding by engaging in riskier lending to restore profitability. A risk of runs from bank deposits into CBCC is also a possibility. Nevertheless, central banks could always lend the

⁹² Bank for International Settlements (2018), *Central bank digital currencies*, BIS, CPMI Markets Committee, BIS, March 2018.

funds diverted from bank deposits into CBCC back to banks, as long as the banks hold eligible collateral, a decision that would, however, increase money supply.

In any case, one should compare these risks to the baseline. The possibility for bank runs already exists and it is partly mitigated by the existing national deposit guarantee schemes. CBCC would hardly facilitate the run, since it would not constitute the reason for the run in any way. If there is a run on a bank, any alternative asset to deposits at that bank is good enough, and other safe and liquid assets beyond CBCC already exist. Furthermore, as mentioned before, it is not obvious that CBCC would become a store of value due to the associated operational risks. As there is no incentive for central banks to provide custodial wallet services, these services could well be provided by banks. In such a case, the logic of a flight from commercial bank deposits into CBCC would break down, illustrating the fact that the specific asset type is not the reason for the run. Instead, the reason for the run is the potentially insolvent institution that has custody over both types of assets.

Last but not least, CBCC could have international implications if non-residents were allowed to hold and transact in it. As a result, foreign entities might be able to provide payment services denominated in the CBCC unit of account. This could raise the risk of substitution of foreign currency for the domestic one ('dollarisation').

More broadly, it could be argued that banks face the risk of being disintermediated in the area of payments and the distribution of other financial products, such as investment funds, due to the expected shift from a bank-centric model of financial service provision to a user-centric distribution via digital platforms. In any case, the ultimate market outcome is not likely to be determined by technology alone, but rather by whatever is the most effective business model that improves user experience. For example, although traditional payment systems may be perfectly efficient on their own, they may lose out to payment solutions that are embedded in social networks simply because traditional payment systems might not appear among the social network's in-app payment features.

At the same time, there may also be opportunities for banks to earn new types of revenues in this new setting. For example, cash is distributed by commercial banks, so CBCC could be, too. Banks could even act as publishing nodes in the CBCC distributed network. Banks could also provide custodial wallets and earn a custody fee. Under this scenario, they could also swap the CBCC held in custody into reserves at the central bank and increase traditional lending to earn a profit or lend out CBCC directly.

3.5 The changing nature of currency competition

The technology underlying cryptocurrencies and the coupling of cryptocurrencies with other digital networks have the potential to change the nature of currency competition⁹³. Issuers can

⁹³ Brunnermeier, M., James, H., and Landau, J.-P. (2019), The digitalization of money, *NBER Working Paper 26300*, September 2019.

take advantage of existing user networks, facilitating both: (i) information diffusion about the new currency; and (ii) adoption of the currency itself. However, it is worth noting that the processing of personal data is regulated by the General Data Protection Regulation (GDPR)⁹⁴. In this regard, any business solution needs to comply with the GDPR rules. Furthermore, cryptocurrencies are free from some of the constraints facing traditional currencies in cross-border transactions to the extent that cryptocurrencies enable direct peer-to-peer transfers. The costs of switching between various service providers are also likely to be lower in a digital environment than in the traditional setting.

When switching costs are low and there is convertibility between currencies and different types of money, it may no longer be necessary to use one and the same currency for all three functions of money (i.e. as a unit of account, a medium of exchange, and a store of value). This could motivate users to choose a different currency for each separate function. Arguably, this applies even to the unit-of-account function of money, because digital technologies today enable agents to swap into a different unit of account for the purposes of an immediate transaction, with their counterparties swapping out right after the transaction. For example, this is how bitcoin is often used when it is accepted by merchants as a means of payment: they receive payment in bitcoin and immediately swap it into a traditional currency. This prompts a wider question as to whether in this context bitcoin can be considered a currency in the real sense of the word or a mere payment instrument.

As digitalisation facilitates the unbundling of the three functions of money, digital platforms may be particularly keen to embed the means-of-exchange function in their ecosystems where consumers, merchants and service providers interact. In this context, the main objective would be to increase the added value to platform users by improving the user experience. This improved user experience would be achieved both: (i) directly through the added payment functionality; and (ii) indirectly through the use of the additional payment data collected as part of the transactions executed on the platform. Improved user experience would facilitate both new-user acquisition and existing-user retention. For example, adding a value transfer functionality within an app is likely to improve user experience of social-network users, and the platform would likely benefit as a result even if it did not take a transaction fee. In other words, digital currencies embedded in digital platforms would become bundled with the services of those platforms, which would make switching to other digital platforms even more difficult.

Digital platforms have economic incentives to develop as closed ecosystems, so that they can collect as much data as possible to improve the user experience. By extension, platforms have no incentives to provide for interoperability with other platforms. The same incentives apply for the convertibility of the currencies used for transactions on such platforms. Most transactions on sufficiently large digital platforms can be settled within the network, and therefore may not require convertibility into the domestic unit of account. The larger the network, the smaller the need for an outside settlement asset. As a result, the need for traditional base money to serve as a medium of exchange may decrease. Ultimately, the interoperability of platforms and convertibility of platform currencies into both one another

⁹⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC.

and the domestic unit of account is crucial to safeguarding an integrated financial system, which is critical for the efficient functioning of the monetary system⁹⁵. The traditional account-based settlement technologies ensure that no single participant has a pure network advantage over others, no matter how large their own network. For example, settlement in central-bank money is accessible to all banks irrespective of the size of their client base.

Should payments migrate from the banking sector to the digital platform ecosystem, banks are likely to lose their already weak client ownership altogether. The National Bureau of Economic Research (NBER) describes a scenario where the current industrial organisation of financial services centred around banks could be replaced by a digital platform model organised around payments and underpinned by a digital currency⁹⁶. Other financial services could also be distributed on top of this payment platform, with banks directly competing for each client transaction with each other. Once users carry out their payments on a platform, they may also wish to seek credit, use savings instruments, and benefit from financial planning services/advice. Some asset managers also see the potential of such a business model to cut out the intermediaries in investment fund distribution, which are mostly banks.

Overall, such a model would imply much more intense competition among banks, and potentially also between banks and other financial-service providers. The worst scenario for banks would be their complete disintermediation from the provision of payment accounts, as this would deprive them of the related transaction data. The ultimate effect on the banking sector would also depend on the particular type of money adopted by such platforms. In the case of e-money, for example, issuers might choose to hold a large share of their deposits at commercial banks, even if central-bank accounts were accessible to them, simply to earn a higher return.

3.6 Conclusions and policy considerations

Cryptocurrencies and traditional account-based settlement systems are complementary. A cryptocurrency ledger only provides for a register of transactions, whereas account-based systems track liabilities by recording claims on the ledger's owner. The EU financial sector and the economy at large could benefit in several respects from the cash on ledger that is denominated in the domestic unit of account. It could make economic and financial processes more efficient and open the door to the broader innovation potential inherent in the use of smart contracts and automated machine-to-machine transactions.

Even though central banks are still studying whether CBCC could offer any net benefits over existing technologies and assess potential CBDC use cases, the private sector has already spoken by investing substantial amounts to make a private solution for cash on ledger a reality. A private software tool for cash on ledger already exists and further work to scale it up is ongoing, with the objective of improving the functionality of money and enabling related innovation. Both a CBCC and a private-sector solution could be effective in unleashing innovation. Except for some illegal use cases, it is difficult to see how a private-sector

⁹⁵ A good or service on a platform can be accessed either by being able to pay in another currency directly on the platform (interoperability) or being able to convert another currency into the currency used on the platform (convertibility).

⁹⁶ Brunnermeier, M., James, H., and Landau, J.-P. (2019), The digitalization of money, *NBER Working Paper* 26300, September 2019.

solution could compete on an equal footing with a CBCC in the same space, however, given that a CBCC would be less risky than any private-sector solution, as the central bank would effectively bear all the risk on its own balance sheet. Although both CBCC and private-sector solutions would be vulnerable to the risk of loss through theft, hacking or misplacement, CBCC may have another advantage over private-sector solutions. It would serve as a single platform open to innovation on top of it, whereas the private sector is likely to introduce many competing versions of cash on ledger, potentially fragmenting the basic foundation of digital finance.

Should central banks decide to issue anything at all, it would be difficult to see the case for two parallel CBCCs: one for wholesale use and another one for retail use. It seems more likely therefore that there could either be no CBCC, a wholesale CBCC only, or a general-purpose CBCC. The choice between these three could have direct implications for private-sector solutions, which could fill the corresponding gap as follows: either by issuing cash on ledger for all segments; issuing cash for the retail segment only; or not issuing anything. Such an approach could ensure complementarity between CBCC and private-sector solutions. In light of this, it could be argued that central banks should preferably make their move swiftly if they decide to introduce a CBCC to avoid inefficient allocation of resources in the private sector.

Building on the existing private-sector solutions for cash on ledger, notably those issued under the legal framework of e-money, it could seem worthwhile to pursue further the approach in which client funds are stored in segregated accounts at the central bank. The International Monetary Fund (IMF) refers to this approach as ‘synthetic’ CBCC⁹⁷. Such an approach could possibly be a cheaper and less risky model for central banks than a fully-fledged CBCC. In addition, this approach could enhance trust in cash on ledger due to safe investment policy and strict regulatory oversight. It might also play a role in facilitating the interoperability of various private-sector solutions if these accounts are also used for settlement purposes between e-money institutions, as this would enable one private issuer to redeem crypto e-money issued by another. However, this might damage the deposit funding of commercial banks should issuance of such crypto e-money take off on a large scale⁹⁸.

Overall, interoperability would likely have to be ensured across any private-sector solutions, which would serve to protect consumers from platform monopoly power by safeguarding healthy competition. In addition, any solution needs to comply with the GDPR, in particular with the purpose limitation principle. Although some banks have expressed concerns about how the Payment Service Directive (PSD2)⁹⁹ could threaten the level-playing field in payment services, PSD2 may yet serve well the banks themselves, should a generalised shift of payment services to digital platforms take place. This is because the right of access to payments data enshrined in PSD2 would allow disintermediated banks to remain active in the payments market. It would be most likely preferable to maintain the full convertibility among

⁹⁷ Adrian, T., and Mancini-Griffoli, T. (2019), The rise of digital money, *IMF FinTech Note* 19/01, July 2019.

⁹⁸ Some private-sector stakeholders have expressed doubts about the viability of such a private sector solution precisely due to the requirement to back the cash ledger with a full deposit, which is deemed inefficient. Note also that even CBCC would be issued in exchange for another asset on a one-to-one basis, be it commercial bank reserves at the central bank (as in the case of cash issuance) or other assets, such as government bonds.

⁹⁹ Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC.

all types of money so as to preserve the uniformity of money. For monetary policy to influence credit provision and risk sharing, public money must be used at least as a unit of account. Hence, one should preferably request convertibility of any type of money or currency used on a digital platform into the official unit of account to ensure minimal friction when moving money in and out of a digital platform.

Turning to the question of whether cash on ledger would be used more as a means of exchange or a store of value, it should be noted that DLT enables meaningful peer-to-peer transactions only as long as cryptocurrency is held in self-custody. Also, machine-to-machine transactions and the use of smart contracts are both more relevant for transaction purposes. Thus, it seems that the main function of cash on ledger would be as a means of exchange. In terms of a store of value, access to accounts at the central bank seem to be the only safe asset solution that would make a real difference. Cash on ledger does not seem conducive to serve as a safe asset due to its general exposure to the risk of loss through theft or misplacement, unless it is kept in a custodial wallet run by the central bank. In any case, to the extent that cash on ledger would be used as a store of value, the use of custodial wallets could be expected to be widespread. However, individuals would also be likely to hold relatively small amounts of cash on ledger in self-custody for transaction purposes.

Work is ongoing to ensure that the EU regulatory framework in the financial sector is fully fit for purpose in dealing with the digitalisation of finance. This work applies notably to the introduction and use of cryptocurrencies where additional efforts have been taken to coordinate the relevant policy approaches with the EU's major international partners.

Chapter 4 TOWARDS CROSS-BORDER BANKING: THE NEED FOR A GENUINE SINGLE MARKET FOR BANKING

The European banking sector has been under immense adjustment pressure over the last decade, although both the nature of the challenges and the Member States most affected have changed over time. As already discussed in Chapter 1, low interest rates compromise banks' margins on traditional lending business, while intense competition from EU banks and international investment banks erodes banks' capacity to expand non-interest income. Furthermore, technological progress reduces the impact of geographic proximity in banking. This leads to new competition from FinTech firms that compete in business areas such as payments, where banks traditionally earned a stable share of their revenues. Chapters 2 and 3 discussed some of the challenges arising from the digital transformation.

In the aftermath of the 2008 financial crisis, banks strategically retreated to their domestic market. This development was a global trend, but only in the EU has it become persistent¹⁰⁰. Banks in the EU missed out on the opportunities offered by the single market to expand and diversify their activities within the EU. Against this background, this chapter aims to make the case that increased cross-border banking would facilitate adjustment in the EU banking sector in response to three trends: (i) low profitability; (ii) weak market valuations; and (iii) the structural changes to the demand for banking products and services (including the changes presented in the previous chapters). The chapter reprises the main economic benefits of cross-border banking and elaborates on the risks that explain why policies have become less supportive to cross-border banking over the last decade. It reviews some of the obstacles to greater cross-border banking and how these obstacles could be addressed.

4.1 The development of cross-border banking in the EU

Stagnant cross-border banking and the prevailing market fragmentation in the EU have resulted in a high dispersion of bank lending and deposit rates. They have also resulted in a low share of cross-border provision of banking services such as credit to non-banks.

An important complement to cross-border lending is the activity of local banks that are controlled by foreign banks¹⁰¹. These banks are subsidiaries or branches of larger banking groups headquartered in other EU Member States or in countries outside the EU. Local banks controlled by foreign banks represent about 20-25% of the total assets of the EU banking sector¹⁰². As shown in Chart 4.1, the market share of entities (both branches and subsidiaries) owned by EU parents has declined over the last decade, as EU banks shied away from searching for business opportunities outside their home market after the financial crisis. In contrast, non-EU banks (and in particular US investment banks) have expanded their cross-

¹⁰⁰ See Schmit, M., and Tirpák, M. (2017), Cross-border banking in the euro area since the crisis: what is driving the great retrenchment?, ECB, *Financial Stability Review*, November 2017; and McCauley, et al. (2019).

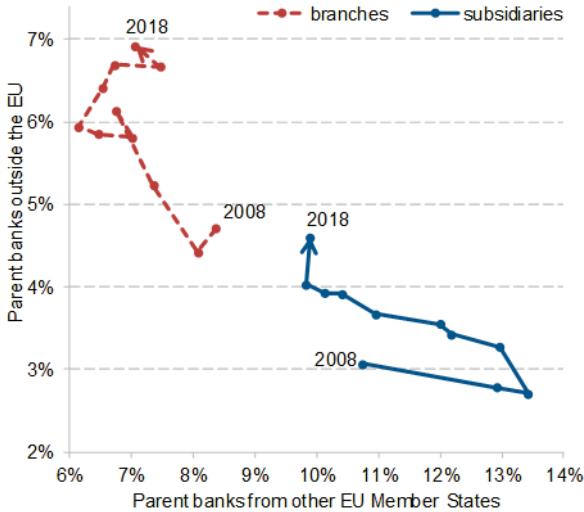
¹⁰¹ The importance of foreign affiliates is also underlined by the empirical finding that about three quarters of cross-border trade in global financial services takes place through the establishment of a commercial presence abroad. For further details, see World Trade Organisation (2019), *World Trade Report 2019, The future of service trade*, Geneva, https://www.wto.org/english/res_e/publications_e/wtr19_e.htm.

¹⁰² Measured with consolidated banking data.

border activity in the EU. This has led to an increase in the market share of entities owned by non-EU parents.

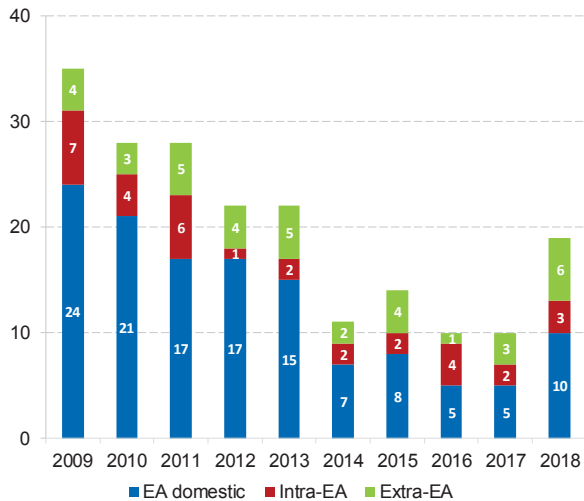
Banks often expand their activities in a foreign market by a merger or acquisition of entities in the host country. The number of bank mergers and acquisitions has been small in the past decade, with most activities being domestic (see Chart 4.2). In recent years, more euro-area banks were acquired from outside the euro area than from within.

Chart 4.1: Share of foreign-controlled credit institutions in the EU



Source: ECB. DG FISMA calculations.
 Note: Parent banks from other EU Member States refer to parent banks that are headquartered in EU Member States other than the one in which the subsidiary or branch is located. 2008-2018 data. Market share figures based on total non-consolidated assets.

Chart 4.2: Mergers and acquisitions in the euro-area banking sector



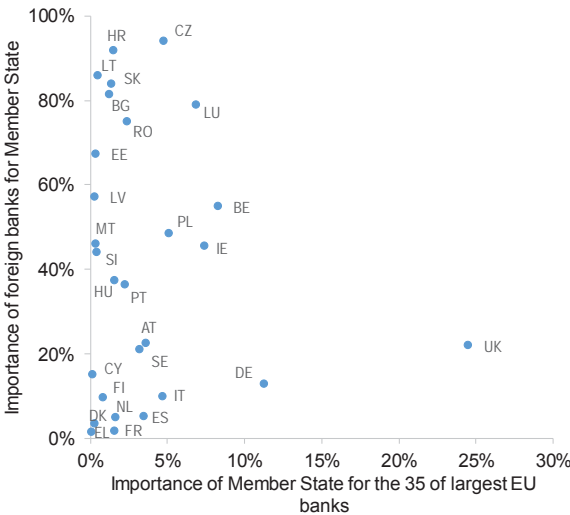
Source: Dealogic.
 Note: Number of M&A transactions.

EU cross-border banks traditionally conducted business in host countries through subsidiaries rather than through branches. Between 2015 and 2017, however, the market share of EU banks’ foreign branches increased, albeit at a low rate and starting from a low base. In the same period, the market share of EU banks’ subsidiaries continued to shrink. This ‘branchification’ allows banks to have more centralised management. It also implies that host supervisors have less influence, since branches depend legally and operationally on the parent bank that is supervised by the home authority. By contrast, subsidiaries are legally independent entities incorporated in the host country and supervised by the host authority. Cross-border bank activity differs significantly between Member States, with foreign banks having a strong or even dominant market position in most central and eastern European (CEE) Member States and a small position in the largest Member States. Chart 4.3 suggests three clusters: (i) Member States with a share of foreign banks higher than 65%, as is the case in

seven CEE Member States and Luxembourg; (ii) the largest euro-area Member States plus Denmark, Cyprus, Greece and Finland, where foreign banks have a market share below 15%; and (iii) all other Member States where foreign banks have a share between 15% and 65%.

The analysis at country level suggests that cross-border banks are significant in CEE Member States and lack significance in the larger Member States. However, the view from the banks' perspective leads to a different assessment. For large EU banks, a significant share of operating income stems from large Member States, while the share of operating income from CEE Member States is small. This also holds if the residence of the large banks is taken into account: a significant part of their foreign profits originates from large Member States and a small part of their profits comes from the CEE Member States. The comparison of banks' geographical income distribution between all banks, large banks, and foreign large banks reveals that France and the Netherlands have a disproportionately low share derived from foreign banks; while Belgium, Luxembourg and Poland have a disproportionately large share derived from foreign banks¹⁰³.

Chart 4.3: Market share of foreign banks in EU Member States and share of banks' income earned in EU Member States



Source: ECB and banks' annual reports. DG FISMA calculations.
 Note: The x-axis reports the percentage of banks' total operating income in 2018 that was earned in a certain Member State, excluding the bank's home market. The y-axis reports the percentage of a banking sector's total operating income in Member States that was earned by foreign banks in 2018, except IE (Q4-2017 data) and LT (Q1-2019 data).

¹⁰³ See also the bank-specific market-share information in CEE economies in Ahmad et al. (2019) and Lehman (2019). For further details, see Ahmad, I., Beck, T., D'Hulster K., Lintner, P., and Unsal, D.F. (2019), Banking supervision and resolution in the EU: effects on small host countries in central, eastern and south-eastern Europe, World Bank Group, Finsac Working Paper, April 2019; and Lehmann, A. (2019), Crisis management for euro-area banks in central Europe, Bruegel, Policy Contribution 14, November 2019.

4.2 Economic benefits and risks

From the launch of the euro until the financial crisis, cross-border banking played a crucial role in spreading the effects of the common monetary policy throughout the euro area. Cross-border banking also fostered the integration of CEE economies into the single market.

Overall, a single market leads to more efficient provision of banking services because it increases competition and helps banks to achieve economies of scale. Banks are also more resilient to adverse economic developments in national markets because they can take advantage of diversification opportunities in a single market. Banks that are more efficient and resilient can also compete better with peers for global business on international capital markets and support the development of European firms' international activities.

Moreover, if the banking sector is fragmented along national borders, the Economic and Monetary Union cannot function properly, since traditional monetary policy affects the economy via the banking system. A segregated banking system thus leads to geographic differences in the monetary transmission mechanisms in the monetary union. Integrated credit markets are also crucial to cushion regional economic disturbances. If banks in one region restrict lending, credit-constrained investors should be able to tap credit from banks in other parts of the single market. This shock-absorbing mechanism turned out to be insufficient to absorb local restrictions on credit during the sovereign debt crisis¹⁰⁴.

The main channels through which market integration can foster consolidation and efficiency in the banking sector are scale, diversification, competition, and cleansing effects. The bullet points below deal with each of these four channels.

- Scale effects help banks to achieve efficiency gains. This boosts bank profitability¹⁰⁵ and helps banks to compete with global peers. There is a broad consensus that cross-border banking groups can achieve scale effects through the centralisation of capital and liquidity. However, it is challenging to derive scale effects in various specific banking services and to distinguish them from the effect of market power.
- Diversification makes banks more resilient to country-specific shocks. The diversification gains are greater the more distinct the markets are in which banks are active (e.g. in sectoral composition, cyclical position, etc.). This suggests that banks might benefit from expanding their activities beyond neighbouring markets. The

¹⁰⁴ As a result: (i) economic divergences across Member States became entrenched; (ii) national factors such as NPLs determined credit supply in Member States; and (iii) the ECB became a liquidity provider on interbank markets. This had several macroeconomic consequences such as the emergence of credit constraints in vulnerable Member States.

¹⁰⁵ See e.g. Wheelock, D.C., and Wilson, P.W. (2015), The Evolution of scale economies in U.S. banking. Federal Reserve Bank of St. Louis, Working Paper 2015-21; and Beccalli, et al. (2015).

literature suggests that diversification gains could outweigh the benefits from scale effects¹⁰⁶.

- The presence of foreign banks will increase competitive pressure on domestic banks. Foreign-controlled entities were slightly more profitable than domestic banking groups in most Member States in recent years, consistent with research that found that foreign subsidiaries are more cost-efficient¹⁰⁷.
- If a bank gets into difficulty, authorities usually consider whether other banks have an interest in buying it in its entirety or in parts. At the same time, foreign banks can use such acquisitions as opportunities to enter the local market and benefit from the brand recognition and local expertise they can obtain via the acquisition. The cross-border merger or acquisition of an ailing bank can present a win-win situation for national authorities and foreign banks and thus support structural adjustment in the banking sector.

On risks, cross-border banking makes it more challenging for national authorities to ensure financial stability in their national market. It also makes it harder to provide fair and competitive market conditions. The financial crisis revealed that these challenges are material and are caused in particular by: (i) home/host coordination in supervision, resolution, and the resulting accountability to the domestic tax payer if an international bank requires support from a national authority; (ii) foreign banks' reputation as being 'footloose', cemented by their withdrawal from cross-border activity in the wake of the crisis; and (iii) the impact of foreign banks on domestic market structure as they can lead to the concentration of market power or overbanking.

The supervisor's accountability for the functioning of the domestic financial system provides a strong incentive to ensure both the sustainability and resolvability of all players present in the domestic banking market. Practical experiences reflect the common wisdom of banking being international in 'life' and national in 'death'¹⁰⁸. Supervisors' supervision, crisis management and restructuring is more complicated if it entails a cross-border bank with subsidiaries and/or branches in different Member States. Cross-border banking groups (or parts thereof) could be resolved either: (i) centrally through a single-point-of-entry (SPE) model; or (ii) in a decentralised way via a multiple-point-of entry (MPE) model. In the SPE model, the national authority has resolution power at the top parent or holding company level, while in the MPE model supervision is decentralised and the national authority in each Member State resolves the entity in its jurisdiction.

¹⁰⁶ See Gropp, R.E., Noth, F., and Schüwer, U. (2019), What drives banks' geographic expansion? The role of locally non-diversifiable risk, SAFE Working Paper No. 246.

However, the literature is inconclusive on the extent to which diversification lowers risks given that diversification also encourages banks to take more risks, which in turn increases their exposure to aggregate and local risk factors. Chavez (2017) shows that more geographically diversified banks in the US take larger risks and hold smaller liquidity buffers, which increases their vulnerability to aggregate shocks. Other US research like Meslier et al. (2016) or Goetz, et al. (2016) conclude that the relationship between geographical diversification and banks' risk is non-linear.

¹⁰⁷ See e.g. Hausenblas and Lešánovská (2018) and the literature quoted therein. For further details, see Hausenblas, V., and Lešánovská, J. (2018), How Do Large Banking Groups Manage the Efficiency of Their Subsidiaries? Evidence from CEE, Czech National Bank Working Paper 13, October 2018.

¹⁰⁸ Attributed to the Bank of England's Charles Goodhart and Mervyn King.

Although public authorities may have a preference for one or the other model, the legal and operational structure of the bank entities determines which one is most feasible. The trend towards business being carried out by branches favours the SPE model, but this model erodes hosts' capacity to obtain a complete picture of banking activity in their jurisdiction. This has strengthened host supervisors' incentive to maintain some control over activity carried out by bank branches in their territory¹⁰⁹.

The retrenchment of cross-border banks during the financial crisis, even from profitable foreign markets, affected host authority attitudes about the usefulness of foreign banks as a stable provider of banking services. Foreign banks appear to prefer to shelter domestic assets over continuing to service host markets. The academic literature finds evidence for this 'flight-to-home effect' given that banks appear to reduce foreign lending in response to a shock in their home country¹¹⁰. Such behaviour transmits shocks across borders, amplifies stability concerns, and reduces credit supply in the host country in times of crisis. Since some subsidiaries of foreign banks are systemic institutions in host Member States, and some branches are large relative to the Member State served, their activity has a material impact on credit provision and funding in that economy.

Foreign banks tend to be large and will thus have a certain degree of market power in the local market, particularly if this market is small. National authorities may not appreciate the additional competition caused by the market entry of large foreign banking groups on (smaller) national players. Especially in overbanked markets, authorities may be cautious about the possible impact of additional large foreign players on the consolidation, employment and efficiency of the domestic banking sector.

4.3 Obstacles to cross-border banking

The low level of profitability of the EU banking system may have discouraged cross-border banking in the EU in recent years. It is common in other industries for firms with the lowest productivity to focus on domestic markets, while firms that are more productive export, and only the most productive firms engage in cross-border production¹¹¹. Low productivity, which is measured in banking through the cost-to-income ratio and is highly correlated with profitability, could be an obstacle in two ways. First, it discourages foreign banks from acquiring a rather unproductive entity in another Member State. Second, low productivity at home narrows the number of banks that are fit to undertake cross-border ventures¹¹². Cyclical conditions may also have played a role given that expansion into shrinking markets is more

¹⁰⁹ Lehman (2019) discusses differences in resolution strategies as the main obstacle to cross-border banking in the EU. For further details, see Lehmann, A. (2019), Crisis management for euro-area banks in central Europe, Bruegel, Policy Contribution 14, November 2019.

¹¹⁰ See Gianetti and Laeven (2012). The literature also identified differences in how lending is provided. Düwel, et al. (2011) for instance show that cross-border lending responds to bank-specific factors while lending by foreign-controlled entities is more strongly determined by conditions in the host market. For further details, see Düwel, C., Frey, R., and Lipponer, A. (2011), Cross-border bank lending, risk aversion and the financial crisis, Deutsche Bundesbank, Discussion Paper No 29/2011.

¹¹¹ For an analysis of this self-selection effect in banking, see Buch, et al. (2011).

¹¹² The impact of low productivity is consistent with the empirical finding that non-performing loan ratios in both the home and the host country are important determinants of cross-border lending. See Emter et al. (2019).

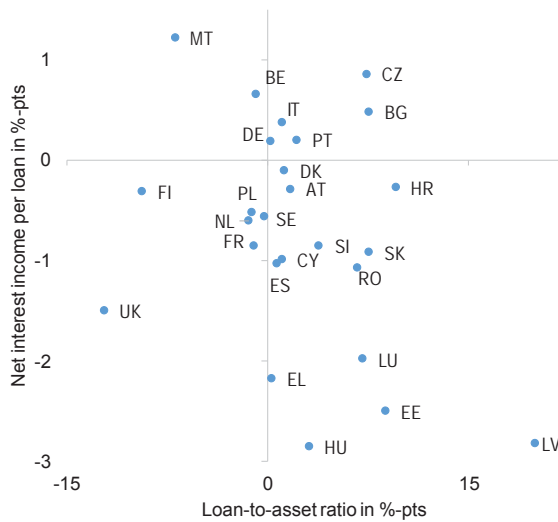
risky than expansion into growing markets. Managers may have perceived profit opportunities from foreign expansion as temporary and too risky in a precarious cyclical environment. Moreover, accountability towards shareholders is likely to have impaired incentives for managers to look out for profit opportunities in stigmatised foreign markets. This has adverse economic consequences for Member States with a shrinking banking system because profitable market segments remain idle and unserved.

A number of traditional factors such as differences in language, legal systems and traditions fragment banking markets in the same way that they fragment other industries. Differences in taxation, borrower-protection or anti-money-laundering provisions at Member-State level result in bank-specific entry and adjustment costs that discourage cross-border banking. If these costs are significant, they preserve market fragmentation and shield incumbents from foreign banks. In general, these costs increase the more dissimilar these conditions are to the home market. Reassuringly, banking regulation has become more uniform in the EU through the single rulebook that reduces some of these costs.

Moreover, like almost all sectors, geographical factors shape the banking sector. Proximity facilitates information processing and relationship building. Proximity is more crucial for retail banking than for investment bank activities, as the former targets households and smaller firms. Investment bank services, on the other hand, are sought by wealthy individuals and larger firms that have a larger geographic reach and are therefore less dependent on local supply. This is consistent with the observation that foreign branches and subsidiaries have a larger share of non-interest income (such as fees, commissions and trading) than domestic banks in most EU Member States. This share of non-interest income among foreign branches and subsidiaries has been slightly increasing in several Member States in recent years, but without surpassing its 2008 value. A shift towards greater use of corporate funding through capital market instruments creates the potential for cross-border banks to increase their revenues from non-interest income sources such as fees when helping firms to issue bonds. This suggests that the Capital Markets Union could play a role in stimulating the cross-border provision of banking services.

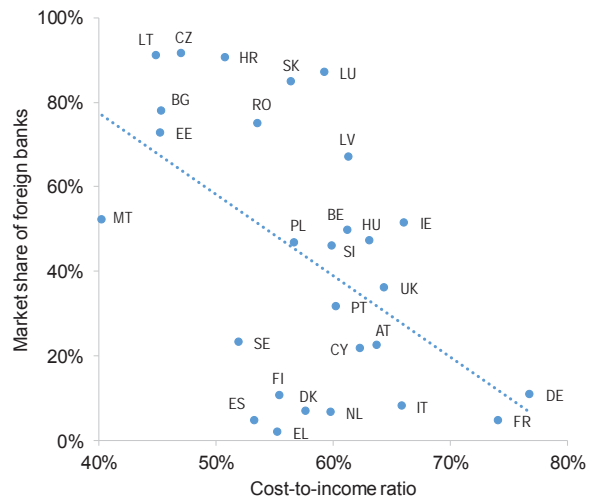
Equally, customers prefer familiar products and brands. This lends an advantage to companies – and banks – supplying in their local region. Customers' home bias implies that the local presence of banks simplifies the process of attracting deposits and establishing credit relationships. Domestic banks' advantage in retail banking is empirically proven by the fact that they generate a larger share of their profits from net-interest income than foreign-controlled entities do. Although subsidiaries or branches of foreign banks have a comparable exposure to credit, as measured by loan-to-asset ratios, their lending business is less profitable compared to their local peers in most Member States (see Chart 4.4).

Chart 4.4: Lending business - Difference between foreign-controlled entities and domestic banks



Source: ECB data. DG FISMA calculations.
Note: Figures are average values for the period 2015-2018.

Chart 4.5: Market share of foreign banks and banks' efficiency in EU Member States



Source: ECB data. DG FISMA calculations.
Note: 2018 data. Efficiency is measured based on a bank's cost-to-income ratio. The blue dotted line shows the linear regression of the observations.

Banks often rely on foreign mergers and acquisitions to obtain local presence, achieve brand recognition and secure local expertise that helps them to overcome any negative impact of customers' home bias¹¹³. While the possibility of acquiring ailing banks typically presents a good opportunity for banks to enter foreign markets, uncertain asset quality and high levels of NPLs seem to have discouraged banks from actually doing so in the last years¹¹⁴. High levels of NPLs make it hard to determine a fair acquisition price, and add a substantial element of uncertainty about the riskiness of the acquired bank. The stagnation of cross-border bank mergers and acquisitions bodes ill for a quick revival of banking integration in the EU¹¹⁵. However, the steadily declining NPL ratios in the EU banking sector should ultimately support foreign bank mergers and acquisitions in the EU.

Retrenchment in cross-border banking during the financial crisis was, among other things, the consequence of public support schemes that often obliged banks to restructure their activities. Activities to support the domestic banking market could often count on political backing, but there was much less appetite for banks to maintain activities in foreign markets. This is because it was perceived to be more difficult to communicate to tax payers why public money should be used in this case. The fact that local policy-makers might value the preservation of national banks above further banking integration seems also to be a factor that deters banks from entering a foreign market. The following two issues discuss other areas of conflict between home and host supervisors in more detail¹¹⁶.

¹¹³ A new trend was that non-bank investor groups, often from outside the EU, placed take-over bids for ailing banks.

¹¹⁴ See Emter et al. (2019).

¹¹⁵ Emter et al. (2019) observed that domestic bank mergers tend to be motivated by cost cutting, while cross-border mergers serve to exploit profit opportunities.

¹¹⁶ See e.g. Association for Financial Markets in Europe (AFME) (2019), The European banking system: tackling the challenges, realising the opportunities, 10 July 2019 or Álvarez, J.M., García J.P., and Gouveia, O. (2016), The globalisation of banking: How is regulation affecting global banks?, BBVA Global Economic Watch, August 2016.

- The ring-fencing of capital and liquidity in host entities prevents banking groups that expand internationally from allocating capital and liquidity centrally, thereby imposing higher costs and making the bank less resilient to shocks¹¹⁷. Moreover, each national supervisor has an incentive to request a large share of capital, liquidity or loss-absorbing liabilities in its jurisdiction. National supervisors thus compete for these resources, leading to unfavourable dynamics that further undermine the possible benefits from the centralisation of resources¹¹⁸.
- Recent cases of misconduct (most prominently money laundering) in some banks' foreign entities have led to reputation costs for supervisors, and strengthened the perception of a possible failure in coordination between home and host authorities. If banks embark on differences in enforcement across Member States, a fragmentation of supervisory practices would inflate compliance costs for international banking groups¹¹⁹.

Moreover, the use of macroprudential policy tools at the national level increases the complexity of cross-border banks' operations¹²⁰. The presence of foreign banks may reduce the effectiveness of the policy intervention. For example, if the authority imposes a macroprudential measure to reduce lending, the measure targets domestic banks and subsidiaries of foreign banks while their branches are indirectly covered. While a certain degree of market fragmentation is the inevitable consequence of macroprudential measures being taken at the national level, the EU macroprudential framework and the coordination of macroprudential policy seeks to ensure: (i) that undesirable cross-border effects are avoided or mitigated; and thus (ii) that national macroprudential policy does not cause more fragmentation.¹²¹

4.4 Ongoing and possible policy debates

The single market, and even more so the Banking Union, seek to promote efficient cross-border banks. Cross-border expansion could spur consolidation and efficiency in national banking markets. The single market in particular would help larger banks to achieve sufficient scale in their home market to remain competitive with international investment banks in global capital markets.

The Banking Union could significantly foster cross-border banking. By providing common rules for the safety net for banks, including for their recovery and resolution, it would address differences in incentives between home and host authorities when they deal with cross-border banking groups. That the Banking Union decouples the relationship between banks and the

¹¹⁷ Empirical evidence that public support and especially nationalisation of banks lead to a withdrawal from foreign markets is presented in Kleymenova, et al. (2016).

¹¹⁸ See Ervin, W. (2018), Understanding 'ring-fencing' and how it could make banking riskier, Brookings Institute.

¹¹⁹ See European Banking Authority (2019), EBA report on potential impediments to the cross-border provision of banking and payment services, 29 October 2019.

¹²⁰ For an in-depth analysis of the functioning of macroprudential policy in the single market, see Chapter 3 in European Financial Stability and Integration Report (EFSIR), SWD(2019) 183 final of 16 May 2019. Empirical studies suggest that the type of spillover depends on whether the macroprudential measures target lenders or borrowers. For further details, see the literature overview in Darracq P.M., Kok, C., and Rancoita, E. (2019), Macroprudential policy in a monetary union with cross-border banking, *ECB Working Paper 2260*.

¹²¹ Typically the host authority asks to the home authority of the bank for reciprocation of the macroprudential measure to branches operating in the host economy"

national interests of both home and host authorities is most evident for those banks under supervision of the ECB’s single supervisory mechanism (SSM) instead of being supervised by national authorities. Whereas national supervisors have an interest in the stability of the bank entities located in their jurisdiction, the SSM cares for the stability of the banking group irrespective of which Member States the different entities are located. This reduces the prospect of banks reacting to financial stress in one Member State by reducing activity on profitable markets in other Member States. The introduction of the **single** resolution mechanism (SRM) clarifies the resolution process of cross-border banking groups, avoiding potential coordination failure among Member States if they had to decide separately on how to resolve such a group. The European deposit insurance scheme could eliminate the cost of a bank failure for the domestic deposit insurance system¹²². This would curtail the risk for the host supervisor. Ultimately, potential reluctance to support an ailing bank by home and host authorities should therefore have less influence on banks’ decisions to expand their activity in other Member States and on the form of such activity (e.g. branches vs subsidiaries). These institutional changes, while reducing, do not eliminate the need for burden sharing if a cross-border entity fails. The need for burden sharing agreements implies that not all stakeholders support the objective of further cross-border banking development in the same way.

Table 4.1: Potential additional future policy directions debates regarding aims of fostering cross-border banking

Impediments	Potential policy directions
Barriers to market entry and uneven level-playing fields with domestic banks	Access to credit data Activity of credit brokers, loan servicers, KYC agents and other services supplementary to banking Pan-European products for saving and lending
Barriers to cross-border mergers and acquisitions	Supervisory expectations Bankruptcy law for banks Enforceable guarantees as internal MREL
Impaired interbank funding	Trading platforms or central counterparties (CCPs) for money markets Support for collateral quality FinTech firms as wholesale lenders

Notes: CCP: central counterparty, MREL: minimum requirement for own funds and eligible liabilities, KYC Know-your-customer.

In addition to tackling the home-host issue, the obstacles elaborated upon above suggest there is room for additional policy debates beyond those on the Banking Union agenda.

Lack of access to information and services auxiliary to banking creates a disadvantage for foreign banks in the lending business. Unlike in the US, where there is a common loan register, this kind of information is stored in the EU Member States by banks and national credit registers or credit bureaux. This data fragmentation along national lines puts foreign market entrants at a disadvantage. Foreign banks could also compete better if: (i) they had access to credit-related services (such as credit brokerage and credit evaluation) that non-bank firms or free-lancers offer; or (ii) they could make use of local players to whom they could outsource their ‘know-your customer’ obligations¹²³. Furthermore, the availability of local credit servicers that assist with post-contractual customer relationships would help foreign

¹²² The default of Icelandic banks in Europe demonstrated that it is not politically acceptable for governments to refuse support to domestic depositors if the foreign deposit insurance cannot provide that support.

¹²³ Customer due diligence in the Anti-Money-Laundering Directive. See Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU.

banks to deal with the various insolvency and borrower-protection regimes that are governed by host-country legislation¹²⁴. Finally, retail end-users have a strong home bias, but may be open to products from elsewhere in the EU. Pan-European personal pension products and covered bonds are examples outside the banking sphere in which the establishment of a European standard aims to re-direct interest among investors and create opportunities for economies of scale among producers¹²⁵. Any suggestion to establish a common loan register or facilitate access to data like credit histories needs to comply with the GDPR. In this regard, a law would be required which meets the conditions and requirements laid down in the GDPR, in particular the data minimization principle. The proposed law would need to respect the principles of necessity and proportionality and ensure the necessary data protection safeguards.

National authorities still often disregard the possibility of cross-border mergers and acquisitions, for example in resolution cases. National authorities might prefer local bidders that are more familiar with the domestic bank market. A local bidder also ensures that taxpayers' money used to resolve a bank is not transferred to foreign owners. Progress has been made based on the Qualifying Holding Directive¹²⁶, the Bank Recovery and Resolution Directive (BRRD)¹²⁷, the SSM/SRB, and the current role of the EBA in resolution cases¹²⁸. The Qualifying Holding Directive determines who is in charge of assessing the acquisition of a bank, and aims to ensure that both a prudential and a resolvability perspective are considered. The SSM has a similar role when supervising banks in the Banking Union and the SRB's role is to ensure the Banking Union perspective in resolution cases for significant banks. Furthermore, the EBA's role in the coordination of cross-border supervisory activities in so-called colleges means that national supervisory or resolution authorities pay greater attention to non-domestic interests¹²⁹.

Although the BRRD provides EU-wide rules on banks' recovery and resolution, liquidation follows national rules in the absence of a European bank bankruptcy law¹³⁰. The BRRD also introduced the concept of 'bail-inable' liabilities or MREL¹³¹, which can help reassure host supervisors that sufficient means would be at their disposal in case of resolution. By facilitating the allocation of losses and internal loss-absorption capacity (internal MREL) between parent bank and subsidiaries, host supervisors can have more trust in the financial means that are available if either the subsidiary or the foreign parent bank is put into

¹²⁴ See European Banking Authority (2019), EBA report on potential impediments to the cross-border provision of banking and payment services, 29 October 2019.

¹²⁵ Among other things, the Capital Markets Union seeks to promote comparability, e.g. by establishing frameworks that facilitate access to information or enable standardised products.

¹²⁶ Directive 2007/44/EC of the European Parliament and of the Council of 5 September 2007 amending Council Directive 92/49/EEC and Directives 2002/83/EC, 2004/39/EC, 2005/68/EC and 2006/48/EC.

¹²⁷ Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council.

¹²⁸ See Financial Stability Board (2019), FSB Report on market fragmentation, 4 June 2019.

¹²⁹ It targets factors such as: (i) the allocation of loss absorbance capacity and 'bail-inable' liabilities; and (ii) transparent and non-discriminatory supervisory expectations on the new corporate and IT structure after the merger.

¹³⁰ Directive 2014/59/EU and the proposal for amending the Directive on loss-absorbing and recapitalisation capacity of credit institutions and investment firms, COM/2016/0852 final - 2016/0362 (COD).

¹³¹ Banks are requested to have a sufficient level of MREL liabilities to absorb losses if they are resolved. The concept is broadly comparable to the total loss absorbing capacity (TLAC) concept used by the Financial Stability Board for global systemically important banks (G-SIBs).

resolution. It also creates incentives for cross-border banks to maintain activity in hosts if they are faced with financial stress in their home (or in another) jurisdiction. At the same time, the need to earmark internal MREL cements the limitation to allocate capital freely across the banking group. Since too much prepositioning of internal MREL has consequences similar to ring-fencing, there is a need to find the right balance between flexibility (of use of MREL for the group) and reassuring hosts (by prepositioning internal MREL).¹³²

The restoration of cross-border interbank funding to pre-crisis levels could also encourage more cross-border lending, and is possibly easier to accomplish than encouraging further cross-border retail banking and lending activities. However, mistrust among banks is high, as evidenced by the fact that banks still keep considerable resources in the ECB deposit facility despite the prevailing negative deposit rate. Establishing a short-term insurance market for unsecured bank claims (CDS), or a system to ensure a minimum quality of the collateral used in secured transactions, could restore trust among banks in lending to each other¹³³. Trade via central counterparties (CCPs) or on an organised market with more standardised products (such as commercial paper or certificates of deposit) could be more efficient than the hitherto over-the-counter market in which money market transactions take place. Finally, FinTech may create new opportunities for cross-border wholesale banking given that FinTech companies could act as brokers/intermediaries for depositors or re-direct the investments they have collected to the banking system. By doing so, FinTech companies would assume a key role in the intermediation chain between depositors and debtors and between banks. This would also alleviate issues caused by home bias¹³⁴. However, up until now, FinTech industries have mainly challenged banks in providing payment services, not in providing credit. Providing credit requires specific banking expertise, unless only highly standardised loan products are considered.

As elaborated upon in the previous chapters, structural changes in the wider economy create numerous challenges for the banking sector. They also provide opportunities for cross-border banks to adapt to the changes in demand for banking services and products.

¹³² Internal MREL was introduced as part of the banking package proposed by the Commission in 2016 and adopted in 2019. For further details, see https://ec.europa.eu/commission/presscorner/detail/en/MEMO_19_2129.

¹³³ Public subsidies or guarantees might accomplish this, but at the expense of distorted competition.

¹³⁴ As a new form of institutional investor, they should also be less subject to home bias than retail depositors.

REFERENCES

- Beccalli, E., Anolli, M., and Borello, G. (2015), Are European banks too big? Evidence on economies of scale, *Journal of Banking & Finance* 58: 232-246.
- Buch, C.M., Koch, C.T., and Koetter, M. (2011), Size, productivity, and international banking, *Journal of International Economics* 85: 329-334.
- Chavez, M. (2017), Liquidity holdings, diversification, and aggregate shocks, *Bank of England Staff Working Paper* 698.
- Diamond, D. (1984), Financial intermediation and delegated monitoring, *Review of Financial Studies* 51: 393-414.
- Emter, L., Schmitz, M., and Tirpák, M. (2019), Cross-border banking in the EU since the crisis: What is driving the great retrenchment?, *Review of World Economics* 155: 287-326.
- Gianetti, M., and Laeven L. (2012), Flight home, flight abroad, and international credit cycles, *American Economic Review* 102: 219-224.
- Goetz, M.R., Laeven, L., and Levine, R. (2016), Does the geographic expansion of banks reduce risk?, *Journal of Financial Economics* 120: 346-362.
- Gorton, G., and Kahn, J. (2000), The design of bank loan contracts, *Review of Financial Studies* 13: 331-364.
- Haskel, J., and Westlake, S. (2017), *Capitalism without capital: the rise of the intangible economy*, Princeton, N.J.: Princeton University Press.
- Kleyменова, A., Rose, A.K., and Wieladek, T. (2016), Does government intervention affect banking globalization?, *Journal of the Japanese and International Economies* 40: 43-58.
- Leland, H.E., and Pyle, D.H. (1977), Information asymmetries, financial structures and financial intermediaries, *Journal of Finance* 32: 371-387.
- McCauley, R.N., Bénétrix, A.S., McGuire, P.M., and von Peter, G. (2019), Financial deglobalisation in banking?, *Journal of International Money and Finance* 94: 116-131.
- Meslier, C., Morgan, D.P., Samolyk, K., and Tarazi, A. (2016), The benefits and costs of geographic diversification in banking, *Journal of International Money and Finance* 69: 287-317.
- Piekkola, H. (2011), Intangible capital: the key to growth in Europe, *Intereconomics* 46: 222-228.